GRAPHICS CONCENTRATION

CSC/CPE 471	Introduction to Computer Graphics	4		
Select from the follo		8		
CSC 473	Advanced Rendering Techniques			
CSC 474	Computer Animation			
CSC/CPE 476	Real-Time 3D Computer Graphics Software			
CSC 572	Computer Graphics			
Tracks 1,2				
Select courses from one of the following tracks:				
GPU/Systems Tra	ack			
CSC 473	Advanced Rendering Techniques			
or CSC 474	Computer Animation			
or CSC 476	Real-Time 3D Computer Graphics Software			
or CSC 572	Computer Graphics			
Technical Electiv Electives Guideli	es (select from the lists in Technical nes below) ¹			
Art Track				
CSC 350 & CSC 450	Computing for Interactive Arts Capstone I			
	and Computing for Interactive Arts Capstone II			
or ART 376	The Art of Mixed Reality			
or ART 384	Digital 3D Modeling and Design			
CSC 371	Game Design			
or CSC 377	Introduction to Mixed Reality			
or CSC 378	Interactive Entertainment Engineering			
Mathematics/Statis	stics Elective			
Select from the follo	owing:	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		

- 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.
- 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 requirement. Credit/No Credit grading is not allowed.

Select Technical Electives from the following: 1,2

Se	elect recrimical Liet	ctives from the following.
	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 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 473	Advanced Rendering Techniques
	CSC 474	Computer Animation

	CSC/CPE 476	Real-Time 3D Computer Graphics Software
	CSC 477	Scientific and Information
	030 411	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
	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 400	Special Problems for Undergraduates
	CPE 416	Autonomous Mobile Robotics
	CPE 419	Applied Parallel Computing
	CPE 428	Computer Vision
	CPE 442	Real Time Embedded Systems
	CPE 464	Introduction to Computer Networks
	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
CHEM 312	Organic Chemistry: Fundamentals
	and Applications
ECON 339	Econometrics
EE 201	Electric Circuit Theory
& EE 251	and Electric Circuits Laboratory
EE 314	Introduction to Communication
EE/CPE 336	Systems Microprocessor System Design
EE/CPE 330 EE 424	Introduction to Remote Sensing
ENVE 542	Sustainable Environmental
LIVVE 342	Engineering
IME 301	Operations Research I
IME 314	Engineering Economics
IME 315	Financial Decision Making for
	Engineers
IME 356	Manufacturing Automation
IME 403	Software Product Management
MATH 241	Calculus IV
MATH 242	Differential Equations I
MATH 248	Methods of Proof in Mathematics
MATH 341	Theory of Numbers
MATH 350	Mathematical Software
MATH 412	Introduction to Analysis I
ME 211	Engineering Statics
ME 212	Engineering Dynamics
ME 405	Mechatronics
PHIL 412	Epistemology
PHIL 422	Philosophy of Mind
PSY 329	Research Methods in Psychology
PSY 333	Quantitative Research Methods for the Behavioral Sciences
PSY 357	Cognition
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

A total of 0-4 technical elective units (depending on Track) 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 (http://catalog.calpoly.edu/search/?P=CSC%20123) is not taken in the major.

Up to a combined 4 units may be taken from CPE 400, CSC 400 (http://catalog.calpoly.edu/search/?P=CSC%20400), CSC 490 (http://catalog.calpoly.edu/search/?P=CSC%20490), CSC 493, or CSC 496 (http://catalog.calpoly.edu/search/?P=CSC%20496).