Class Schedule - Spring 2019

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>61698</td>
<td>Laboratory</td>
<td>AB1</td>
<td>09:00 AM - 10:50 AM</td>
<td>F</td>
<td>0222 - Siebel Center for Comp Sci</td>
<td>Bambenek, J</td>
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</tbody>
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Digital Forensics II
This lab section will meet in 0222 Siebel Center

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<thead>
<tr>
<th>CRN</th>
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<th>Time</th>
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<th>Location</th>
<th>Instructor</th>
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<tbody>
<tr>
<td>65904</td>
<td>Laboratory</td>
<td>AB2</td>
<td>11:00 AM - 12:50 PM</td>
<td>F</td>
<td>0222 - Siebel Center for Comp Sci</td>
<td>Bambenek, J</td>
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Digital Forensics II

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<tr>
<th>CRN</th>
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<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
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<tbody>
<tr>
<td>69364</td>
<td>Lecture-Discussion</td>
<td>ABD</td>
<td>12:30 PM - 01:45 PM</td>
<td>TR</td>
<td>1310 - Digital Computer Laboratory</td>
<td>Chekuri, C</td>
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</table>

Credit Hours: 4 hours
Algorithms for Big Data
Restricted to Engineering.

Algorithms for Big Data 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, and sparsification methods, with applications to signals, matrices, and graphs. Emphasis will be on theoretical aspects of the design and analysis of such algorithms. Prerequisite: grades of at least B+ in CS 374 and CS 361, or comparable understanding and facility with algorithms and probability.

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<th>Instructor</th>
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<tbody>
<tr>
<td>61697</td>
<td>Lecture</td>
<td>AL1</td>
<td>09:00 AM - 09:50 AM</td>
<td>MW</td>
<td>1302 - Siebel Center for Comp Sci</td>
<td>Bambenek, J</td>
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</table>

Credit Hours: 4 hours
Digital Forensics II
This is a course for graduate students and advanced undergraduates wanting to develop greater depth and breadth in digital forensics and assumes a basic knowledge of the material covered in Digital Forensics I. Topics include standards of evidence, investigatory procedures, forms of investigation, legal procedures, reasoning about evidence, psychology of cyber crime, anti-forensics, multimedia forensics, computer forensics, web browser forensics, embedded systems forensics, network forensics, cloud forensics, applications forensics, and fraud examination. It introduces known barriers and open challenges in the field. Prerequisite: Completion of Digital Forensics I or special permission granted by the instructor.

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<th>Instructor</th>
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<tr>
<td>65685</td>
<td>Lecture</td>
<td>AML</td>
<td>03:30 PM - 04:45 PM</td>
<td>TR</td>
<td>1320 - Digital Computer Laboratory</td>
<td>Walker, T</td>
</tr>
</tbody>
</table>

Credit Hours: 3 hours
Applied Machine Learning
Restricted to Engineering.

Techniques of machine learning, with applications to various signal problems. Techniques covered will be: regression including linear regression, multiple regression, regression forests and nearest neighbors regression; classification with various methods
including logistic regression, support vector machines, nearest neighbors, simple boosting and decision forests; clustering with various methods including basic agglomerative clustering and k-means; resampling methods, including cross-validation and the bootstrap; model selection methods, including AIC, stepwise selection and the lasso; hidden Markov models; model estimation in the presence of missing variables; and neural networks, including deep networks. The course is intended to support students who wish to apply machine learning methods, and will focus on tool-oriented and problem-oriented exposition. Application areas include computer vision, natural language, interpreting accelerometer data, and understanding audio data. Prereq: A course in probability or statistics, a course in linear algebra, and some programming experience.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Type</th>
<th>Credit Hours</th>
<th>Title</th>
<th>Restrictions</th>
<th>Instructor(s)</th>
</tr>
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<tbody>
<tr>
<td>67942</td>
<td>Online</td>
<td>4</td>
<td>Applied Machine Learning</td>
<td>Restricted to MCS:Computer Sci Online -UIUC.</td>
<td>Walker, T</td>
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<tr>
<td>69511</td>
<td>Online</td>
<td>4</td>
<td>Cloud Computing Applications</td>
<td>Restricted to MCS:Computer Sci Online -UIUC.</td>
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<tr>
<td>68121</td>
<td>Lecture-Discussion</td>
<td>4</td>
<td>Cloud Computing Applications</td>
<td>Restricted to NDEG:Computer Science Onl-UlC or MCS:Computer Sci Online -UIUC.</td>
<td>Campbell, R Iyer, R</td>
</tr>
<tr>
<td>65868</td>
<td>Online</td>
<td>4</td>
<td>Data Science &amp; Analytics</td>
<td>Restricted to Computer Science major(s). Restricted to Graduate - Urbana-Champaign.</td>
<td>Farivar, R</td>
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<tr>
<td>68120</td>
<td>Lecture-Discussion</td>
<td>3</td>
<td>Cloud Computing Applications</td>
<td>Restricted to Engineering. Restricted to Undergrad - Urbana-Champaign.</td>
<td>Campbell, R Iyer, R</td>
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<tr>
<td>69336</td>
<td>Online</td>
<td>3</td>
<td>Smart Cities</td>
<td>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</td>
<td>Agha, G</td>
</tr>
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</table>
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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<tbody>
<tr>
<td>69419</td>
<td>Lecture-D</td>
<td>IT3</td>
<td>09:30 AM - 10:45 AM</td>
<td>MW</td>
<td>1109 - Siebel Center for Comp Sci</td>
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Credit Hours: 3 hours

