Industrial Engineering

IE 598  **Special Topics**  credit: 0 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>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>66173</td>
<td>Lecture</td>
<td>ET</td>
<td>06:00 PM - 09:00 PM</td>
<td>R</td>
<td>A - Illini Center</td>
<td>Lariviere, D</td>
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<tr>
<td>69688</td>
<td>Lecture</td>
<td>ODL</td>
<td>03:30 PM - 04:50 PM</td>
<td>TR</td>
<td>169 - Davenport Hall</td>
<td>Sun, R</td>
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<tr>
<td>69148</td>
<td>Lecture-Discussion</td>
<td>RE</td>
<td>03:30 PM - 04:50 PM</td>
<td>TR</td>
<td>256 - Mechanical Engineering Bldg</td>
<td>Etesami, S</td>
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<tr>
<td>69147</td>
<td>Lecture-Discussion</td>
<td>XCL</td>
<td>05:00 PM - 06:20 PM</td>
<td>TR</td>
<td>203 - Transportation Building</td>
<td>Chen, X</td>
</tr>
</tbody>
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Credit Hours: 4 hours
Electronic Trading
Restricted to MS: Financial Engineering.
Prerequisites: IE 522 and IE 523. The purpose of this course is to investigate the exact nature of order matching and routing at the compute-packet level in most exchanges. Not knowing the nature the interfaces has led to many "good fit" predictive models. However, they are often, predicting the past! Analyses need to adjust for speed and time-stamps. The course will address these issues. However, it should be stressed that the course does not purport nor intend to examine nor propose "trading strategies."

Credit Hours: 4 hours
Optimization for Deep Learning
Restricted to Graduate - Urbana-Champaign.
Prerequisites: IE 510, ECE 490, or equivalent courses on introductory optimization. Mathematical optimization is a crucial component of modern machine learning. This course focuses on optimization for deep learning, including modeling, algorithms, and geometry. For modeling, we discuss a few recent machine learning models, including deep neural networks, GANs, adversarial attack, embedding, etc. For algorithms, we discuss various popular methods such as SGD, AdaGrad, Adam, distributed training and quantized training. For geometry, we discuss the optimization landscape of neural-network problems, which is closely related to the quality of the local minima. This course will be a mixture of lectures and student presentations.

Credit Hours: 4 hours
Distributed Decision Systems
Restricted to Graduate - Urbana-Champaign.
Prerequisites: Must have knowledge in Probability, Linear Algebra, and Optimization. This course is an advanced graduate level course where the objective is to study and learn the most recent advances in models and algorithmic developments for analysis of distributed decision making systems with or without conflicting objectives. The course is mainly motivated by the emergence of large scale networks under complex dynamic environment, characterized by the lack of a centralized coordinator or centralized access to information. The purpose of this course is to study such systems by exploring the interplay of optimization theory, game theory, dynamical systems, and to some extent graph theory. The topics to be covered include models and algorithms for distributed resource allocation over networks, Markov chains and random walks over networks, distributed coordination algorithms such as consensus and gossip over networks, diffusion and opinion dynamics over social networks, distributed control algorithms, as well as quantization and synchronization phenomena in engineered systems.

Credit Hours: 4 hours
Logistics & Supply Chain Mgmt
Restricted to Graduate - Urbana-Champaign.
Prerequisites: IE 410 and IE 411. In this course, we will explore the state-of-the-art logistics strategies, models, algorithms and tools for integrating the supply chain in ways that reduce system-wide costs, and improve system-wide service. Our main focus is on building mathematical models, developing efficient algorithms and performing rigorous analysis. For this purpose, we will cover theoretical foundations such as dynamic programming, convex analysis and lattice programming essential to analyze these models. Some recent related research will also be covered.