

## Computer Engineering Areas of Study and Area Courses

1. ASR – Autonomous Systems & Robotics
2. CN – Communications and Networks
3. DDSS – Distributed, Dependable, Secure Systems
4. MSP – Multimedia and Signal Processing
5. VAES – VLSI, Architecture & Embedded Systems

### Course Descriptions

For course descriptions please see the course catalog: <https://webapp4.asu.edu/catalog/>

Course & Prefix	Course Title (Credit Hours)	ASR	CN	DDSS	MSP	VAES
CEN 503	Algorithms for Computer-Aided Design of Digital Systems in VAES (3)					X
CEN 571	Hardware Acceleration and FPGA Computing (3)					X
CEN 598/BMI 598	Embedded Machine Learning (3)					X
CEN 598	Hardware Acceleration and FPGA Computing (3)					X
CEN 598/CSE 598	Hardware Security & Trust (3)			X		X
CEN 691	Digital Logic Synthesis & Verification Algorithms (3) Approved under these numbers and course titles: CEN 691: Algorithms for Computer-Aided Design of VLSI Systems (Fall 2016) CEN 598: Algorithms for Synthesis and Optimization of Digital Systems (Fall 2015) CSE 591: Digital Logic Synthesis and Verification Algorithms (Fall 2005, Fall 2006, Fall 2007, Fall 2009, Spring 2012)					X
CSE 509	Digital Video Processing (3)				X	
CSE 511	Data Processing at Scale *This course is an anti-requisite to CSE 512. You cannot take both CSE 511 and CSE 512*			X		
CSE 512	Distributed Database Systems (3) *This course is an anti-requisite to CSE 511. You cannot take both CSE 511 and CSE 512*			X		
CSE 515	Multimedia Web Databases (3)				X	
CSE 520	Computer Architecture II (3)					X
CSE 522	Real Time Embedded Systems (3)					X

<b>Course &amp; Prefix</b>	<b>Course Title (Credit Hours)</b>	<b>ASR</b>	<b>CN</b>	<b>DDSS</b>	<b>MSP</b>	<b>VAES</b>
CSE 530	Embedded Operating Systems Internals (3)					X
CSE 531	Distributed & Multiprocessor Operating Systems (3)			X		
CSE 534	Advanced Computer Networks (3)		X			
CSE 535	Mobile Computing (3)					X
CSE 536	Advanced Operating Systems (3)			X		
CSE 539	Applied Cryptography (3)			X		
CSE 543	Information Assurance and Security (3)			X		
CSE 545	Software Security (3)			X		
CSE 546	Cloud Computing (3)			X		
CSE 548	Advanced Computer Network Security (3)		X	X		
CSE 569	Fundamentals of Statistical Learning and Pattern Recognition (3)	X			X	
CSE 550	Combinatorial algorithms and intractability (3)			X		
CSE 552	Randomized and Approximation Algorithms (3)			X		
CSE 570	Advanced Computer Graphics (3)				X	
CSE 571	Artificial Intelligence (3)	X				
CSE 572	Data Mining (3)	X				
CSE 573	Semantic Web Mining				X	
CSE 574	Planning and Learning Methods in AI (3)	X				
CSE 575	Statistical Machine Learning (3)	X				
CSE 576	Natural Language Processing (3)	X				
CSE 579	Knowledge Representation (3)			X	X	
CSE 591	Perception in Robotics (3)	X				
CSE 598	Introduction to Deep Learning in Visual Computing (3)	X			X	

