Welcome to the

Computer Science Major

in the College of Physical and Mathematical Sciences

College Advisement Center
      Website: https://science.byu.edu/advisement
      Email: science.math.advisement@byu.edu
      Phone: 801-422-2674
      Office: N-181 ESC

Computer Science Department
      Website: cs.byu.edu
      Email: csoffice@cs.byu.edu
      Phone: 801-422-3027
      Office: 3361 TMCB

Undergraduate Department Advisor – Lynnette Nelson
      Email: lnelson@cs.byu.edu
      Phone: 801-422-9439
      Office: 2250 TMCB

Internship Coordinator – Dennis Ng (International Students only)
      Email: ng@compsci.byu.edu
      Phone: 801-422-2835
      Office: 3322 TMCB

University Career Services – Lane Muranaka
      Website: careers.byu.edu (Handshake--see flyer in packet)
      Email: lane_muranaka@byu.edu
      Phone: 801-422-9360, or 801-422-2674 (schedule appointment)
      Office: N221-J ESC

STEM Alliance--Connect with STEM employers, mentors, and clubs: stemalliance.byu.edu

Clubs
      ACM – Kimball Germane, kimball@cs.byu.edu, and visit acm.byu.edu to join and learn more
      AI— Porter Jenkins, pjenkins@cs.byu.edu
      Developers Club – Kimball Germane, kimball@cs.byu.edu, and visit dev.byu.edu to join and learn more
      BYU Competitive Programming Club—Ryan Farrell (2216 TMCB), farrell@cs.byu.edu, 422-3222
      Gaming – Seth Holladay (2220 TMCB), seth_holladay@byu.edu, 422-6490
      Linux Users Group – Casey Deccio (3368 TMCB), linuxclub.cs.byu.edu, 422-5319
      Women in Computer Science – Nancy Fulda - nfulda@cs.byu, and visit wics.byu.edu to join and learn more

Learning outcomes can be found here: https://learningoutcomes.byu.edu/Courses/program-courses/693220/Computer+Science+BS+/1323

Things to Know

Resources for Graduation Planning

- o Flow Charts and Major Academic Plans (MAPs) can be found here: https://science.byu.edu/advisement/flowcharts.
- o Academic advisors in N-181 ESC will help you understand course sequencing and help you plan classes to efficiently fill requirements. They can also help you with study skills and initial career exploration as well as connecting you with correct resources.
- o Plan and register from your plan on MyMAP. Your academic advisor can help you understand how to best utilize this resource.
- o Evaluate your current program. Periodically major programs are updated. An academic advisor would be happy to review the differences between the programs with you to help you determine what would be best for you.
- o Consider meeting with a faculty advisor in your department. Contact info is found on first page of this packet.

Tutoring Resources and Research

- o Volunteer peer tutors are available through Y Serve if you need help with a class. Also, if you excel in a subject, consider serving your fellow students by becoming a tutor. Find out more here: https://tutoring.byu.edu/.
- o Many departments provide TA Tutorial Labs and research opportunities. Check your department for details:
    - Chemistry and Biochemistry: C-100 BNSN, 801-422-3667, https://www.chem.byu.edu/
    - Computer Science: 3361 TMCB, 801-422-3027, csoffice@cs.byu.edu
    - Geological Sciences: S-389 ESC, 801-422-3918, geology@byu.edu
    - Mathematics: 275 TMCB, 801-422-2061, office@mathematics.byu.edu
    - Mathematics Education: 167 TMCB, 801-422-1735, office@mathed.byu.edu
    - Physics and Astronomy: N-283 ESC, 801-422-4361, physics_office@byu.edu
    - Statistics: 2152 WVB, 801-422-4505, statsec@stat.byu.edu

Prepare Early for a Career

- o Check out University Career Services in 2590 WSC and at https://ucs.byu.edu/.
- o Consider doing an internship.
    - Attend the STEM and Career Fairs held in fall and winter semesters.
    - Talk to your department about internship opportunities.
    - Use LinkedIn and Handshake (see flyer in this packet) to connect with alumni and apply for jobs/internships. BYU Connect is another great resource for networking (connect.byu.edu).
    - Talk with the college Career Director who can help you search for internships as well as assist you with many other career related strategies (see first page of this packet).
- o Consider taking StDev 317 (Career Strategies) your junior year.
- o Consider taking either Chem 502, CS 502, Geol 502, Math 502, PHSCS 502, or STAT 502 (1-credit Job Search Class). Class is held for 1 hour per week for eight non-consecutive weeks throughout the semester.

