Class Schedule - Fall 2018

Computer Science

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.

<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>61482</td>
<td>Laboratory</td>
<td>AB1</td>
<td>12:00 PM - 12:50 PM</td>
<td>W</td>
<td>1129 - Siebel Center for Comp Sci</td>
<td>Bambenek, J, Campbell, R, Kesan, J</td>
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<tr>
<td>61483</td>
<td>Laboratory</td>
<td>AB2</td>
<td>01:00 PM - 01:50 PM</td>
<td>W</td>
<td>1129 - Siebel Center for Comp Sci</td>
<td>Bambenek, J, Campbell, R, Kesan, J</td>
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<td>70418</td>
<td>Laboratory</td>
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<td>02:00 PM - 02:50 PM</td>
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<td>1129 - Siebel Center for Comp Sci</td>
<td>Bambenek, J, Campbell, R, Kesan, J</td>
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<tr>
<td>61457</td>
<td>Lecture</td>
<td>AL1</td>
<td>09:30 AM - 10:45 AM</td>
<td>MW</td>
<td>1310 - Digital Computer Laboratory</td>
<td>Bambenek, J, Campbell, R, Kesan, J</td>
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</table>

Digital Forensics

Credit Hours: 4 hours
Digital Forensics
Digital forensics concerns the acquisition and investigation of evidence from all devices capable of storing digital data and is often related to the prosecution of cyber crime and fraud. The class introduces the process of forensic investigation, chain of custody, forensics analysis, court proceedings and the legal justice system. It includes examination of digital storage and network traffic from personal computers, enterprise systems, embedded devices, and mobiles. Laboratory student exercises will use the tools and techniques of digital forensics investigators. Prerequisite: a basic knowledge of computer science concepts including operating systems and networking. Information about pre-requisites and the self-assessment quiz can be seen at this link - http://publish.illinois.edu/digitalforensics1/prerequisite/

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<tbody>
<tr>
<td>68911</td>
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<td>AM3</td>
<td>02:00 PM - 03:20 PM</td>
<td>TR</td>
<td>2013 - Electrical &amp; Computer Eng Bldg</td>
<td>Miller, A</td>
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Credit Hours: 3 hours
Applied Cryptography

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<tr>
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<td>Lecture</td>
<td>AM4</td>
<td>02:00 PM - 03:20 PM</td>
<td>TR</td>
<td>2013 - Electrical &amp; Computer Eng Bldg</td>
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Credit Hours: 4 hours
Applied Cryptography
Restricted to Computer Science major(s). Restricted to Graduate - Urbana-Champaign.
<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
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<td>AML</td>
<td>03:30 PM - 04:45 PM</td>
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<td>1404 - Siebel Center for Comp Sci</td>
<td>Forsyth, D</td>
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<td>43753</td>
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<td>CD</td>
<td>11:00 AM - 12:15 PM</td>
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<td>1103 - Siebel Center for Comp Sci</td>
<td>Gunter, C</td>
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<tr>
<td>70961</td>
<td>Online</td>
<td>CNO</td>
<td>ARRANGED -</td>
<td>-</td>
<td>Godfrey, P</td>
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<tr>
<td>70363</td>
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<td>DL3</td>
<td>03:30 PM - 04:45 PM</td>
<td>TR</td>
<td>1310 - Digital Computer Laboratory</td>
<td>Lazebnik, S</td>
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<td>70372</td>
<td>Lecture</td>
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<td>03:30 PM - 04:45 PM</td>
<td>TR</td>
<td>1310 - Digital Computer Laboratory</td>
<td>Lazebnik, S</td>
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</tbody>
</table>

Credit Hours: 3 hours
Applied Machine Learning
Restricted to Engineering. Restricted to Undergrad - Urbana-Champaign.

Credit Hours: 3 hours
Cyber Dystopia
Restricted to Engineering. 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.

