

Welcome to the

# Computer Science Major Bioinformatics Emphasis

in the College of Physical and Mathematical Sciences

## College Advisement Center

Website: <https://science.byu.edu/advisement>  
Email: [science.math.advisement@byu.edu](mailto:science.math.advisement@byu.edu)  
Phone: 801-422-2674  
Office: N-181 ESC

## Computer Science Department

Website: [cs.byu.edu](http://cs.byu.edu)  
Email: [csoffice@cs.byu.edu](mailto:csoffice@cs.byu.edu)  
Phone: 801-422-3027  
Office: 3361 TMCB

## Undergraduate Department Advisor – Lynnette Nelson

Email: [lnelson@cs.byu.edu](mailto:lnelson@cs.byu.edu)  
Phone: 801-422-9439  
Office: 2250 TMCB

## Internship Coordinator – Dennis Ng (International Students only)

Email: [ng@compsci.byu.edu](mailto:ng@compsci.byu.edu)  
Phone: 801-422-2835  
Office: 3322 TMCB

## University Career Services – Lane Muranaka

Website: [careers.byu.edu](http://careers.byu.edu) (Handshake--see flyer in packet)  
Email: [lane\\_muranaka@byu.edu](mailto: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](http://stemalliance.byu.edu)

## Clubs

**ACM** – Kimball Germane, [kimball@cs.byu.edu](mailto:kimball@cs.byu.edu), and visit [acm.byu.edu](http://acm.byu.edu) to join and learn more

**AI**— Porter Jenkins, [pjenkins@cs.byu.edu](mailto:pjenkins@cs.byu.edu)

**Developers Club** – Kimball Germane, [kimball@cs.byu.edu](mailto:kimball@cs.byu.edu), and visit [dev.byu.edu](http://dev.byu.edu) to join and learn more

**BYU Competitive Programming Club**—Ryan Farrell (2216 TMCB), [farrell@cs.byu.edu](mailto:farrell@cs.byu.edu), 422-3222

**Gaming** – Seth Holladay (2220 TMCB), [seth\\_holladay@byu.edu](mailto:seth_holladay@byu.edu), 422-6490

**Linux Users Group** – Casey Deccio (3368 TMCB), [linuxclub.cs.byu.edu](http://linuxclub.cs.byu.edu), 422-5319

**Women in Computer Science** – Nancy Fulda - [nfulda@cs.byu](mailto:nfulda@cs.byu), and visit [wics.byu.edu](http://wics.byu.edu) to join and learn more

Learning outcomes can be found here: <https://learningoutcomes.byu.edu/Courses/program-courses/693222/Computer+Science+BS+Bioinformatics/1323>



# Things to Know

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## Resources for Graduation Planning

- Flow Charts and Major Academic Plans (MAPs) can be found here:  
<https://science.byu.edu/advisement/flowcharts>.
- 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.
- Plan and register from your plan on MyMAP. Your academic advisor can help you understand how to best utilize this resource.
- 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.
- Consider meeting with a faculty advisor in your department. Contact info is found on first page of this packet.

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## Tutoring Resources and Research

- 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/>.
- 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](mailto:csoffice@cs.byu.edu)
  - Geological Sciences: S-389 ESC, 801-422-3918, [geology@byu.edu](mailto:geology@byu.edu)
  - Mathematics: 275 TMCB, 801-422-2061, [office@mathematics.byu.edu](mailto:office@mathematics.byu.edu)
  - Mathematics Education: 167 TMCB, 801-422-1735, [office@mathed.byu.edu](mailto:office@mathed.byu.edu)
  - Physics and Astronomy: N-283 ESC, 801-422-4361, [physics\\_office@byu.edu](mailto:physics_office@byu.edu)
  - Statistics: 2152 WVB, 801-422-4505, [statsec@stat.byu.edu](mailto:statsec@stat.byu.edu)

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## Prepare Early for a Career

- Check out University Career Services in 2590 WSC and at <https://ucs.byu.edu/>.
- 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](http://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).
- Consider taking StDev 317 (Career Strategies) your junior year.
- 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: Bioinformatics (693222) 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	
<b>University Core Requirements:</b>		
<b>Requirements</b>	<b>#Classes</b>	<b>Hours</b>
<b>Religion Cornerstones</b>		<b>Classes</b>
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
<b>The Individual and Society</b>		
American Heritage	1-2	3-6.0 from approved list
Global and Cultural Awareness	1	3.0 from approved list
<b>Skills</b>		
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*
<b>Arts, Letters, and Sciences</b>		
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	4.0 BIO 130*
Physical Science	2	7.0 CHEM 105* & PHSCS 121*
Social Science	1	3.0 from approved list
<b>Core Enrichment: Electives</b>		
Religion Electives	3-4	6.0 from approved list
Open Electives	Variable	Variable personal choice
*THESE CLASSES FILL BOTH UNIVERSITY CORE AND PROGRAM REQUIREMENTS (18-22 hours overlap)		
<b>Graduation Requirements:</b>		
Minimum residence hours required		30.0
Minimum hours needed to graduate		120.0
<p><b>FRESHMAN YEAR</b></p> <p><u>1st Semester</u></p> <p>C S 111 3.0</p> <p>First-year Writing or American Heritage 3.0</p> <p>BIO 130 4.0</p> <p>MATH 112 4.0</p> <p>Religion Cornerstone course 2.0</p> <p><b>Total Hours 16.0</b></p> <p><u>2nd Semester</u></p> <p>First-year Writing or American Heritage 3.0</p> <p>C S 235 3.0</p> <p>BIO 165 3.0</p> <p>MATH 113 4.0</p> <p>Religion Cornerstone course 2.0</p> <p><b>Total Hours 15.0</b></p> <p><b>SOPHOMORE YEAR</b></p> <p><u>3rd Semester</u></p> <p>C S 236 3.0</p> <p>Civilization 1 3.0</p> <p>C S 224 3.0</p> <p>CHEM 105 4.0</p> <p>Religion Cornerstone course 2.0</p> <p><b>Total Hours 15.0</b></p> <p><u>4th Semester</u></p> <p>C S 240 4.0</p> <p>BIO 264 3.0</p> <p>MATH 213 2.0</p> <p>MATH 215 1.0</p> <p>Religion Cornerstone course 2.0</p> <p>Arts 3.0</p> <p><b>Total Hours 15.0</b></p> <p><b>JUNIOR YEAR</b></p> <p><u>5th Semester</u></p> <p>C S 312 3.0</p> <p>C S 324 3.0</p> <p>WRTG 316 3.0</p> <p>MMBIO 240 3.0</p> <p>Religion Elective 2.0</p> <p><b>Total Hours 14.0</b></p> <p><u>6th Semester</u></p> <p>C S Elective 3.0</p> <p>C S 472 or 474 3.0</p> <p>C S 404 2.0</p> <p>PWS 340 3.0</p> <p>Civilization 2 (letters) 3.0</p> <p>Religion Elective 2.0</p> <p><b>Total Hours 16.0</b></p> <p><b>SENIOR YEAR</b></p> <p><u>7th Semester</u></p> <p>BIO 250 or BIO 420 2.0-4.0</p> <p>Computer Science Elective 3.0</p> <p>General Elective 3.0</p> <p>BIO 364 3.0</p> <p>Religion Elective 2.0</p> <p><b>Total Hours 13.0-15.0</b></p> <p><u>8th Semester</u></p> <p>Computer Science Elective 3.0</p> <p>Computer Science Elective 3.0</p> <p>General Elective 3.0</p> <p>Global and Cultural Awareness 3.0</p> <p>BIO 465 3.0</p> <p><b>Total Hours 15.0</b></p>		
<p>Note 1: 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.</p> <p>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.</p> <p>FOR UNIVERSITY CORE OR PROGRAM QUESTIONS, CONTACT THE ADVISEMENT CENTER.</p>		

## BS in Computer Science: Bioinformatics (693222)

### 2022-2023 Program Requirements (82-84 Credit Hours)

*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.*

**REQUIREMENT 1** Complete 8 courses

**COMPUTER SCIENCE CORE:**

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 312 - Algorithm Design and Analysis	3.0
C S 324 - Systems Programming	3.0
C S 404 - Ethics and Computers in Society	2.0

**REQUIREMENT 2** Complete 7 courses

**BIOLOGY CORE:**

*BIO 130 - Biology	4.0
BIO 165 - Introduction to Bioinformatics	3.0
BIO 264 - Statistical Analysis for Biologists	4.0
BIO 364 - Bioinformatics Algorithms	3.0
BIO 465 - Capstone in Bioinformatics	3.0
MMBIO 240 - Molecular Biology	3.0
PWS 340 - Genetics	3.0

**REQUIREMENT 3** Complete 6 courses

**SUPPORTING COURSES:**

CHEM 105 - General College Chemistry 1 with Lab (Integrated)	4.0
MATH 112 - Calculus 1	4.0
MATH 113 - Calculus 2	4.0
MATH 213 - Elementary Linear Algebra	2.0
MATH 215 - