CS 498  **Special Topics**  credit: 1 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. 1 to 4 undergraduate hours. 1 to 4 graduate hours. May be repeated in the same or separate terms if topics vary.

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<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
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<tbody>
<tr>
<td>63294</td>
<td>Lecture-Discussion</td>
<td>ABD</td>
<td>09:30 AM - 10:45 AM</td>
<td>TR</td>
<td>0216 - Siebel Center for Comp Sci</td>
<td>Chekuri, C</td>
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</table>

Credit Hours: 4 hours  
Algorithms for Big Data  
Restricted to Computer Science or Math & Computer Science major(s). Restricted to Undergrad - Urbana-Champaign.  
This course will describe some algorithmic techniques that have been developed for handling large amounts of data which may not fit in memory or is available in limited ways. Topics include data stream algorithms, sampling and sketching techniques, sparsification methods, and parallelization with applications to signals, matrices, and graphs. Emphasis will be on theoretical aspects of the design and analysis of such algorithms. Strongly suggested Prerequisites: grades of at least B+ in CS 374 and CS 361, or comparable understanding and facility with algorithms and probability. For up-to-date information about CS course restrictions, please see the following link: [http://go.cs.illinois.edu/csregister](http://go.cs.illinois.edu/csregister)  
Not intended for First Time Freshman students.

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<tr>
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<td>TR</td>
<td>0216 - Siebel Center for Comp Sci</td>
<td>Chekuri, C</td>
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Credit Hours: 4 hours  
Algorithms for Big Data  
Restricted to Computer Science or Bioinformatics major(s). Restricted to Graduate - Urbana-Champaign.  
This course will describe some algorithmic techniques that have been developed for handling large amounts of data which may not fit in memory or is available in limited ways. Topics include data stream algorithms, sampling and sketching techniques, sparsification methods, and parallelization with applications to signals, matrices, and graphs. Emphasis will be on theoretical aspects of the design and analysis of such algorithms. Strongly suggested Prerequisites: grades of at least B+ in CS 374 and CS 361, or comparable understanding and facility with algorithms and probability. For up-to-date information about CS course restrictions, please see the following link: [http://go.cs.illinois.edu/csregister](http://go.cs.illinois.edu/csregister)  
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<tr>
<td>68911</td>
<td>Lecture</td>
<td>AM3</td>
<td>11:00 AM - 12:20 PM</td>
<td>TR</td>
<td>2013 - Electrical &amp; Computer Eng Bldg</td>
<td>Khurana, D</td>
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</table>

Credit Hours: 3 hours  
Applied Cryptography  
Restricted to Computer Engineering or Computer Science or Electrical Engineering major(s). Restricted to Undergrad - Urbana-Champaign.  
For up-to-date information about CS course restrictions, please see the following link: [http://go.cs.illinois.edu/csregister](http://go.cs.illinois.edu/csregister)  
Not intended for First Time Freshman students.

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<tr>
<td>68912</td>
<td>Lecture</td>
<td>AM4</td>
<td>11:00 AM - 12:20 PM</td>
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<td>2013 - Electrical &amp; Computer Eng Bldg</td>
<td>Khurana, D</td>
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</table>

Credit Hours: 4 hours  
Applied Cryptography  
Restricted to Computer Science or Electrical & Computer Engr major(s). Restricted to Graduate - Urbana-Champaign.
### Cyber Dystopia