Credit Hours: 4 hours
Cloud Networking
Restricted to MCS:Computer Sci Online -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 Computer Science MCS/MCS-DS Program offered on the Coursera platform. Additional Coursera ID verification and ProctorU fees may apply.

Credit Hours: 3 hours
Introduction to Deep Learning
Restricted to Engineering.
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: multivariable calculus, linear algebra, CS 361 or STAT 400. No previous exposure to machine learning is required.
### Introduction to Deep Learning

Credit Hours: 4 hours

Introduction to Deep Learning
Restricted to Computer Science major(s).

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: multivariable calculus, linear algebra, CS 361 or STAT 400. No previous exposure to machine learning is required.

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<th>Agha, G</th>
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### Smart Cities

Credit Hours: 3 hours

Smart Cities
CS 498 Smart Cities: Concepts and Technologies
The cities of the future will incorporate innovative information technology to optimize water management, power grid, transportation network, communication network, administrative services, and social spaces. The course will provide a technical introduction to relevant computer science concepts and how they are applied to smart cities. Topics covered will include sensor/actuator networks, crowd sourcing, data science, computer security, privacy, and artificial intelligence. Perspectives on potential implications of these technologies for urban living will be also be discussed.

Restricted to O/C Engineering City Scholars students.

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<tr>
<th></th>
<th>Credit Hours: 3 hours</th>
<th>Lecture-Discussion</th>
<th>HS3</th>
<th>11:00 AM - 12:15 PM</th>
<th>WF</th>
<th>1310 - Digital Computer Laboratory</th>
<th>Sundaram, H</th>
</tr>
</thead>
</table>

### Computational Advertising

Credit Hours: 3 hours

Computational Advertising
Restricted to Engineering.

This class will survey the emerging landscape of computational advertising. It will provide students with a thorough understanding of the technologies including web-search, auctions, behavioral targeting, mechanisms for viral marketing, that underpin the display of advertisements on a variety of locations. These locations include web pages (banner ads), on prominent search engines (text ads), on social media platforms, as well as cell phones. The students shall also learn about new research areas in computational advertising including electronic billboards, moving objects (banners atop taxi cabs) and algorithmic synthesis of personalized advertisements. This class will also discuss issues related to consumer privacy.

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<th>Lecture-Discussion</th>
<th>HS4</th>
<th>11:00 AM - 12:15 PM</th>
<th>WF</th>
<th>1310 - Digital Computer Laboratory</th>
<th>Sundaram, H</th>
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### Computational Advertising

Credit Hours: 4 hours

Computational Advertising
Restricted to Computer Science major(s). Restricted to Graduate - Urbana-Champaign.

This class will survey the emerging landscape of computational advertising. It will provide students with a thorough understanding of the technologies including web-search, auctions, behavioral targeting, mechanisms for viral marketing, that underpin the display of advertisements on a variety of locations. These locations include web pages (banner ads), on prominent search engines (text ads), on social media platforms, as well as cell phones. The students shall also learn about new research areas in computational advertising including electronic billboards, moving objects (banners atop taxi cabs) and algorithmic synthesis of personalized advertisements. This class will also discuss issues related to consumer privacy.

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<th>Lecture-Discussion</th>
<th>KA3</th>
<th>11:00 AM - 12:15 PM</th>
<th>TR</th>
<th>1131 - Siebel Center for Comp Sci</th>
<th>Kirlik, A</th>
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</thead>
</table>

### Experimental Methods for HCI

Credit Hours: 3 hours

Experimental Methods for HCI
Restricted to Engineering.

Course description: This course covers conceiving, designing, performing, analyzing data and reporting the results of experiments and usability/UX tests in HCI and empirically evaluating interactive technologies in engineering generally. Topics include defining research questions, selecting experimental objects, tasks, and participants, the ethical protection of subjects, selecting experimental designs, mitigating threats to validity, the collection and analysis of both qualitative and quantitative data, and reporting experimental research in publications. Both parametric and nonparametric data analysis are covered, including the most commonly used inferential statistical tests such as repeated- and independent-measures ANOVA, post-hoc Tukey, Wilcoxon, Mann-Whitney,
Kruskal-Wallis and others. Statistical material is taught using methods based on mathematical foundations rather than with statistical software languages or packages in order to provide both a rigorous and intuitive understanding to complement the convenience these programming environments provide in research practice. Grades are based mainly on homework and 2 exams.