BS in Computer Science (693220) MAP Sheet

Physical and Mathematical Sciences, Computer Science
For students entering the degree program during the 2022-2023 curricular year.

University Core and Graduation Requirements	Suggested Sequence of Courses

University Core Requirements:

Requirements	#Classes	Hours	Classes
Religion Cornerstones			
Teachings and Doctrine of The Book of Mormon	1	2.0	REL A 275
Jesus Christ and the Everlasting Gospel	1	2.0	REL A 250
Foundations of the Restoration	1	2.0	REL C 225
The Eternal Family	1	2.0	REL C 200
The Individual and Society			
American Heritage	1-2	3-6.0	from approved list
Global and Cultural Awareness	1	3.0	from approved list
Skills			
First Year Writing	1	3.0	from approved list
Advanced Written and Oral Communications	1	3.0	WRTG 316*
Quantitative Reasoning	1	4.0	MATH 112* or 113*
Languages of Learning (Math or Language)	1	4.0	MATH 112* or 113*
Arts, Letters, and Sciences			
Civilization 1	1	3.0	from approved list
Civilization 2	1	3.0	from approved list
Arts	1	3.0	from approved list
Letters	1	3.0	from approved list
Biological Science	1	3-4.0	from approved list
Physical Science	1	3.0	CS 312*
Social Science	1	3.0	from approved list
Core Enrichment: Electives			
Religion Electives	3-4	6.0	from approved list
Open Electives	Variable	Variable	personal choice

*THESE CLASSES FILL BOTH UNIVERSITY CORE AND PROGRAM REQUIREMENTS (13 hours overlap)

Graduation Requirements:

Minimum residence hours required	30.0
Minimum hours needed to graduate	120.0

Suggested Sequence of Courses

FRESHMAN YEAR
<u>1st Semester</u>

C S 111	3.0
First-year Writing or American Heritage	3.0
MATH 112	4.0
General Education courses, university requirements, and/or general electives	3.0
Religion Cornerstone course	2.0
Total Hours	**15.0**

<u>2nd Semester</u>

PHSCS 121	3.0
C S 235	3.0
American Heritage or First-year Writing	3.0
MATH 113	4.0
Religion Cornerstone course	2.0
Total Hours	**15.0**

SOPHOMORE YEAR
<u>3rd Semester</u>

C S 236	3.0
C S 224	3.0
STAT 121 or STAT 201 or MATH 431	3.0
Civilization 1	3.0
Religion Cornerstone course	2.0
Total Hours	**14.0**

<u>4th Semester</u>

C S 240	4.0
C S 252	3.0
Biological Science	3.0
MATH 213	2.0
MATH 215	1.0
Religion Cornerstone Course	2.0
Total Hours	**15.0**

JUNIOR YEAR
<u>5th Semester</u>

C S 312	3.0
C S 340	3.0
C S 324	3.0
WRTG 316	3.0
Religion elective	2.0
General electives	2.0
Total Hours	**16.0**

<u>6th Semester</u>

Computer Science Elective	3.0
Computer Science Elective	3.0
Computer Science Elective	3.0
C S 404	2.0
Letters	3.0
Religion Elective	2.0
Total Hours	**16.0**

SENIOR YEAR
<u>7th Semester</u>

Computer Science Elective	3.0
Computer Science Elective	3.0
Computer Science Elective	3.0
Arts	3.0
Religion Elective	2.0
Total Hours	**14.0**

<u>8th Semester</u>

CS/MATH/Science Elective	3.0
Computer Science Elective	3.0
Civilization 2	3.0
Global and Cultural Awareness	3.0
Social Science	3.0
Total Hours	**15.0**

Note: The sequence of courses suggested may not fit the circumstances of every student. Students should contact their college advisement center for help in outlining an efficient schedule.
Note 2: Students are encouraged to complete an average of 15 credit hours each semester or 30 credit hours each year, which could include spring and/or summer terms. Taking fewer credits substantially increases the cost and the number of semesters to graduate.