- **Credit Hours:** 3 hours
- **Course Description:**
  - Restricted to Computer Science or Statistics & Computer Science or Math & Computer Science or Computer Sci & Anthropology or Computer Sci & Astronomy or Computer Sci & Chemistry or Computer Sci & Linguistics or Computer Science & Crop Sciences or Computer Science and Music or Computer Science & Economics or Computer Science & Advertising or Computer Science & Geog & GIS or Computer Science & Philosophy or Computer Sci & Animal Sci major(s).
  - Restricted to Undergrad - Urbana-Champaign.
  - Section Info: Analyzing the Adverse Impacts of Advances in Computer Technology. The information revolution is bringing changes that are not always seen as positive to the people they affect. Nevertheless there is a strong feeling that the changes it brings are inevitable and that our efforts should be devoted to advancing, enjoying, and profiting from cyber technologies rather than restraining them. But do our efforts in this direction risk the emergence of a cyber dystopia in which many, perhaps most, people are significantly harmed by technology advances? This course focuses on insights into the downsides of this technological progress. We will characterize key aspects of the problem, assess their severity, predict their future, speculate on how much of what we are facing is inevitable, and think about what steps might avoid the most undesirable outcomes. This will be guided by reading and class discussion of recent works on the topic and a project.
  - Learn more from the course web site [https://tinyurl.com/cyberdystopia](https://tinyurl.com/cyberdystopia).
  - Not intended for First Time Freshman students.

### Cloud Networking

- **Credit Hours:** 4 hours
- **Course Description:**
  - Restricted to MCS:Computer Sci Online -UIUC, MCS:Computer Sci Online -UIUC, or NDEG:Computer Science Onl-UIUC.
  - Course description: Computer communication networks are among the most important and influential global infrastructures that humanity has created. The goal of this course is to provide a foundational view of communication networks, with a focus on networks enabling modern hyperscale cloud computing. In the first part of this course, we’ll study the principles upon which the Internet and other computer networks are built, and how those principles translate into deployed protocols. In the second part of this course, we build on those principles to learn how to build a network infrastructure that provides the agility to deploy virtual networks on a shared infrastructure, that enables both efficient transfer of big data and low latency communication, and that enables applications to be federated across countries and continents. Topics will include: switching; intradomain routing; the Internet Protocol and interdomain networking; reliability, flow control, congestion control, and their embodiment in TCP; quality of service; network applications; cloud network requirements and traffic patterns; data center network architecture; virtualized and software-defined networks; and wide-area connectivity. The course will involve a significant amount of Unix-based network programming and assumes some familiarity with C or C++. One shorter programming project employs Python. Students will implement realistic network protocols, and gain the perspective of real-world networking challenges through interviews with industry professionals and academic researchers.
  - This course is only for students that are in the online Computer Science MCS/MCS-DS Program.
  - Additional ProctorU fees may apply.
  - Not intended for First Time Freshman students.