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<tr>
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This course will provide an introduction to mathematical logic from the perspective of computer science, emphasizing decidable fragments of logic and decision algorithms. The topics covered will be motivated by applications in artificial intelligence, databases, formal methods and theoretical computer science. The goal of the course is to prepare students for using logic as a formal tool in computer science. The course will roughly cover the following topics (in this order): syntax, semantics and proof theory of propositional logic, sat-solvers, syntax of first-order, the resolution proof system, syntax of second-order logic, connections between monadic second order logic and regular languages (word and tree, finite and infinite), tree-width and Courcelle's theorem with applications to parametric complexity, finite model theory and descriptive complexity, games and inexpressiveness. Prerequisite: Courses CS 173, and CS 374 or instructor's consent. In particular, students should be familiar with inductive proofs, propositional logic syntax, ability to use quantifiers (for all and exists) to express simple properties in first-order logic, basic properties of finite graphs, simple graph algorithms, finite automata and regular languages, deterministic and non-deterministic computational models, and complexity classes like NP. This section is for either undergraduate or graduate students.

70494  | Lecture-Discussion | MV4 | 12:30 PM - 01:45 PM | TR | 1103 - Siebel Center for Comp Sci | Viswanathan, M

Credit Hours: 4 hours
Logic
Restricted to Computer Science major(s). Restricted to Graduate - Urbana-Champaign.

40091  | Lecture | VR3 | 02:00 PM - 03:15 PM | MW | 1404 - Siebel Center for Comp Sci | Shaffer, E

Credit Hours: 3 hours
Virtual Reality
Restricted to Engineering.
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

40092  | Lecture-Discussion | VR4 | 02:00 PM - 03:15 PM | MW | 1404 - Siebel Center for Comp Sci | Shaffer, E

Credit Hours: 4 hours
Virtual Reality
Restricted to Computer Science major(s). Restricted to Graduate - 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

67900  | Lecture | WN3 | 09:30 AM - 10:45 AM | TR | 1302 - Siebel Center for Comp Sci | Kravets, R

Credit Hours: 3 hours
Wireless Network Lab
Restricted to Engineering.
Wireless networks are everywhere in our world, one laptops, smartphones, sensor and the new IoT devices popping up everywhere. Understanding how wireless networks work and why they break is the key to their successful deployment and integration. In the first half of this class, we focus on the basics of wireless networking, from the physical transmission of radio signals to the impact of lossy communication on higher layer routing and transport protocols. The second half of the class is dedicated to student led topics, including sensor networks, IoT, security and privacy, energy conservation and general performance improving techniques. Over the course of the semester, students design and implement a group project using a variety of wireless devices and technologies, ending with a project report and a poster presentation of their work.

67901  | Lecture | WN4 | 09:30 AM - 10:45 AM | TR | 1302 - Siebel Center for Comp Sci | Kravets, R
Credit Hours: 4 hours
Wireless Network Lab
Restricted to Computer Science major(s). Restricted to Graduate - Urbana-Champaign.

Wireless networks are everywhere in our world, one laptops, smartphones, sensor and the new IoT devices popping up everywhere. Understanding how wireless networks work and why they break is the key to their successful deployment and integration. In the first half of this class, we focus on the basics of wireless networking, from the physical transmission of radio signals to the impact of lossy communication on higher layer routing and transport protocols. The second half of the class is dedicated to student let topics, including sensor networks, IoT, security and privacy, energy conservation and general performance improving techniques. Over the course of the semester, students design and implement a group project using a variety of wireless devices and technologies, ending with a project report and a poster presentation of their work.