Department of Industrial and Enterprise Systems Engineering

Elective Course Offerings

Spring 2009

For more detail, see posted notices, contact instructor, or consult *http://courses.uiuc.edu/cis/index.html.*

GE Undergraduate Curriculum

\+ Course is a Design Elective

IE Undergraduate Curriculum

* Course is a Human Factors Elective

\# Course is a Manufacturing Elective

^ Course is an Operations Research Elective

@ Course is an M&IE Elective

& Course is a Technical Elective

Some courses may fit into several categories, but you may not use one course to fulfill more than one requirement.

UNDERGRADUATE ELECTIVES

GE 361, RLP: *Emotional Intelligence Skills*

Through innovative experiences both in and out of the classroom, *Engineering Emotional Intelligence* will help you determine your own EQ (Emotional Quotient), and show you how to develop the interpersonal, communications and leadership skills crucial for personal and professional success.

CRN	CREDIT	TIME	DAYS	LOCATION	INSTRUCTOR	PREREQUISITE
33096	3 hrs	4-5:15 pm	TR	204 TB	TBA	Sophomore standing & above

GE 402, A: *Comp-Aided Product Realization*

Computer-aided design, analysis, and prototyping tools used in the product development process. Principles of computer graphics and geometric modeling, including transformations, coordinate systems, parametric solid modeling, spline curves, and surface modeling. Finite element and kinematics analysis. Rapid prototyping, product dissection.

CRN	CREDIT	TIME	DAYS	LOCATION	INSTRUCTOR	PREREQUISITE
50864	3 hrs	12-1:50 pm	MW	TBA	Leake, J.	GE 101, 331, Jr. standing & above

GE 410, E: *Component Design* +

Design of basic engineering components: structural members, machine parts, and connections. Principles applied include: material failure (yield, fracture, fatigue); buckling and other instabilities; design reliability; analytical simulation.

CRN	CREDIT	TIME	DAYS	LOCATION	INSTRUCTOR	PREREQUISITE
33212	3 hrs	3-3:50 pm	MWF	203 TB	TBA	GE 311 & GE 320

UNDERGRADUATE - GRADUATE

GE 412, R: *Nondestructive Evaluation*

Introduces the concept of Nondestructive Evaluation (NDE), and provides a review of probability, the role of NDE in Design, and the role of NDE in manufacturing and in maintenance. The primary Nondestructive Testing and Evaluation (NDT&E) techniques, including visual methods, ultrasonic methods, acoustic emission, acousto-ultrasonics, radiological methods, electro-magnetic testing, eddy currents, penetrant methods, thermal methods, and holography, are introduced from the fundamental laws of physics. Industrial applications of these techniques towards flaw detection, material properties characterization, impact and fatigue damage evaluation, adhesion, etc., are presented. Current literature is examined.

CRN	CREDIT	TIME	DAYS	LOCATION	INSTRUCTOR	PREREQUISITE
39435	3 or 4 hrs	1-2:15 pm	TR	TBA	TBA	CEE 300

GE 413, R: *Engineering Desgn Optimization + &*
Focuses on the application of optimization techniques to engineering design problems. Emphasis is placed on problem formulation primarily in structural and mechanical engineering applications. Important theoretical results and numerical optimization methods are covered. Weekly computer programming assignments (using the Matlab programming language) develop software for solving nonlinear mathematical programming problems.

CRN	CREDIT	TIME	DAYS	LOCATION	INSTRUCTOR	PREREQUISITE
33232	3 hrs	1-2:20 pm	TR	204 TB	TBA	GE 330 & GE 310

GE 423: *Mechatronics + &*
Concepts and practice of mechatronics: computer interfacing of physical devices (sensors, actuators); data acquisition; real time programming and real time control; human—machine interfaces; design principles of mechatronics in manufacturing systems and in consumer systems Same as MFGE 430.