BS in Computer Science (693220)
2022-2023 Program Requirements (74 Credit Hours)

Computer science majors, especially those planning graduate work, are advised to acquire a strong background in mathematics, possibly a minor.

Personnel in the College of Physical and Mathematical Sciences Advisement Center will advise regarding core courses and suggested general education. Questions regarding curriculum and career decisions should be directed to the undergraduate advisor in the Computer Science Department.

Note: All hours of credit applied toward a major in computer science must be of C- or better and must be taken within eight years of declaring the computer science major. Any exceptions must be approved by the department. Students may choose to graduate under later requirements by updating their date of entry into the major at the college advisement center.

Note: No double counting is allowed within the major.

REQUIREMENT 1 Complete 10 courses
CORE COURSES:

C S 111 - Introduction to Computer Science	3.0
C S 224 - Introduction to Computer Systems	3.0
C S 235 - Data Structures and Algorithms	3.0
C S 236 - Discrete Structures	3.0
C S 240 - Advanced Programming Concepts	4.0
C S 252 - Introduction to Computational Theory	3.0
C S 312 - Algorithm Design and Analysis	3.0
C S 324 - Systems Programming	3.0
C S 340 - Software Design	3.0
C S 404 - Ethics and Computers in Society	2.0

REQUIREMENT 2 Complete 3 options
SUPPORTING COURSES:

OPTION 2.1 Complete 4 courses

MATH 112 - Calculus 1	4.0
MATH 113 - Calculus 2	4.0
PHSCS 121 - Introduction to Newtonian Mechanics	3.0
*WRTG 316 - Technical Communication	3.0

OPTION 2.2 Complete 1 group

GROUP 2.2.1 Complete 1 course
MATH 313 - (Not currently offered)

GROUP 2.2.2 Complete 2 courses

MATH 213 - Elementary Linear Algebra	2.0
MATH 215 - Computational Linear Algebra	1.0

OPTION 2.3 Complete 1 course

MATH 431 - Probability Theory	3.0
STAT 121 - Principles of Statistics	3.0
STAT 201 - Statistics for Engineers and Scientists	3.0

REQUIREMENT 3 Complete 24.0 hours from the following option(s)
COMPLETE A TOTAL OF 8 COURSES (24 HOURS) FROM THE FOLLOWING THREE GROUPS:

OPTION 3.1 Complete up to 24.0 hours from the following course(s)
COMPLETE 12-24 CREDIT HOURS FROM THE FOLLOWING COURSES. A MINIMUM OF 4 OF THE EIGHT ELECTIVE COURSES MUST BE FROM THIS GROUP.

C S 260 - Web Programming	3.0
C S 329 - Testing, Analysis, and Verification	3.0
C S 330 - Concepts of Programming Languages	3.0
C S 345 - Operating Systems Design	3.0
C S 355 - Interactive Graphics and Image Processing	3.0
C S 356 - Designing the User Experience	3.0
C S 393 - Advanced Algorithms and Problem Solving	3.0
C S 401R - Topics in Computer Science	3.0v
You may take up to 3 credit hours.	
C S 412 - Linear Programming and Convex Optimization	3.0
C S 428 - Software Engineering	3.0
C S 431 - Algorithmic Languages and Compilers	3.0
C S 450 - Computer Vision	3.0
C S 452 - Database Modeling Concepts	3.0
C S 453 - Fundamentals of Information Retrieval	3.0
C S 455 - Computer Graphics	3.0
C S 456 - Introduction to User Interface Software	3.0
C S 460 - Computer Communications and Networking	3.0
C S 462 - Large-Scale Distributed System Design	3.0
C S 465 - Computer Security	3.0
C S 470 - Introduction to Artificial Intelligence	3.0
C S 471 - Voice User Interfaces	3.0
C S 472 - Introduction to Machine Learning	3.0
C S 474 - Introduction to Deep Learning	3.0
C S 486 - Verification and Validation	3.0
C S 501R - Advanced Topics in Computer Science	3.0v
You may take up to 3 credit hours.	
C S 513 - Robust Control	3.0

C S 580 - Theory of Predictive Modeling	3.0

Note: If C S 401R or C S 501R is chosen, it must be taken for three hours.