### Introduction to Deep Learning

- **Credit Hours:** 3 hours
- **Course Description:**
  - Restricted to Computer Science major(s). Restricted to Undergrad - Urbana-Champaign.
  - This course will provide an elementary hands-on introduction to neural networks and deep learning. Topics covered will include linear classifiers, multi-layer neural networks, back-propagation and stochastic gradient descent, convolutional neural networks, recurrent neural networks, generative networks, and deep reinforcement learning. Coursework will consist of programming assignments in TensorFlow or PyTorch. Those registered for 4 credit hours will have to complete a project.
  - Prerequisites: multi-variable calculus, linear algebra, CS 361 or STAT 400.
  - No previous exposure to machine learning is required.
  - For up-to-date information about CS course restrictions, please see the following link: [http://go.cs.illinois.edu/csregister](http://go.cs.illinois.edu/csregister).
  - Not intended for First Time Freshman students.
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</table>
| 70372       | Lecture      | DL4 03:30 PM - 04:45 PM | WF 1320 - Digital Computer Laboratory | Lazebnik, S | Credit Hours: 4 hours  
Introduction to Deep Learning  
Restricted to Computer Science or Bioinformatics major(s). Restricted to Graduate - Urbana-Champaign.  
This course will provide an elementary hands-on introduction to neural networks and deep learning. Topics covered will include linear classifiers, multi-layer neural networks, back-propagation and stochastic gradient descent, convolutional neural networks, recurrent neural networks, generative networks, and deep reinforcement learning. Coursework will consist of programming assignments in TensorFlow or PyTorch. Those registered for 4 credit hours will have to complete a project. Prerequisites: multi-variable calculus, linear algebra, CS 361 or STAT 400. No previous exposure to machine learning is required. For up-to-date information about CS course restrictions, please see the following link: http://go.cs.illinois.edu/csregister |
| 64650       | Lecture      | HS1 12:30 PM - 01:45 PM | WF 1310 - Digital Computer Laboratory | Sundaram, H | Credit Hours: 3 hours  
Social & Information Networks  
Restricted to Computer Science or Computer Science & Advertising major(s). Restricted to Undergrad - Urbana-Champaign.  
Topic: Networks are to be found everywhere: from your familiar social networks to buyer-seller markets to protein-protein interactions. This class is an introduction to network science and we shall cover a broad range of concepts including: random graphs; networks and social contexts, networks and game theory, information diffusion and community detection. We shall discuss both classic questions about networks (how to model the spread of disease, what kinds of networks support decentralized search?) as well as more recent questions on networks with attributes and how to analyze massive networks efficiently. For up-to-date information about CS course restrictions, please see the following link: http://go.cs.illinois.edu/csregister  
Not intended for First Time Freshman students. |
| 64642       | Lecture-Discussion | HS2 12:30 PM - 01:45 PM | WF 1310 - Digital Computer Laboratory | Sundaram, H | Credit Hours: 4 hours  
Social & Information Networks  
Restricted to Computer Science or Bioinformatics major(s). Restricted to Graduate - Urbana-Champaign.  
Topic: Networks are to be found everywhere: from your familiar social networks to buyer-seller markets to protein-protein interactions. This class is an introduction to network science and we shall cover a broad range of concepts including: random graphs; networks and social contexts, networks and game theory, information diffusion and community detection. We shall discuss both classic questions about networks (how to model the spread of disease, what kinds of networks support decentralized search?) as well as more recent questions on networks with attributes and how to analyze massive networks efficiently. For up-to-date information about CS course restrictions, please see the following link: http://go.cs.illinois.edu/csregister |
| 41988       | Online       | HSO ARRANGED - | - | Sundaram, H | Credit Hours: 3 hours  
Social & Information Networks  
Restricted to online non-degree, online MCS, online MSAE, online MSME, and online MSCE students. Center for Innovation in Teaching & Learning (CITL) restrictions and assessments apply, see https://online.illinois.edu. For more details on this course section, please see http://engineering.illinois.edu/online/courses/. Can be taken for 3 or 4 credit hours. |
| 42449       | Online       | ITO ARRANGED - | - | Caesar, M | Credit Hours: 4 hours  
Internet of Things  
Restricted to MCS:Computer Sci Online -UIUC.  
The Internet of Things (IoT) stands to be the next revolution in computing. Billions of data-spouting devices connected to the Internet are already fundamentally changing the way we live and work. This course teaches a deep understanding of IoT technologies |
from the ground up. Students will learn IoT device programming (Arduino and Raspberry Pi), sensing and actuating technologies, IoT protocol stacks (Zigbee, 5G, NFC, MQTT, etc), networking backhaul design and security enforcement, data science for IoT, and cloud-based IoT platforms such as AWS IoT. Students will be guided through laboratory assignments designed to give them practical real-world experience, where they will deploy a distributed wifi monitoring service, a cloud-based IoT service platform serving tens of thousands of heartbeat sensors, and more. Students will emerge from the class with a cutting-edge education on this rapidly emerging technology segment, and with the confidence to carry out tasks they will commonly encounter in industrial settings.

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<tr>
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<td>Lecture</td>
<td>VR3</td>
<td>02:00 PM - 03:15 PM</td>
<td>1404 - Siebel Center for Comp Sci</td>
<td>Shaffer, E</td>
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</tbody>
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Credit Hours: 3 hours
Virtual Reality
Restricted to Computer Science major(s). Restricted to Undergrad - Urbana-Champaign.
Fundamentals of virtual reality systems, including geometric modeling, transformations, graphical rendering, optics, the human vision system, the vestibular system, interface design, human factors, developer recommendations, and technological issues. Implementation exercises and a final project are included. Extensive programming background not required. For up-to-date information about CS course restrictions, please see the following link: [http://go.cs.illinois.edu/csregister](http://go.cs.illinois.edu/csregister)
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