

## Computer Science with Business Applications

<i>Fall Quarter</i>	<i>Units</i>	<i>Winter Quarter</i>	<i>Units</i>	<i>Spring Quarter</i>	<i>Units</i>
FIRST YEAR					
CS 010A <i>C++ Programming I</i>	4	CS 010B <i>C++ Programming II</i>	4	CS 010C <i>Intro to Data Structures &amp; Algorithms</i>	4
ENGL 001A <i>Beginning Composition</i>	4	ENGL 001B <i>Intermediate Composition</i>	4	MATH 009C <i>First Year Calculus</i>	4
ENGR 001M <i>Professional Dev. &amp; Mentoring</i>	1	MATH 009B <i>First Year Calculus</i>	4	Breadth _____ <i>Humanities/Natural Sciences</i>	4
MATH 009A <i>First Year Calculus</i>	4	CS/MATH 011 <i>Intro to Discrete Structures</i>	4	Breadth _____ <i>Humanities/Natural Sciences</i>	4
SECOND YEAR					
BUS 020 <i>Financial Accounting &amp; Reporting</i>	4	MATH 010A <i>Multivariable Calculus</i>	4	ECON 002 <i>Intro to Macroeconomics</i>	5
CS 061 <i>Machine Org. &amp; Assembly Lang. Prog.</i>	4	CS 111 <i>Discrete Structures</i>	4	MATH 031 or EE 020B <i>Applied Linear Algebra</i>	4
CS 100 <i>Software Construction</i>	5	STAT 155 <i>Probability &amp; Statistics for Engr</i>	4	Breadth _____ <i>Humanities/Natural Sciences</i>	4
ECON 003 <i>Intro to Microeconomics</i>	5	Breadth _____ <i>Biological Sci (Biol 002 or BIOL 003, or BIOL</i>	4	Breadth _____ <i>Humanities/Natural Sciences</i>	4
THIRD YEAR					
BUS 103 <i>Marketing &amp; Distribution Mgmt</i>	4	BUS/STAT 104 <i>Decision Analysis &amp; Mgmt Science</i>	4	CS 153 <i>Design of Operating Systems</i>	4
CS 141 <i>Interm. Data Structures &amp; Algorithms</i>	4	BUS 106/ECON 134 <i>Intro to Financial Mgmt</i>	4	Breadth _____ <i>Humanities/Natural Sciences</i>	4
ENGR 180W** <i>Technical Communications</i>	4	SOC 150 <i>Soc. of Economic Organizations</i>	4	CS Technical Elective** _____	4
Breadth _____ <i>Humanities/Natural Sciences</i>	5	ENGR 101M <i>Professional Dev. &amp; Mentoring</i>	1	CS Technical Elective** _____	4
FOURTH YEAR					
BUS IS Tech Elec*** _____	4	BUS IS Tech Elec*** _____	4	CS Technical Elective** _____	4
CS Networks <i>CS 110, CS 160, CS 164, CS 166, CS 167, CS 169, CS 172, CS 180, CS 183</i>	4	CS Technical Elective* _____	4	BUS Technical Elective <sup>‡</sup> _____	4
CS Networks <i>CS 110, CS 160, CS 164, CS 166, CS 167, CS 169, CS 172, CS 180, CS 183</i>	4	CS Technical Elective*  <i>ENGR Elective</i>	4	BUS Technical Elective <sup>‡</sup> _____	4
		ECON 005, ECON 060, STAT 004, STAT 008, STAT 010, MATH 046			

Total Units: 182  
Maximum Units: 222

To earn a B.S., you must complete all College and University requirements. For a complete list: [catalog.ucr.edu](http://catalog.ucr.edu).

### ENGLISH COMPOSITION\*\*

A C or better is required in three quarters of English Composition courses to satisfy the graduation requirement. ENGR 180W fulfills third quarter English Composition.

### BREADTH REQUIREMENTS

For an approved list of Breadth courses: <http://student.engr.ucr.edu/policies/requirements/breadth.html>.

Humanities: (3 courses)

- A. World History: \_\_\_\_\_  
B. Fine Arts/Lit./Phil./Hist: \_\_\_\_\_  
C. Human Persp. on Sci: \_\_\_\_\_

Natural Sciences: (4 courses)

- A. Biological Science: \_\_\_\_\_  
B. Physical Science: 1 \_\_\_\_\_  
2 \_\_\_\_\_  
3 \_\_\_\_\_

Ethnicity: (1 course)

1. \_\_\_\_\_

Upper Division: (1 course)

1. \_\_\_\_\_

### TECHNICAL ELECTIVES \*\*\*

Please note that Technical Electives may be offered throughout the Academic Year. Consult with your Academic Advisor about potential offerings. See approved technical electives on back.