CRN	TYPE	CREDIT	TIME	DAYS	LOCATION	INSTRUCTOR	PREREQUISITE
33223	Lec AL1	3 hrs	11-11:50 am	MW	204 TB	Block, D	GE 320
33221	Lab AB1		3-4:50 pm	T	302 TB	Block, D	
33222	Lab AB2		3-4:50 pm	R	302 TB	Block, D	

GE 461/TE 461, A: *Technology Entrepreneurship*
Critical factors affecting technology-based ventures: opportunity assessment; the entrepreneurial process; founders and team building; and preparation of a business plan including market research, marketing and sales, finance, and manufacturing considerations. Same as TE 461.

CRN	CREDIT	TIME	DAYS	LOCATION	INSTRUCTOR	PREREQUISITE
48500 GE 48501 TE	3 hrs	6-8:30	R	204 TB	Lilly, B.	MATH 231

GE 498, RLP: *Leading Sustainable Change*
Leading, managing and adapting to change are core skills necessary for successful careers in organizations where participants are expected to lead in their area of responsibility. The course will focus on four areas associated with change: 1) theories and processes of change, 2) systems thinking concerning change consequences, 3) building coalitions and communities to support change, and 4) implementing and managing projects effectively. Students will learn processes to stage, implement, manage and sustain change with an organization through aligning change strategies with organizational and individual concerns.

CRN	CREDIT	TIME	DAYS	LOCATION	INSTRUCTOR	PREREQUISITE
39444	3 hrs	4-5:15 pm	MW	203 TB	Price, R.	Junior standing and above.

IE 411, E3/E4: *Optimization of Large Systems @ ^ &*
Practical methods of optimization of large-scale linear systems including extreme point algorithms, duality theory, parametric linear programming, generalized upper bounding technique, price-directive and resource-directive decomposition techniques, Lagrangian duality, Karmarkar's algorithm, applications in engineering systems and use of state-of-the-art computer codes.

CRN	CREDIT	TIME	DAYS	LOCATION	INSTRUCTOR	PREREQUISITE
34267 34269	3 hrs E3 4 hrs E4	2-2:50 pm	MWF	204 TB	TBA	IE 310 & MATH 415. E4 section-grads only

IE 413, G3/G4: *Simulation @ ^ &*
Introduction to the use of discrete-event simulation in the modeling and analysis of complex systems using a simulation package. Topics covered: components of simulation software, including data structures and event-list processing; verification and validation of simulation models; input modeling, including selection of probability distributions and random variate generation; statistical analysis of output data.

CRN	CREDIT	TIME	DAYS	LOCATION	INSTRUCTOR	PREREQUISITE
43422 43424	3 hrs. G3 4 hrs. G4	3-4:50 pm	MW	1109 Siebel	TBA	CS 101 & IE 310. G4 section-grads only

IE 431: *Quality Engineering @ &*
Quality Engineering principles and the Six Sigma Define-Measure-Analyze-Improve-Control (DMAIC) process. Application of concepts and methods of statistical process control, designed experiments, and measurement systems analysis to cases of quality and productivity improvement; application of the fundamentals of quality engineering and the Six Sigma to areas of produce development, service enterprise, and manufacturing processes.

CRN	CREDIT	TIME	DAYS	LOCATION	INSTRUCTOR	PREREQUISITE
50867	3 hrs	11 am-12:15 pm	MW	203 TB	Kim, H.	GE 331 or IE 300

IE 445, BG4/BU3: *Hum Perf and Eng Psych * @ &* Same as AVI 456 and PSYC 456
Human capabilities and limitations in processing information; models and theories of signal detection, stimulus analysis, short-term memory, choice reaction time, decision-making, attention, and motor performance are evaluated with respect to experimental data; emphasizes theory, although implications for design of man-machine systems are considered.

CRN	CREDIT	TIME	DAYS	LOCATION	INSTRUCTOR	PREREQUISITE
39905 39906	3 hrs. (undergrads) 4 hrs. (grads)	12:30-1:45 pm	TR	32 Psych. Bldg.	McCarley, J.	PSYC 100 or 103

IE 446, AL1/AB1/AB2: *Hum Comp Interaction Lab * @ &*
Examines basic concepts, methodology, and critical skills needed in conducting research, evaluating and designing human-computer interfaces. Laboratory includes performing experiments in human-computer interaction.