OPTION 3.2 Complete up to 9.0 hours from the following course(s)
COMPLETE UP TO 9.0 CREDIT HOURS FROM THE FOLLOWING COURSES. UP TO 3 OF THE EIGHT ELECTIVE COURSES COULD BE FROM THIS GROUP.

C S 180 - Introduction to Data Science	3.0
C S 405 - Creating and Managing a Software Business	3.0
EC EN 424 - Computer Systems	4.0
EC EN 425 - Real-Time Operating Systems	4.0
IT&C 567 - Cybersecurity and Penetration Testing	3.0
MATH 411 - Numerical Methods	3.0
MATH 485 - Mathematical Cryptography	3.0

OPTION 3.3 Complete up to 9.0 hours from the following course(s)
COMPLETE UP TO 9.0 CREDIT HOURS FROM THE FOLLOWING COURSES. UP TO 3 OF THE EIGHT ELECTIVE COURSES COULD BE FROM THIS GROUP.

C S 480 - Software Engineering Capstone 1	3.0
C S 481 - Software Engineering Capstone 2	3.0
C S 482 - Data Science Capstone 1	3.0
C S 483 - Data Science Capstone 2	3.0
C S 493R - Computing Competitions	3.0
You may take up to 3 credit hours.	
C S 494 - Capstone 1	3.0
C S 495 - Capstone 2	3.0
C S 497R - Undergraduate Research	3.0
You may take up to 6 credit hours.	
C S 498R - Undergraduate Special Projects	3.0v
You may take up to 3 credit hours.	

Note: If C S 493R, C S 497R, C S 498R, or C S 501R is chosen, it must be taken for three credit hours.

REQUIREMENT 4
Complete Senior Exit Interview with the CS department during your last semester or term.

BS in Computer Science (693220)

2022-2023

THE DISCIPLINE

Computer science touches virtually every area of human endeavor. Software is responsible for everything from the control of kitchen appliances to sophisticated climate models used in predicting future environmental change. Students in computer science learn to approach complex problems in business, science, and entertainment using their strong background in mathematics, algorithms, and data structures.

The degree programs in the Computer Science Department prepare students to be confident software developers and technical problem solvers. The curriculum also trains students for research into new avenues where computers will have a significant impact. The BS curriculum is accredited by the Computing Accreditation Commission of ABET.

CAREER OPPORTUNITIES

Graduates pursue exciting opportunities in graphics, artificial intelligence, software engineering, database design, scientific programming, systems administration, and research at universities and national laboratories.

Students completing the animation emphasis will be prepared for technical positions at animation and game programming studios. Students will learn both the technical and artistic side of creating and implementing digital animations and games.

The bioinformatics emphasis is designed for students who are interested in building software to assist in analyzing biological systems. Students will graduate with a significant background in biology coupled with the software development and analysis skills necessary to implement large bioinformatics applications.

MAP DISCLAIMER

While every reasonable effort is made to ensure accuracy, there are some student populations that could have exceptions to listed requirements. Please refer to the university catalog and your college advisement center/department for complete guidelines.