Computer Science Technical Electives:

1. \_\_\_\_\_ 3. \_\_\_\_\_  
2. \_\_\_\_\_ 4. \_\_\_\_\_  
5. \_\_\_\_\_

Business Administration Technical Electives:

1. \_\_\_\_\_ (IS) 3. \_\_\_\_\_  
2. \_\_\_\_\_ (IS) 4. \_\_\_\_\_

Course Plan is subject to change.

## Computer Science w/Business Applications Technical Electives

### Computer Science Technical Electives:

You must complete at least 20 units of upper division Computer Science Technical Electives which must be distinct from major requirements. These 20 units may be chosen from upper division requirements or technical electives for the Computer Science Major.

CS 105	Data Analysis Methods (4)	CS 164	Computer Networks (4)
CS 108	Data Science Ethics (4)	CS 165	Computer Security (4)
CS 110	Web Development (4)	CS 166	Database Management Systems (4)
CS 120A	Logic Design (5)	CS 167	Intro to BIG-DATA Management (4)
CS 120B	Introduction to Embedded Systems (4)	CS/EE 168	Intro to Very Large Scale Integration (VLSI) Design (4)
CS 122A	Inter. Embedded&Real-Time Syst. (5)	CS 169	Mobile Wireless Networks (4)
CS 122B	Adv Embedded&Real-Time Syst (5)	CS 170	Introduction to Artificial Intelligence (4)
CS 130	Computer Graphics (4)	CS 171/EE 142	Intro to Machine Learning & Data Mining (4)
CS 131	Edge Computing (4)	CS 172	Introduction to Information Retrieval (4)
CS 133	Computational Geometry (4)	CS 173	Intro to Natural Language Processing
CS 135	Virtual Reality (4)	CS 175	Entrepreneurship in Computing (4)
CS 142	Algorithm Engineering (4)	CS 177	Modeling & Simulation (4)
CS 144	Algorithm for Bioinformatics (4)	CS 178B	Project Sequence in CS (4)
CS 145	Combinatorial Optimization Algor. (4)	CS 179 (E-Z)	Project in Computer Science (4 units maximum)
CS/EE 147	GPU Programming	CS 180	Introduction to Software Engineering (4)
CS 150	Theory of Automata & Formal Lang. (4)	CS 181	Principles of Programming Languages (4)
CS 152	Compiler Design (4)	CS 182	Software Testing and Verification (4)
CS 160	Concurrent Programming & Parallel Systems (4)	CS 183	UNIX System Administration (4)
CS 161	Design&Architecture of Comp. Syst. (4)	CS 193	Design Project (4 units maximum)
CS 162	Computer Architecture (4)		

### Business Administration Technical Electives:

You must complete at least 16 units of upper division Business Administration Technical Electives, including at least 8 units of courses listed in the Information Systems concentration within the Business Administration major. These units must be distinct from major requirements and may be chosen from any of the available Business Administration courses.

*\* Choose at least TWO from Information Systems courses:*

BUS 110	Data Mining & Visual Analytics (4)
BUS 125	Simulation for Business (4)
BUS 128	Project Planning and Control (4)
BUS 163	Technology Entrepreneurship (4)
BUS 166	Accounting Information Systems (4)
BUS 171	System Analysis & Design (4)
BUS 172	Information Economics (4)
BUS 173	Introduction to Databases for Mgmt (4)
BUS 174	Electronic Commerce (4)
BUS 175	Business Data Communications (4)
BUS 179	Business App of GIS (4)

*\* Choose remaining TWO from:*

*ANY AVAILABLE UPPER DIVISION BUSINESS ADMINISTRATION (BUS) COURSES, EXCEPT BUS 101*

Please note the following credit exceptions:

No credit is given for BUS 101

Only one of BUS 163 or CS 175 can be taken for credit

Only one of BUS 171 or CS 180 can be taken for credit

Only one of BUS 173 or CS 166 can be taken for credit

Only one of BUS 175 or CS 164 can be taken for credit

Only one of BUS 125 or CS 177 can be taken for credit

1 Technical Electives may require that you complete additional courses as prerequisites that are not accounted for in the undergraduate program. Please go to [www.catalog.ucr.edu](http://www.catalog.ucr.edu) for course descriptions and prerequisite information.

### Computer Science with Business Applications Course Details

ENGR 001M: Required for freshman students. ENGR 001M is waived for transfer students.

ENGR 101M: ONLY offered in Winter quarter. For Junior or Senior standing.

ENGR 180W: Students must enroll in the corequisite of ENGL 007 (.5 units) and be Junior or Senior standing.

CSBA students do NOT take STAT 008 and BUS 101. You are required to take STAT 155 in lieu of STAT 008.

**Upper Division Business courses which require STAT 008 and/or BUS 101, please submit the enrollment permit request form:**

<https://business.ucr.edu/undergraduate/student-forms>