Course & Prefix	Course Title (Credit Hours)	ASR	CN	DDSS	MSP	VAES
CSE 598	Theoretical Foundations of Cyber-Physical Systems (3) Approved under these numbers and course titles: CSE 591 Theoretical Foundations of Cyber-Physical Systems; CSE 591 Cyber-Physical Systems: Modeling, Verification and Synthesis; CSE 591 Cyber-Physical Systems	X				
EEE 505	Time-Frequency Signal Processing (3)				X	
EEE 506	Digital Spectral Analysis (3)				X	
EEE 507	Multidimensional Signal Processing (3)				X	
EEE 508	Digital Image and Video Processing and Compression (4)				X	
EEE 511	Artificial Neural Computation (3)	X				
EEE 515	Machine Vision and pattern recognition (3)				X	
EEE 523	Advanced Analog Integrated Circuits (4)					X
EEE 525	VLSI Design (4)					X
EEE 526	VLSI Architectures (3)					X
EEE 527	Analog to Digital Converters (4)					X
EEE 529	Semiconductor Memory Tech & Sys (3)					X
EEE 530	Advanced Silicon Processing (3)					X
EEE 531	Semiconductor Device Theory (3)					X
EEE 551	Information Theory (3)		X			
EEE 552	Digital Communications (3)		X			
EEE 553	Coding and Cryptography (3)			X		
EEE 556	Detection and Estimation Theory (3)				X	
EEE 557	Broadband Networks (3)		X			
EEE 558	Wireless Communications (3)		X			
EEE 559	Wireless Networks (3)		X			
EEE 581	Filtering Stochastic Processes	X	X	X		

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EEE 582	Linear System Theory (3)	X				
EEE 585	Security and Privacy Network Systems (3)		X	X		
EEE 586	Nonlinear Control Systems (3)	X				
EEE 587	Optimal Control (3)	X				
EEE 588	Design of Multivariable Control Systems (3)	X				
EEE 589	Linear Algebra and Convex Optimization (3)				X	
EEE 598/516	Computational Cameras, Lighting, and Displays (3) Other titles include: Physics-Based Computer Vision				X	
EEE 598	Computational Image Understanding (3)	X			X	
EEE 598	Constructionist approach to microprocessor design (4)					X
EEE 598	Distributed and Large Scale Optimization (3)	X		X		
EEE 598	Deep Learning for Media Processing (4)				X	
EEE 598	Intro to Complex Networks (3)		X	X		
EEE 598	Introduction to Electric and Autonomous Vehicles (3)	X				X
EEE 598	Machine Learning (3)	X			X	
EEE 598	Mobile Systems Architecture (3)					X
EEE 598	Neuromorphic Computing Hardware Design (3)	X				X
EEE 598	Personal Sensors for Mobile Health (3)					X
EEE 598	Speech and Audio Processing and Perception (3)				X	
EEE 598	Statistical Machine Learning: From Theory to Algorithms (3)	X			X	
EEE 598	System-Level Design for Multicore Architectures (3)					X
EEE 606	Adaptive Signal Processing (3)				X	
EEE 607	Speech Coding for Multimedia Communications (3)				X	
EEE 625	Advanced VLSI Design (4)					X

Course & Prefix	Course Title (Credit Hours)	ASR	CN	DDSS	MSP	VAES
EEE 686	Adaptive Control (3)	X				

Approved 400-level and combined 400/591-level courses. CEN MS students can take those as electives with up to 6 credits of 400-level courses and up to 12 credits of total combined 4XX/591 courses counting toward MS degree.

Course & Prefix	Course Title (Credit Hours)
CSE 408	Multimedia Information Systems (3)
CSE 438	Embedded Systems Programming (3)
CSE 434	Computer Networks (3)
CSE 440	Compiler Construction I (3)
CSE 445	Distributed Software Development (3)
CSE 463	Intro Human Computer Interaction (3)
CSE 468	Computer Network Security (3)
CSE 471	Intro Artificial Intelligence (3)
EEE 404/591	Real-Time Digital Signal Processing (4)
EEE 407/591	Digital Signal Processing (4)
EEE 425/591	Digital Circuits and Systems (4)
EEE 433/591	Analog Integrated Circuits (4)
EEE 434/591	Quantum Mechanics for Engineers (3)
EEE 436/591	Fundamentals of Solid State Devices (3)
EEE 455/591	Communication Systems (4)
EEE 459/591	Communication Networks (3)
EEE 480/591	Feedback Systems (4)
EEE 481/591	Computer Controlled Systems (4)
EEE 498/591	Constructionist Approach to Microprocessor Design (4)
EEE 498/591	Foundations of Machine Learning: From Theory to Practice (4)
EEE 498/591	Machine Learning Basics with Applications to FPGAs (3)
EEE 498/591	Machine Learning Basics with Deployment to FPGAs (3)
EEE 498/591	Python for Rapid Engineers Solutions (3)
EEE 498/591	Quantum Optics and Quantum Information (3)