DEPARTMENT INFORMATION

Computer Science Department
Brigham Young University
3361 Talmage Building
Provo, UT 84602
Telephone: (801) 422-3027

ADVISEMENT CENTER INFORMATION

Physical and Mathematical Sciences College Advisement Center
Brigham Young University
N-181 ESC
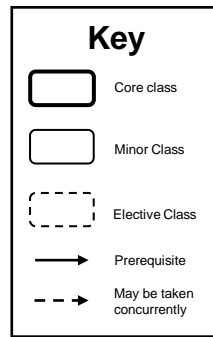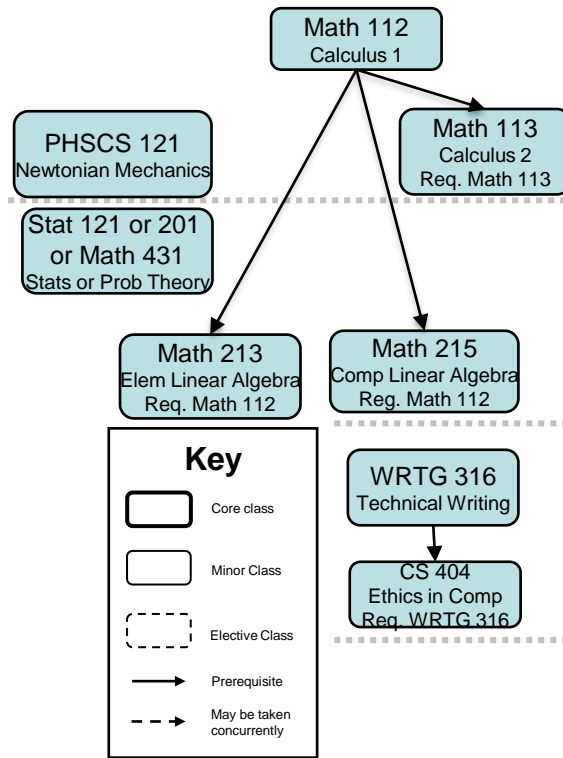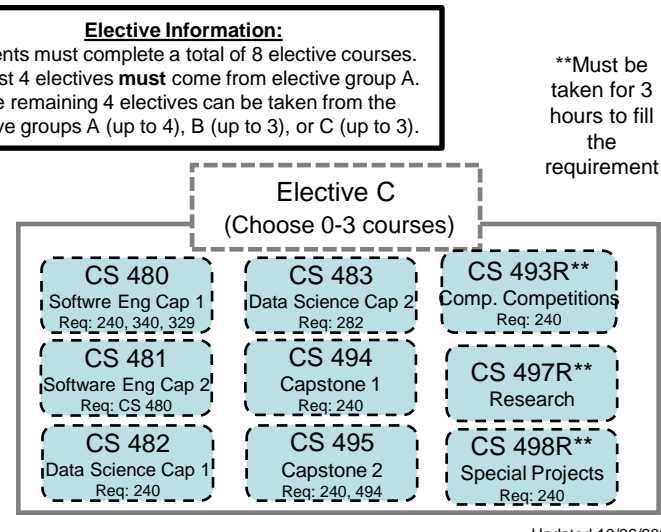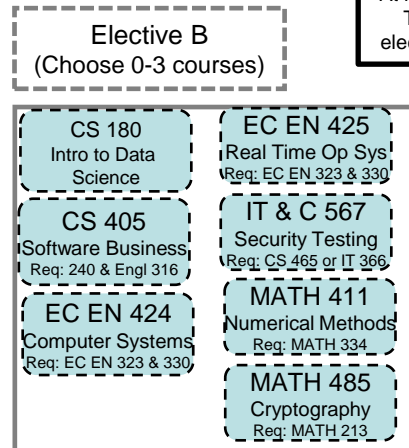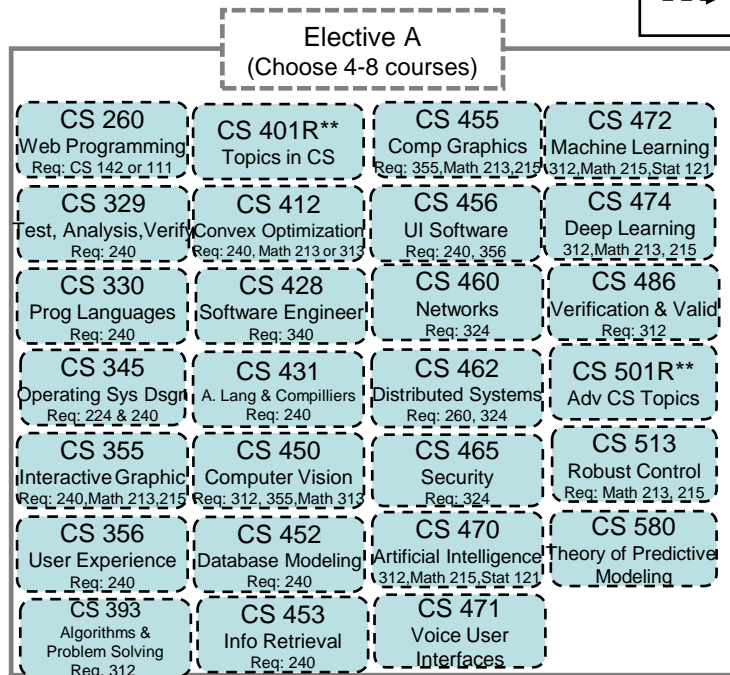Provo, UT 84602
Telephone: (801) 422-2674