CRN	TYPE	CREDIT	TIME	DAYS	LOCATION	INSTRUCTOR	PREREQUISITE
46317	Lec AL1	4 hrs.	12-1:50 pm	M	29 Psych. Bldg.	Fu, W.	PSYC 224, 358 or 456; and a course in CS.
46318	Lab AB1		10-11:50 am	W	219A Psych. Bldg.	Fu, W. & Moon, J.	
46319	Lab AB2		1-2:50 pm	W	219A Psych. Bldg.	Fu, W.	

IE 498, SK/SK4: *EcoDesign and Environmentally Conscious Manufacturing # @ &*

CRN	CREDIT	TIME	DAYS	LOCATION	INSTRUCTOR	PREREQUISITE
39185 47743	3 hrs. 4 hrs.	11:30 am-12:50 pm	TR	218 MEB	Wentz, J.	PSYC 100 or 103

GRADUATE

GE 520, R: *Analysis of Nonlinear Systems* Same as ECE 528 and ME 546
First-level graduate course on the analysis on nonlinear dynamical systems, covering topics such as nonlinear dynamics, vector fields and flows, Lyapunov stability theory, regular and singular perturbations, averaging, integral manifolds, input-output and input-to-state stability, and various design applications in control systems and robotics.

CRN	CREDIT	TIME	DAYS	LOCATION	INSTRUCTOR	PREREQUISITE
33987	4 hrs.	10-11:20 am	TR	TBA	Liberzon, D.	ECE 515 & MATH 385

GE 525: *Control of Complex Systems*
Introduction to a variety of control methodologies for complex, i.e., interconnected dynamic systems. A unified framework based on the vector Liapunov functions concept is used to introduce and study the following methodologies: decentralized overlapping control; optimal control of interconnected systems; multi-player differential game theory; decentralized optimization and its link with the multi-criteria optimization. Illustrative examples are considered in areas such as control of groups of unmanned vehicles, control of power systems, and coverage control.

CRN	CREDIT	TIME	DAYS	LOCATION	INSTRUCTOR	PREREQUISITE
50871	4 hrs.	9-10:40 am	MW	204 TB	Stipanovic, D.	GE 424

GE 550: *Decision Analysis II*
Continuation of GE 450. Fundamental requirements of a decision-making system; comparison of different decision-making methods, "paradoxes" in decision making; foundations and history of probability as a degree of belief; Bayesian vs. classical statistics; the entropy of a random variable; experimentation and optimal stopping; invariance formulations in utility and probability; one-switch preferences, and graph-based methods to incorporate dependence in multiattribute utility functions. Intended for those interested in pursuing research in decision analysis or wanting to deepen understanding of the foundations of the subject.

CRN	CREDIT	TIME	DAYS	LOCATION	INSTRUCTOR	PREREQUISITE
50787	3 or 4 hrs.	2:30-4:50 pm	T	203 TB	Abbas, A.	GE 450

GE 598, AY2: *Product & Market Development for Subsistence Marketplaces*
This is the second of a unique two-course sequence on product and market development for subsistence marketplaces or the bottom of the pyramid. The course focuses on developing products and services to serve the needs of those living in subsistence marketplaces. The course will combine in-class pedagogy with significant experiential learning, resulting in useful and marketable product concepts and prototypes. The Fall session course focuses on understanding subsistence marketplaces through *immersion* in this context and through *emersion* of business principles. The Spring semester will be spent converting concepts to workable prototypes, testing them in the market, and developing manufacturing, marketing and business strategic plans.

CRN	CREDIT	TIME	DAYS	LOCATION	INSTRUCTOR	PREREQUISITE
46096	4 hrs.	6-8:50 pm	M	215 TB	Clarke, J.	GE 598 AY1, Instructor approval required.

GE 598, LF: *Stochastic Calculus in Financial Engineering*
This is an introductory course to derivative markets, mathematical models and computational techniques in financial engineering. Topics include derivative securities, binomial option pricing model, the Black-Scholes-Merton option pricing model, exotic options, monte carlo simulation, numerical solutions of partial differential equations, transform methods, and introduction to stochastic calculus.

CRN	CREDIT	TIME	DAYS	LOCATION	INSTRUCTOR	PREREQUISITE
46095	4 hrs.	1-2:15	TR	203 TB	Feng, L.	

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