Internet of Things

Restricted to Engineering. Restricted to Undergrad - Urbana-Champaign.

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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<td>69420</td>
<td>Lecture-D</td>
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<td>09:30 AM - 10:45 AM</td>
<td>MW</td>
<td>1109 - Siebel Center for Comp Sci</td>
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</table>

Credit Hours: 4 hours

Internet of Things

Restricted to Computer Science or Bioinformatics major(s). Restricted to Graduate - Urbana-Champaign.

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>
<td>69348</td>
<td>Online</td>
<td>MD</td>
<td>ARRANGED -</td>
<td>R</td>
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Credit Hours: 3 hours

Mobile Interactive Design

Restricted to O/C Engineering City Scholars students.

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<tr>
<th>Code</th>
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<th>Location</th>
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<tr>
<td>69337</td>
<td>Lecture</td>
<td>MID</td>
<td>03:00 PM - 05:20 PM</td>
<td>W</td>
<td>1109 - Siebel Center for Comp Sci</td>
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</table>

Credit Hours: 3 hours

Mobile Interactive Design

Restricted to Engineering. Restricted to Undergrad - Urbana-Champaign.

In this course, students will learn how to imagine, implement, and evaluate novel mobile experiences. Topics will include user research, prototyping, field studies, user interface architectures, touch and in-air gestures, and sensors; as applied to a mobile context. Students will also learn design thinking skills, design communication skills, and team work skills. The class format is lecture, individual and group activities, and discussion. Class attendance and participation is expected. Students cannot receive credit for both CS 465 and CS 498 BPM.

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<tr>
<td>65864</td>
<td>Online</td>
<td>ONL</td>
<td>ARRANGED -</td>
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Applied Machine Learning

Restricted to MCS:Computer Sci Online -UIUC.

Restricted to CS online MCS Students. ProctorU and other fees may apply.
Credit Hours: 3 hours
Audio Computing Lab
Restricted to Engineering. Restricted to Undergrad - Urbana-Champaign.
This course will cover the computational foundations of modern audio applications. This will be a lab-like course in which students will be required to bring in their laptops in class and collectively implement a variety of core audio operations that are commonplace today. In this class we will cover the necessary theory to start working on audio processing, and implement a variety of applications such as room and 3D/virtual audio rendering, pitch manipulations and autotuning, denoising for communications and forensics, audio classification, music information retrieval based on audio, rudimentary speech recognition, speech and audio coding, applications of machine learning to audio scene recognition, audio restoration, missing data recovery, and many more. Students will need to have a good grasp of programming in Python (or MATLAB) and will be required to bring to class their laptops and headphones to participate in lab exercises. Suggested prerequisites include MATH416 (or equivalent) and CS241.