BYU Computer Science Major
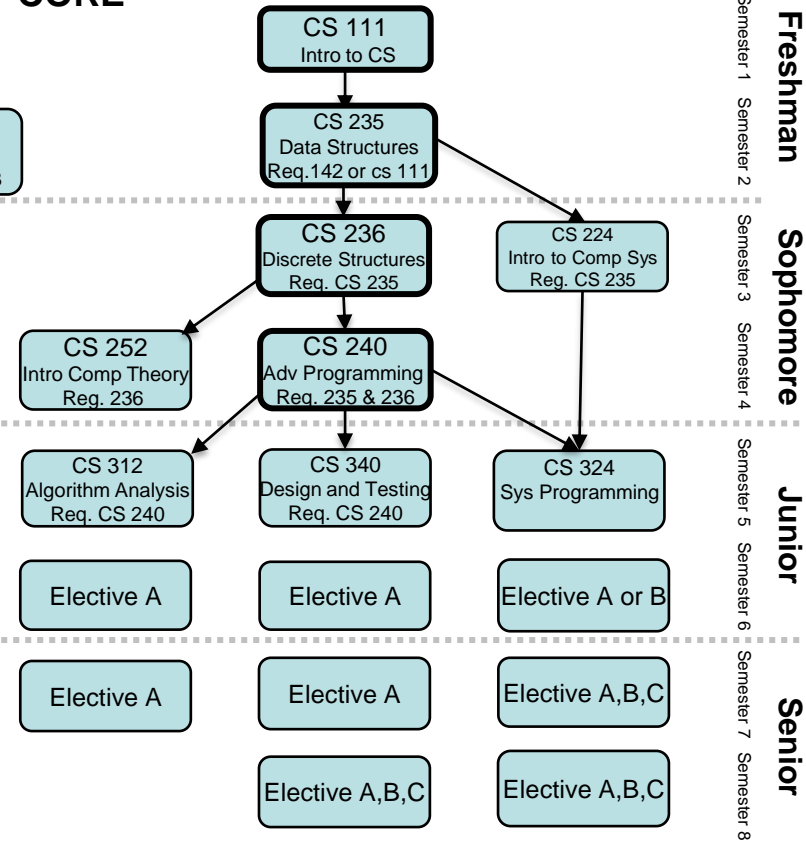
Fall 2022 Requirements

Major (74 Hours)
1. Grades below C- are not allowed in major courses.
2. Complete the following courses: CS 111, 224, 235, 236, 240, 252, 312, 324, 340, 404
3. Complete the following supporting courses: WRTG 316, Math 112,113, 213, 215, and Phscs 121
4. Complete one of the following: Math 431, Stat 121 or Stat 201
5. Complete a total of 8 elective courses from the follow three groups:
   a. 4-8 courses **must** be from the following courses: CS 260, 329, 330, 345, 355, 356, 393, 401R**,412,428, 431, 450, 452, 453, 455, 456, 460, 462, 465, 470, 471, 472, 474, 486, 501R**, 513, 580
   b. Up to 3 courses from the following courses: CS 180, 405, EC EN 424, EC EN 425, , IT & C 567, MATH 411, MATH 485
   c. Up to 3 courses from the following courses: CS 480, 481, 482, 483, 493R**, 494, 495, 497R**, 498R**

(If CS 401R, 493R, 497R, 498R, or 501R is chosen, it must be taken for three credit hours)

Guide only---please consult MyMap for full requirements.

Key

Symbol	Meaning
Core class
Minor Class
Elective Class
→	Prerequisite
⇢	May be taken concurrently

Semester labels (right margin)
- Freshman: Semester 1, Semester 2
- Sophomore: Semester 3, Semester 4
- Junior: Semester 5, Semester 6
- Senior: Semester 7, Semester 8

Core flowchart

- Math 112 — Calculus 1
- PHSCS 121 — Newtonian Mechanics
- Math 113 — Calculus 2 — Req. Math 113
- Stat 121 or 201 or Math 431 — Stats or Prob Theory
- CS 111 — Intro to CS
- CS 235 — Data Structures — Req.142 or cs 111
- CS 236 — Discrete Structures — Req. CS 235
- CS 224 — Intro to Comp Sys — Req. CS 235
- Math 213 — Elem Linear Algebra — Req. Math 112
- Math 215 — Comp Linear Algebra — Req. Math 112
- CS 252 — Intro Comp Theory — Req. 236
- CS 240 — Adv Programming — Req. 235 & 236
- WRTG 316 — Technical Writing
- CS 312 — Algorithm Analysis — Req. CS 240
- CS 340 — Design and Testing — Req. CS 240
- CS 324 — Sys Programming
- CS 404 — Ethics in Comp — Req. WRTG 316
- Elective A
- Elective A
- Elective A or B
- Elective A
- Elective A
- Elective A,B,C
- Elective A,B,C
- Elective A,B,C

Elective Information:
Students must complete a total of 8 elective courses. At least 4 electives **must** come from elective group A. The remaining 4 electives can be taken from the elective groups A (up to 4), B (up to 3), or C (up to 3).

**Must be taken for 3 hours to fill the requirement

Elective A (Choose 4-8 courses)

- **CS 260** — Web Programming — Req: CS 142 or 111
- **CS 401R**** — Topics in CS
- **CS 455** — Comp Graphics — Req: 355,Math 213,215
- **CS 472** — Machine Learning — 312,Math 215,Stat 121
- **CS 329** — Test, Analysis,Verify — Req: 240
- **CS 412** — Convex Optimization — Req: 240, Math 213 or 313
- **CS 456** — UI Software — Req: 240, 356
- **CS 474** — Deep Learning — 312,Math 213, 215
- **CS 330** — Prog Languages — Req: 240
- **CS 428** — Software Engineer — Req: 340
- **CS 460** — Networks — Req: 324
- **CS 486** — Verification & Valid — Req: 312
- **CS 345** — Operating Sys Dsgn — Req: 224 & 240
- **CS 431** — A. Lang & Compilliers — Req: 240
- **CS 462** — Distributed Systems — Req: 260, 324
- **CS 501R**** — Adv CS Topics
- **CS 355** — Interactive Graphic — Req: 240,Math 213,215
- **CS 450** — Computer Vision — Req: 312, 355,Math 313
- **CS 465** — Security — Req: 324
- **CS 513** — Robust Control — Req: Math 213, 215
- **CS 356** — User Experience — Req: 240
- **CS 452** — Database Modeling — Req: 240
- **CS 470** — Artificial Intelligence — 312,Math 215,Stat 121
- **CS 580** — Theory of Predictive Modeling
- **CS 393** — Algorithms & Problem Solving — Req: 312
- **CS 453** — Info Retrieval — Req: 240
- **CS 471** — Voice User Interfaces

Elective B (Choose 0-3 courses)

- **CS 180** — Intro to Data Science
- **EC EN 425** — Real Time Op Sys — Req: EC EN 323 & 330
- **CS 405** — Software Business — Req: 240 & Engl 316
- **IT & C 567** — Security Testing — Req: CS 465 or IT 366
- **EC EN 424** — Computer Systems — Req: EC EN 323 & 330
- **MATH 411** — Numerical Methods — Req: MATH 334
- **MATH 485** — Cryptography — Req: MATH 213

