IE 598  **Special Topics**  credit: 1 TO 4 hours.

Subject offerings of new and developing areas of knowledge in industrial engineering intended to augment the existing curriculum. See Class Schedule or departmental course information for topics and prerequisites. Approved for letter and S/U grading. May be repeated in the same or separate terms if topics vary.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
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<tbody>
<tr>
<td>41718</td>
<td>Lecture-Discussion</td>
<td>JG</td>
<td>05:00 PM - 06:20 PM</td>
<td>MW</td>
<td>1214 - Siebel Center for Comp Sci</td>
<td>Garg, J</td>
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Credit Hours: 4 hours
Games, Mkts, & Mathmtcl Prg
Restricted to Graduate - Urbana-Champaign.

Course Prerequisites: IE 310 or equivalent; basic knowledge of optimization, probability, and linear algebra; mathematical maturity.This course will introduce students to the theory of games and markets and their strong connections to mathematical programming techniques. It will include solution concepts in game theory such as Nash equilibrium and correlated equilibrium, their computation; zero-sum games and minimax theorem; extensive form games; repeated games; competitive equilibrium in markets; utility maximization; strategic analysis; among others. It will be shown that many problems in these areas can be formulated as network flow, linear programming (LP), convex programming (CP), and complementarity (LCP, NCP) problems. The course will also touch upon the topics of fair division, resource allocation, bargaining and mechanism design without money.

| 66415| Lecture                | JS      | 08:00 AM - 09:20 AM| TR   | 103 - Transportation Building | Sirignano, J |

Credit Hours: 4 hours
Deep Learning
Restricted to Graduate - Urbana-Champaign.

Prerequisites: CS 446 or equivalents. This course provides an introduction to neural networks and deep learning. Topics include training and implementation of neural networks, convolution neural networks, recurrent neural networks, and deep reinforcement learning. The course will use TensorFlow to train models on GPUs.

| 69421| Lecture                | SS      | 03:30 PM - 04:50 PM| TR   | 305 - Materials Science & Eng Bld | Stolyar, A |

Credit Hours: 4 hours
Service Engineering
Restricted to Graduate - Urbana-Champaign.

Restricted to students in the Industrial & Enterprise Sys Eng or Electrical & Computer Eng department.

Course Prerequisite: IE 410 or equivalent graduate course on stochastic processes. Many systems, such as cloud data centers, communication networks, customer call/contact centers, healthcare services, can be modeled as service systems. Engineering an efficient service system involves many tasks, including system design, capacity planning and real-time control. In this course students will learn how to use stochastic models and methods to engineer and analyze service systems. A special emphasis is placed on large-scale systems and their asymptotic approximations (fluid, diffusion, mean-field), as well as on real-time resource allocation algorithms (routing and scheduling).