Credit Hours: 4 hours
Audio Computing Lab
Restricted to Computer Science or Bioinformatics major(s). Restricted to Graduate - Urbana-Champaign.
This course will cover the computational foundations of modern audio applications. This will be a lab-like course in which students will be required to bring in their laptops in class and collectively implement a variety of core audio operations that are commonplace today. In this class we will cover the necessary theory to start working on audio processing, and implement a variety of applications such as room and 3D/virtual audio rendering, pitch manipulations and autotuning, denoising for communications and forensics, audio classification, music information retrieval based on audio, rudimentary speech recognition, speech and audio coding, applications of machine learning to audio scene recognition, audio restoration, missing data recovery, and many more. Students will need to have a good grasp of programming in Python (or MATLAB) and will be required to bring to class their laptops and headphones to participate in lab exercises. Suggested prerequisites include MATH416 (or equivalent) and CS241.

Credit Hours: 3 hours
Art and Science of Web Prog
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 major(s). Restricted to Undergrad - Urbana-Champaign.
Presents client- and server-side technologies that enable modern Web applications. Topics include the building blocks of the Web (HTML, CSS, the Document Object Model, Javascript) and data exchange (HTTP, JSON, RESTful APIs, and SQL/NoSQL databases). Programming assignments will expose students to CSS preprocessors, grid systems, and full-stack Javascript frameworks that scaffold development and testing. In addition, students will work in teams to design, implement and deploy a full-featured web application. Prerequisites: CS225.

Credit Hours: 3 hours
Art and Science of Web Prog
Restricted to Computer Science major(s). Restricted to Graduate - Urbana-Champaign.
Presents client- and server-side technologies that enable modern Web applications. Topics include the building blocks of the Web (HTML, CSS, the Document Object Model, Javascript) and data exchange (HTTP, JSON, RESTful APIs, and SQL/NoSQL databases). Programming assignments will expose students to CSS preprocessors, grid systems, and full-stack Javascript frameworks that scaffold development and testing. In addition, students will work in teams to design, implement and deploy a full-featured web application. Prerequisites: CS225.
Credit Hours: 3 hours  
Art and Science of Web Prog  
Restricted to Engineering. Restricted to Undergrad - Urbana-Champaign.  
Presents client- and server-side technologies that enable modern Web applications. Topics include the building blocks of the Web (HTML, CSS, the Document Object Model, Javascript) and data exchange (HTTP, JSON, RESTful APIs, and SQL/NoSQL databases). Programming assignments will expose students to CSS preprocessors, grid systems, and full-stack Javascript frameworks that scaffold development and testing. In addition, students will work in teams to design, implement and deploy a full-featured web application. Prerequisites: CS225. Those registered for this section will watch recordings from lecture of RK2.

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<th>Days</th>
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<tr>
<td>69526</td>
<td>Online</td>
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<td>ARRANGED -</td>
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<td>Kumar, R</td>
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Credit Hours: 3 hours  
Art and Science of Web Prog  
Restricted to Computer Science major(s). Restricted to Graduate - Urbana-Champaign.

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<th>Course Code</th>
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<th>Time</th>
<th>Location</th>
<th>Instructor(s)</th>
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<tr>
<td>69469</td>
<td>Lecture-Discussion</td>
<td>SM</td>
<td>02:00 PM - 03:20 PM</td>
<td>3015 - Electrical &amp; Computer Eng Bldg</td>
<td>Mitra, S Mohan, S</td>
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Credit Hours: 4 hours  
Principles of Safe Autonomy

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<thead>
<tr>
<th>Course Code</th>
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<th>Instructor(s)</th>
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<tr>
<td>50232</td>
<td>Lecture</td>
<td>VR3</td>
<td>04:00 PM - 05:15 PM</td>
<td>1320 - Digital Computer Laboratory</td>
<td>Shaffer, E</td>
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Credit Hours: 3 hours  
Virtual Reality  
Restricted to Engineering. Restricted to Undergrad - Urbana-Champaign.

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<tr>
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<tr>
<td>50234</td>
<td>Lecture</td>
<td>VR4</td>
<td>04:00 PM - 05:15 PM</td>
<td>1320 - Digital Computer Laboratory</td>
<td>Shaffer, E</td>
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Credit Hours: 4 hours  
Virtual Reality  
Restricted to Statistics & Computer Science or 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 major(s). Restricted to Graduate - Urbana-Champaign.