## Computer Science

### CS 598  **Special Topics**  credit: 2 TO 4 hours.

Subject offerings of new and developing areas of knowledge in computer science intended to augment the existing curriculum. See Class Schedule or departmental course information for topics and prerequisites. 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>62086</td>
<td>Lecture-Discussion</td>
<td>AK</td>
<td>02:00 PM - 03:15 PM</td>
<td>TR</td>
<td>1304 - Siebel Center for Comp Sci</td>
<td>Kloeckner, A</td>
</tr>
<tr>
<td>35989</td>
<td>Lecture-Discussion</td>
<td>CXZ</td>
<td>02:00 PM - 03:15 PM</td>
<td>TR</td>
<td>1302 - Siebel Center for Comp Sci</td>
<td>Zhai, C</td>
</tr>
<tr>
<td>42378</td>
<td>Lecture-Discussion</td>
<td>KGK</td>
<td>11:00 AM - 12:15 PM</td>
<td>TR</td>
<td>1109 - Siebel Center for Comp Sci</td>
<td>Karahalios, K</td>
</tr>
<tr>
<td>55918</td>
<td>Lecture-Discussion</td>
<td>LVK</td>
<td>09:30 AM - 10:45 AM</td>
<td>TR</td>
<td>1214 - Siebel Center for Comp Sci</td>
<td>Kale, L</td>
</tr>
</tbody>
</table>

**Credit Hours: 4 hours**

**Integral Equations & Fast Methods**

Title: Integral Equations and Fast Methods  
Topic: This course discusses the use of integral equations as a computational tool to solve partial differential equations (PDEs). Topics covered include: Elements of Potential Theory, Integral equations for the Laplace, Poisson, Helmholtz PDEs, applications, Discretizations of integral equations and singular quadrature. Fast algorithms, including the Fast Multipole Method and, time permitting, more recent fast linear-algebraic approaches.  

**Advanced Information Retrieval**

Restricted to Graduate - Urbana-Champaign.  
Topic: Advanced Topics in Information Retrieval. Advanced concepts, models, and algorithms in information retrieval and text mining, including both historical milestones and major recent developments in the field. Topics include information retrieval models, statistical language models, information retrieval evaluation, applications of machine learning in information retrieval and text mining, and other emerging new topics.

**Social Spaces on the Internet**

Restricted to Graduate - Urbana-Champaign.  
Topic: Social Spaces on the Internet. The Internet is home to a panoply of varieties of human interaction. Social media, interactive games, telepresence, online environments, and simple text e-mails now mediate our normal experiences of education, medicine, politics, business, sociality, collective action, and more. As the Internet has become an infrastructure for social life and society itself, our ability to measure and represent that society is also transforming. In this cross-disciplinary university-wide seminar we will investigate the rise of "culture as data:" that is, the use of widespread networked computation to quantify, analyze, explain, and navigate our relationships to social institutions and each other. Students from all disciplines and colleges are welcome. There are no pre-requisites. This section meets with CAS 587, 30145.

**Parallel Programming**

Topic: Parallel programming with migratable objects. This course will teach and explore a method for parallel programming that can be used to program multicore desktop (with and without accelerators), small clusters, as well as petascale/exascale computers, with the same programming model. The model is based on the idea of over-decomposing the computation into a large number of interacting objects, mostly independent of the number of processors, and to empower an intelligent runtime system decide where
and when the objects execute. Pre-requisite: No specific course requirements. Good sequential programming experience in C++ and/or Java.

| 46989 | Lecture-Discussion | PS | 03:30 PM - 04:45 PM | WF | 0216 - Siebel Center for Comp Sci | Smaragdis, P |

Credit Hours: 4 hours
Mach Lrng for Signal Processng
Restricted to Graduate - Urbana-Champaign.
Topic: Machine Learning for Signal Processing. Prerequisite: Linear algebra, Probability theory. Today we see an increasing need for machines that can understand complex real-world signals, such as speech, images, movies, music, biological and mechanical readings, etc. In this course we will cover the fundamentals of machine learning and signal processing as they pertain to this goal, as well as exciting recent developments. We will learn how to decompose, analyze, classify, detect and consolidate signals, and examine various commonplace operations such as finding faces from camera feeds, organizing personal music collections, designing speech dialog systems and understanding movie content. The course will consist of lectures and student projects and presentations. Students are expected to have a working knowledge of linear algebra, probability theory, and programming skills to carry an implementation of a final project (preferably in MATLAB, but all languages are welcome).

| 46042 | Lecture-Discussion | SS | 12:30 PM - 01:45 PM | TR | 1103 - Siebel Center for Comp Sci | Sinha, S |

Credit Hours: 4 hours
Advance Bioinformatics
Topic: Probabilistic Methods for Biological Sequence Analysis. This course will present some of the important research topics pertaining to the computational processing of genomic sequences, focusing on probabilistic approaches to the problem. Computational techniques will be discussed in the context of the important biological process of gene regulation, and problems such as sequence alignment, motif finding, and module detection, will be studied in detail. A recurrent theme of the course will be comparative genomics -- the paradigm of examining data from multiple species for improving the extracted signal.