

## Computer Science and Computer Engineering Electives

This page lists the courses that can be used to meet Departmental Upper-Level Technical Elective requirements for the Computer Science and Computer Engineering programs. This page is current for the 2019/2020 catalog – older catalogs may have different course numbers, different options, and/or different requirements. Check with the Department Undergraduate Advisor concerning possible courses not listed including several 5000-level courses that may be suitable for undergraduate students. This list is provided as a guide; the Undergraduate Catalog remains as the definitive source of requirements. *Note that not all of the courses listed below will be offered in any given academic year.*

### Notes:

- 1) CEN 4020 Software Engineering is a required course starting with the 2017 catalog year.
- 2) CNT 4419 Secure Coding is a required course starting with the 2018 catalog year.
- 3) See USF Course Inventory for course descriptions and a listing of prerequisites.
- 4) CIS 4930 is the designation for special topic courses. These courses could be software, hardware, or theory, depending on course content.
- 5) The nominal prerequisite for all elective courses (including CIS 4930 and CIS 4900, CIS 4915, and CIS 4940) is Computer Logic and Design (CDA 3201) and Data Structures (COP 4530), however some courses may have a prerequisite other than CDA 3201 and COP 4530; this may be noted in OASIS. USF Course Inventory lists courses prerequisites.
- 6) Students are allowed to count a maximum of three (3) hours of an elective programming language as a software elective.
- 7) Students are allowed to count as elective credit a maximum of six (6) hours combined of CIS 4900 and/or any other supervised individual study (that is, CIS 4915 and CIS 4940).

Courses are identified as elective or required by program.

### Software courses

Course ID	Course Name	Computer Engineering	Computer Science
CAP 4034	Computer Animation Fundamentals	Elective	Elective
CAP 4063	Web Application Design	Elective	Elective
CAP 4401	Image Processing Fundamentals	Elective	Elective
CAP 4662	Introduction to Robotics	Elective	Elective
CEN 4020	Software Engineering	Elective	<b>Required</b>
CEN 4072	Software Testing	Elective	Elective
CIS 4930	Introduction to AI	Elective	Elective
CIS 4930	Intro to Hadoop and Big Data	Elective	Elective
CIS 4930	Practical Cybersecurity	Elective	Elective
CIS 4930	Data Visualization	Elective	Elective
CIS 4930	Programming on Massively Parallel Systems	Elective	Elective
CIS 4930	Principles of Cyber Physical Systems	Elective	Elective
CIS 4930	Affective Computing	Elective	Elective

CIS 4930	Network Science	Elective	Elective
CIS 4930	Biometric Authentication on Mobile Devices	Elective	Elective
CIS 4930	Social Media Mining	Elective	Elective
CNT 4004	Computer Networks I	Elective	Elective
CNT 4411	Computing and Network Security	Elective	Elective
CNT 4419	Secure Coding	Elective	<b>Required</b>
COP 4020	Programming Languages	Elective	Elective
COP 4365	Software Systems Development	Elective	Elective
COP 4620	Compilers	Elective	Elective
COP 4656	Software Development for Mobile Devices	Elective	Elective
COP 4710	Database Design	Elective	Elective
CIS 4930	Foundations of Software Security	Elective	Elective
CIS 4930	Advanced JavaScript	Elective	Elective
CIS 4930	Intro to Augmented VR	Elective	Elective
CIS 4930	Capture the Flag	Elective	Elective
CIS 4930	Natural Language Processing	Elective	Elective

### Hardware courses

Course ID	Course Name	Computer Engineering	Computer Science
CDA 4203/4203L	Computer System Design & Lab	<b>Required</b>	Elective
CDA 4213/4213L	CMOS/VLSI Design & Lab	<b>Required</b>	Elective
CDA 4253	FPGA Design and Analysis	Elective	Elective
CDA 4621	Control of Mobile Robots	Elective	Elective
CIS 4930	Digital Circuit Synthesis	Elective	Elective
CIS 4930	Embedded Systems	Elective	Elective
CIS 4930	Hardware Security	Elective	Elective
CIS 4930	Cryptographic Hardware and Embed Sys	Elective	Elective
CIS 4930	Brain-Computer Interfaces	Elective	Elective
CIS 4930	VLSI Testing	Elective	Elective

### Theory courses

Course ID	Course Name	Computer Engineering	Computer Science
COT 4210	Automata Theory and Formal Languages	Elective	Elective
COT 4521	Computational Geometry	Elective	Elective
CIS 4930	Privacy Preserving Infrastructure	Elective	Elective

### Other courses

Course ID	Course Name	Computer Engineering	Computer Science
CIS 4900	Independent Study	Elective	Elective
CIS 4910	Senior Project	<b>Required</b>	Elective
CIS 4915	Supervised Research	Elective	Elective
CIS 4940	Industry Internship	Elective	Elective

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