Computer Science

CS 498  **Special Topics in CS**  credit: 0 TO 4 hours.
Lectures in topics of current interest. See Schedule for current topics. Approved for both letter and S/U grading. May be repeated. Prerequisite: As specified for each topic offering, see Schedule or departmental course description.

<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>47232</td>
<td>Laboratory</td>
<td>AB</td>
<td>ARRANGED -</td>
<td></td>
<td></td>
<td>Hwu, W</td>
</tr>
<tr>
<td>47231</td>
<td>Lecture</td>
<td>AL</td>
<td>10:00 AM - 11:20 AM</td>
<td>MW</td>
<td>103 - Talbot Laboratory</td>
<td>Hwu, W</td>
</tr>
<tr>
<td>39547</td>
<td>Lecture</td>
<td>CG3</td>
<td>11:00 AM - 12:15 PM</td>
<td>WF</td>
<td>1304 - Siebel Center for Comp Sci</td>
<td>Gunter, C</td>
</tr>
<tr>
<td>46307</td>
<td>Lecture</td>
<td>CG4</td>
<td>11:00 AM - 12:15 PM</td>
<td>WF</td>
<td>1304 - Siebel Center for Comp Sci</td>
<td>Gunter, C</td>
</tr>
<tr>
<td>40022</td>
<td>Lecture-Discussion</td>
<td>GR3</td>
<td>03:30 PM - 04:45 PM</td>
<td>TR</td>
<td>1131 - Siebel Center for Comp Sci</td>
<td>Campbell, R Garnett, G McGrath, R</td>
</tr>
<tr>
<td>31601</td>
<td>Lecture-Discussion</td>
<td>GR4</td>
<td>03:30 PM - 04:45 PM</td>
<td>TR</td>
<td>1131 - Siebel Center for Comp Sci</td>
<td>Campbell, R Garnett, G McGrath, R</td>
</tr>
</tbody>
</table>

Credit Hours: 4 hours
Topic: Programming Massively Parallel Microprocessors. Prerequisites: ECE 411 or CS 225 and CS 433. This section meets with Prof. Hwu's section of ECE 498.

Credit Hours: 3 hours
Topic: Foundations of Security. Prerequisite: CS 498RHC, "Information Assurance" or Consent of Instructor. This section is for either undergraduate or graduate students.

Credit Hours: 4 hours
Restricted to Graduate - Urbana-Champaign.
Topic: Foundations of Security. Prerequisite: CS 498RHC, "Information Assurance" or Consent of Instructor. This section is for graduate students only.

Credit Hours: 3 hours
Topic: Special Topics in Game-Related Computing. Prerequisite: CS 241 or consent of instructor. Introduction to Metaverse Building - A metaverse is a synthetic world--a persistent, shared immersive environment--potentially including avatars, physics, and 3D graphics that exploits networked clients and has applications that include user interfaces, communication, collaboration, commerce, science, games, and simulations. This project course will focus on the design and construction of the software architecture and an open source implementation of a metaverse including the network, security, and data interchange infrastructure that can support the creation of games, synthetic worlds, cyberphysical systems, and other networked interactive collaborative environments. The course is aimed at students interested in these applications and skilled in: networking, security, system design, data (representation, exchange, storage), UI, 3D graphics, and other areas. Students will emerge from this course with a deeper understanding of one or more of these technologies as well as experience in collaboratively creating a complex software framework integrating many components. This section is for either undergraduate or graduate students.

Credit Hours: 4 hours
Restricted to Graduate - Urbana-Champaign.

**Topic: Special Topics in Game-Related Computing. Prerequisite: CS 241 or consent of instructor.** Introduction to Metaverse Building

- A metaverse is a synthetic world—a persistent, shared immersive environment—potentially including avatars, physics, and 3D graphics that exploits networked clients and has applications that include user interfaces, communication, collaboration, commerce, science, games, and simulations. This project course will focus on the design and construction of the software architecture and an open source implementation of a metaverse including the network, security, and data interchange infrastructure that can support the creation of games, synthetic worlds, cyberphysical systems, and other networked interactive collaborative environments. The course is aimed at students interested in these applications and skilled in: networking, security, system design, data (representation, exchange, storage), UI, 3D graphics, and other areas. Students will emerge from this course with a deeper understanding of one or more of these technologies as well as experience in collaboratively creating a complex software framework integrating many components. This section is for graduate students only.

<table>
<thead>
<tr>
<th>Course</th>
<th>Type</th>
<th>Time</th>
<th>Location</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>46400</td>
<td>Lecture</td>
<td>03:30 PM - 04:45 PM</td>
<td>1109 - Siebel Center for Comp Sci</td>
<td>Borisov, N</td>
</tr>
</tbody>
</table>

**Credit Hours: 3 hours**

**Topic: Introductory Computer Security. Prerequisite: CS 225.** This course introduces the fundamental principles of computer and communications security and information assurance. Topics include ethics, privacy, notions of threat, vulnerabilities, and risk in systems, malicious software, data secrecy and integrity issues, network security, and trusted computing. The course will cover mandatory, discretionary, and role-based access control policies as well as certification and accreditation of systems against security standards. Security mechanisms will include authentication, auditing, access control, confidentiality, non-repudiation, cryptography, protocols, availability, intrusion detection, and multilevel secure systems. This section is for either undergraduate or graduate students.

<table>
<thead>
<tr>
<th>Course</th>
<th>Type</th>
<th>Time</th>
<th>Location</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>46401</td>
<td>Lecture</td>
<td>03:30 PM - 04:45 PM</td>
<td>1109 - Siebel Center for Comp Sci</td>
<td>Borisov, N</td>
</tr>
</tbody>
</table>

**Credit Hours: 4 hours**

Restricted to Graduate - Urbana-Champaign.

**Topic: Introductory Computer Security. Prerequisite: CS 225.** This course introduces the fundamental principles of computer and communications security and information assurance. Topics include ethics, privacy, notions of threat, vulnerabilities, and risk in systems, malicious software, data secrecy and integrity issues, network security, and trusted computing. The course will cover mandatory, discretionary, and role-based access control policies as well as certification and accreditation of systems against security standards. Security mechanisms will include authentication, auditing, access control, confidentiality, non-repudiation, cryptography, protocols, availability, intrusion detection, and multilevel secure systems. This section is for graduate students only.

<table>
<thead>
<tr>
<th>Course</th>
<th>Type</th>
<th>Time</th>
<th>Location</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>47282</td>
<td>Lecture</td>
<td>02:00 PM - 03:20 PM</td>
<td>241 - Everitt Laboratory</td>
<td>Vaidya, N</td>
</tr>
</tbody>
</table>

**Credit Hours: 3 hours**

**Topic: Wireless Networks. Prerequisites: ECE/CS 438 or equivalent.** This section meets with ECE 498, NHV and NV4. This section is for undergraduates OR graduate students.

<table>
<thead>
<tr>
<th>Course</th>
<th>Type</th>
<th>Time</th>
<th>Location</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>47283</td>
<td>Lecture</td>
<td>02:00 PM - 03:20 PM</td>
<td>241 - Everitt Laboratory</td>
<td>Vaidya, N</td>
</tr>
</tbody>
</table>

**Credit Hours: 4 hours**

Restricted to Graduate - Urbana-Champaign.

**Topic: Wireless Networks. Prerequisites: ECE/CS 438 or equivalent.** This section meets with ECE 498, NHV and NV4. This section is for graduate students only.

<table>
<thead>
<tr>
<th>Course</th>
<th>Type</th>
<th>Time</th>
<th>Location</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>47219</td>
<td>Lecture</td>
<td>02:00 PM - 03:15 PM</td>
<td>1131 - Siebel Center for Comp Sci</td>
<td>Kamin, S</td>
</tr>
</tbody>
</table>

**Credit Hours: 3 hours**

**Topic: Program Generation and Transformation.** This course will cover tools and applications of metaprogramming, which is the use of programs to generate and manipulate other programs. Applications are found in numerous areas, including software engineering, where metaprogramming tools can be used to achieve modularity without overhead, and scientific programming, where speed-
Speed-ups can be achieved by data-driven specialization. Tools to be studied will include, at least, C++ template metaprogramming and MetaOCaml (static, type-safe program generation), Stratego (program transformation), and Jumbo (run-time program generation). This section is for undergraduate or graduate students.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Location</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>47220</td>
<td>Lecture</td>
<td>PG4</td>
<td>02:00 PM - 03:15 PM</td>
<td>WF 1131 - Siebel Center for Comp Sci</td>
<td>Kamin, S</td>
</tr>
</tbody>
</table>

Credit Hours: 4 hours
Restricted to Graduate - Urbana-Champaign.
Topic: Program Generation and Transformation. This course will cover tools and applications of metaprogramming, which is the use of programs to generate and manipulate other programs. Applications are found in numerous areas, including software engineering, where metaprogramming tools can be used to achieve modularity without overhead, and scientific programming, where speed-ups can be achieved by data-driven specialization. Tools to be studied will include, at least, C++ template metaprogramming and MetaOCaml (static, type-safe program generation), Stratego (program transformation), and Jumbo (run-time program generation). This section is for graduate students only.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Location</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>39662</td>
<td>Lecture</td>
<td>SH3</td>
<td>02:00 PM - 03:15 PM</td>
<td>TR 1111 - Siebel Center for Comp Sci</td>
<td>Hinrichs, S</td>
</tr>
</tbody>
</table>

Credit Hours: 3 hours
Topic: Cybersecurity Laboratory. Prerequisite: CS498RHC (Information Assurance) or Consent of Instructor. This applied security course complements CS498RHC, Introduction to Information Assurance. It reinforces the security taught in that course with hands on projects. The projects in the lab class are divided into the following areas: endpoint security, network security, intrusions and defenses, and security architectures. Projects include configuration scenarios for security mechanisms such as Windows, SE Linux, and firewalls; programming tasks such as least privilege programming in Windows and worm creation; and system designs, attacks, and defenses. This section is either for undergraduate or graduate students.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Location</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>46309</td>
<td>Lecture</td>
<td>SH4</td>
<td>02:00 PM - 03:15 PM</td>
<td>TR 1111 - Siebel Center for Comp Sci</td>
<td>Hinrichs, S</td>
</tr>
</tbody>
</table>

Credit Hours: 4 hours
Restricted to Graduate - Urbana-Champaign.
Topic: Cybersecurity Laboratory. Prerequisite: CS498RHC (Information Assurance) or Consent of Instructor. This applied security course complements CS498RHC, Introduction to Information Assurance. It reinforces the security taught in that course with hands on projects. The projects in the lab class are divided into the following areas: endpoint security, network security, intrusions and defenses, and security architectures. Projects include configuration scenarios for security mechanisms such as Windows, SE Linux, and firewalls; programming tasks such as least privilege programming in Windows and worm creation; and system designs, attacks, and defenses. This section is for graduate students only.