Elective C (Choose 0-3 courses)

- **CS 480** — Softwre Eng Cap 1 — Req: 240, 340, 329
- **CS 483** — Data Science Cap 2 — Req: 282
- **CS 493R**** — Comp. Competitions — Req: 240
- **CS 481** — Software Eng Cap 2 — Req: CS 480
- **CS 494** — Capstone 1 — Req: 240
- **CS 497R**** — Research
- **CS 482** — Data Science Cap 1 — Req: 240
- **CS 495** — Capstone 2 — Req: 240, 494
- **CS 498R**** — Special Projects — Req: 240

Handshake: BYU's Online Job Board

handshake

BYU's own job board. Employers who want to hire BYU graduates or offer internships to current students post job openings to this website and students apply. Just like LinkedIn, employers can view student profiles and students can network as they apply for jobs and internships

Login to handshake.byu.edu >>> BYU Net ID

*you do not need to create an account, just sign in with you BYU information

HOW TO MAKE THE MOST OUT OF HANDSHAKE:

1. COMPLETE YOUR PROFILE

- Upload your resume and it will auto-fill in your profile
- Completed profiles tailor your Handshake experience
- Information from your transcript is already uploaded
- Fill in the Summary/Bio section
- Fill in yor past jobs and experiences, including all the bullet points you use on your resume
- Add a professional headshot and background photo

Remember: every word in your profile will be searchable by students and employers

employers are
5X MORE LIKELY
to view a profile that has at least one job/skill/organization

2. APPLY FOR JOBS

- Search for job titles, employers, or skills
- Apply for interesting jobs that meet your skill set

3. RESEARCH COMPANIES

- Under the "Jobs" Tab there is an "Employers" Tab
- Search for keywords or locations to find companies that are the right fit for you
- Plan to attend their info sessions on BYU Campus, connect with them at Career Fairs, or set up informational interviews to learn more

Remember: when looking at companies or jobs, Handshake will tell you what other BYU students have worked there. Use this resource to network and discover more information!

4. EXPLORE FELLOW STUDENTS

- "Students" tab
- Search for fellow BYU students to view their profiles and job positions (Facebook stalking... "networking")

5. ATTEND EVENTS

- The "Events" tab will be your key to attending info sessions, interviews, and Career Fairs
- The "Calendar" tab under "Events" will show you what events are coming soon
- Make sure to save events you are interested in or RSVP so you do not forget to attend
- Spread the word to your friends on social media

6. DOWNLOAD HANDSHAKE APP

- Search: "Handshake" not "Handshake Career Services"
- Input your BYU e-mail address: netID@byu.edu (it will forward emails to the e-mail you have on file with BYU)
- Handshake will send you a link via e-mail to enable your account in the app
- Navigate the app to perform all the functions of the website that have been previously mentioned

7. VISIT THE CAREER STUDIO

- Freshen up your resume, cover letter, or LinkedIn
- Receive networking help
- Practice interviewing with a mock interview
- Meet with a full-time Career Counselor in your field

8. GET A JOB, RING THE BELL

- Once you're hired, stop by the Career Studio to ring our Victory Bell and get a picture for the Victory Board

Possible Careers
with a Computer Science major
(Not a comprehensive list)

Animation Tool Developer
Applications developer
Artificial intelligence engineer
Bioinformatics developer
Business intelligence analyst
Cloud-related jobs – devops engineer, cloud engineer,
        virtualization engineer, web serviced engineer
Computational and information scientist
Computer programmer
Computer systems analyst
Cyber Security Analyst
Data scientist
Database manager
Embedded Systems Programmer
Multimedia programmer
Network Engineer
Network Architect
Professor*
Research Scientist
Robotics software engineer
Security Engineer
Security Architect
Software Test Engineer
Software Development Manager
Software Engineer
Systems Engineer
UI/UX Engineer
UI/UX Researcher
Video game developer and designer
Web designer
Web programmer

*Usually requires a graduate degree

More information is available at the Counseling and Career Center and from CareerOneStop:
http://www.careeronestop.org/