GENERAL CURRICULUM IN COMPUTER SCIENCE

Technical Electives
Select from the lists in Technical Electives Guidelines below 1,2 20

Mathematics/Statistics Elective
Select from the following: 4

MATH 241  Calculus IV
MATH 248  Methods of Proof in Mathematics
MATH 306  Linear Algebra II
MATH 334  Combinatorial Math
MATH 335  Graph Theory
MATH 437  Game Theory
MATH 470  Selected Advanced Topics
STAT 305  Introduction to Probability and Simulation
STAT 323  Design and Analysis of Experiments I
STAT 324  Applied Regression Analysis
STAT 330  Statistical Computing with SAS
STAT 331  Statistical Computing with R
STAT 334  Applied Linear Models
STAT 416  Statistical Analysis of Time Series
STAT 418  Categorical Data Analysis
STAT 419  Applied Multivariate Statistics
STAT 434  Statistical Learning: Methods and Applications

Total units 24

1 Consultation with advisor is recommended prior to selecting technical electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.
2 An additional 4 units of CPE/CSC Technical Electives is needed if CPE/CSC 123 (http://catalog.calpoly.edu/search/?P=CSC%20123) is not taken in the major.

Technical Electives Guidelines
Courses used to satisfy any other Major, Support, or General Education requirement are not allowed to count toward the Technical Electives Elective requirement. Credit/No Credit grading is not allowed.

Select Technical Electives from the following: 1,2

CSC 305  Individual Software Design and Development
CSC 309  Software Engineering II
CSC 313  Teaching Computing
CSC 321  Introduction to Computer Security
CSC 323  Cryptography Engineering
CSC 325  Introduction to Privacy: Policy and Technology
CSC 344  Music Programming
CSC 366  Database Modeling, Design and Implementation

CSC 369  Introduction to Distributed Computing
CSC 371  Game Design
CSC 377  Introduction to Mixed Reality
CSC 378  Interactive Entertainment Engineering
CSC 400  Special Problems 2
CSC 402  Software Requirements Engineering
CSC 405  Software Construction
CSC 406  Senior Project - Software Deployment
CSC 409  Current Topics in Software Engineering
CSC 410  Software Evaluation
CSC 421  Binary Exploitation: Tools and Techniques
CSC 422  Network Security
CSC 424  Software Security
CSC/CPE 425  Wireless Security
CSC 429  Current Topics in Computer Security
CSC 431  Compiler Construction
CSC 436  Mobile Application Development
CSC 437  Dynamic Web Development
CSC 448  Bioinformatics Algorithms
CSC/CPE 454  Implementation of Operating Systems
CSC/CPE 458  Current Topics in Computer Systems
CSC 466  Knowledge Discovery from Data
CSC 468  Database Management Systems Implementation
CSC/CPE 469  Distributed Systems
CSC/CPE 471  Introduction to Computer Graphics
CSC 473  Advanced Rendering Techniques
CSC 474  Computer Animation
CSC/CPE 476  Real-Time 3D Computer Graphics Software
CSC 477  Scientific and Information Visualization
CSC 478  Current Topics in Computer Graphics
CSC 480  Artificial Intelligence
CSC 481  Knowledge Based Systems
CSC 482  Speech and Language Processing
CSC 484  User-Centered Interface Design and Development
CSC 486  Human-Computer Interaction Theory and Design
CSC 487  Deep Learning
CSC 490  Selected Advanced Topics 2
CSC 493  Cooperative Education Experience 2
CSC 496  Selected Advanced Laboratory 2
CSC 508  Software Engineering I
CSC 509  Software Engineering II
CSC 513  Computing Education Research and Practice
CSC/CPE 515  Computer Architecture
General Curriculum in Computer Science

CSC 521  Computer Security
CSC 522  Advanced Network Security
CSC 524  System Security
CSC 530  Languages and Translators
CSC 540  Theory of Computation II
CSC 549  Advanced Algorithm Design and Analysis
CSC 550  Operating Systems
CSC 560  Database Systems
CSC/CPE 564  Computer Networks: Research Topics
CSC 566  Topics in Advanced Data Mining
CSC/CPE 569  Distributed Computing
CSC 570  Current Topics in Computer Science
CSC 572  Computer Graphics
CSC 580  Artificial Intelligence
CSC 581  Computer Support for Knowledge Management
CSC 582  Computational Linguistics
CSC 587  Advanced Deep Learning
CPE 315  Computer Architecture
CPE 316  Microprocessors and Embedded Applications
CPE/PHYS 345  Quantum Computing
CPE 400  Special Problems for Undergraduates
CPE 416  Autonomous Mobile Robotics
CPE 419  Applied Parallel Computing
CPE/EE 428  Computer Vision
CPE/EE 442  Real Time Embedded Systems
CPE 464  Introduction to Computer Networks
CPE 465  Advanced Computer Networks
CPE 488  Microelectronics and Electronics Packaging
DATA 301  Introduction to Data Science

The following restrictions must be satisfied.

4 units must be satisfied by a course that has as a prerequisite either

1) An upper-division course required by the major (excluding CSC 357) or
2) Another Technical Elective.

Select from the following:

CSC 366  Database Modeling, Design and Implementation
CSC 402  Software Requirements Engineering
CSC 405  Software Construction
CSC 406  Senior Project - Software Deployment
CSC 409  Current Topics in Software Engineering
CSC 410  Software Evaluation
CSC 421  Binary Exploitation: Tools and Techniques
CSC 422  Network Security
CSC 424  Software Security
CSC/CPE 425  Wireless Security
CSC 429  Current Topics in Computer Security
CSC 437  Dynamic Web Development
CSC 448  Bioinformatics Algorithms
CSC/CPE 454  Implementation of Operating Systems
CSC 466  Knowledge Discovery from Data
CSC 468  Database Management Systems Implementation
CSC 473  Advanced Rendering Techniques
CSC 474  Computer Animation
CSC/CPE 476  Real-Time 3D Computer Graphics Software
CSC 477  Scientific and Information Visualization
CSC 478  Current Topics in Computer Graphics
CSC 481  Knowledge Based Systems
CSC 482  Speech and Language Processing
CSC 484  User-Centered Interface Design and Development
CSC 486  Human-Computer Interaction Theory and Design
CSC 487  Deep Learning
CSC 508  Software Engineering I
CSC 509  Software Engineering II
CSC/CPE 515  Computer Architecture
CSC 521  Computer Security
CSC 522  Advanced Network Security
CSC 530  Languages and Translators
CSC 540  Theory of Computation II
CSC 549  Advanced Algorithm Design and Analysis
CSC 550  Operating Systems
CSC 560  Database Systems
CSC/CPE 564  Computer Networks: Research Topics
CSC 566  Topics in Advanced Data Mining
CSC 572  Computer Graphics
CSC 580  Artificial Intelligence
CSC 581  Computer Support for Knowledge Management
CSC 582  Computational Linguistics
CSC 584  Computational Linguistics
CSC 587  Advanced Deep Learning
CPE 416  Autonomous Mobile Robotics
CPE 465  Advanced Computer Networks

Up to 4 units may be taken from the Approved External Electives listed below:

AERO 450  Introduction to Aerospace Systems Engineering
ART 376  The Art of Mixed Reality
ART 384  Digital 3D Modeling and Design
BUS 310  Introduction to Entrepreneurship
CHEM 216  Organic Chemistry I
CHEM 217  Organic Chemistry II
CHEM 218  Organic Chemistry III
<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>CHEM 312</td>
<td>Organic Chemistry: Fundamentals and Applications</td>
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<tr>
<td>ECON 339</td>
<td>Econometrics</td>
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<tr>
<td>EE 201 &amp; EE 251</td>
<td>Electric Circuit Theory and Electric Circuits Laboratory</td>
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<td>EE 314</td>
<td>Introduction to Communication Systems</td>
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<td>EE/CPE 336</td>
<td>Microprocessor System Design</td>
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<td>EE 424</td>
<td>Introduction to Remote Sensing</td>
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<td>ENVE 542</td>
<td>Sustainable Environmental Engineering</td>
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<td>IME 301</td>
<td>Operations Research I</td>
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<tr>
<td>IME 314</td>
<td>Engineering Economics</td>
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<tr>
<td>IME 315</td>
<td>Financial Decision Making for Engineers</td>
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<td>IME 356</td>
<td>Manufacturing Automation</td>
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<td>IME 403</td>
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<td>MATH 241</td>
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<td>ME 211</td>
<td>Engineering Statics</td>
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<td>ME 405</td>
<td>Mechatronics</td>
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<td>PHIL 412</td>
<td>Epistemology</td>
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<td>PHIL 422</td>
<td>Philosophy of Mind</td>
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<td>PHYS 211</td>
<td>Modern Physics I</td>
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<td>Research Methods in Psychology</td>
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<td>PSY 333</td>
<td>Quantitative Research Methods for the Behavioral Sciences</td>
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1 A total of 20 Technical Elective units selected from upper-division and graduate CSC and CPE courses open to those in the major and not otherwise required by the major. An additional 4 units of CPE/CSC Technical Electives is needed if CPE/CSC 123 is not taken in the major.

2 Up to a combined 4 units may be taken from CSC 400, CPE 400, CSC 490, CSC 493, or CSC 496.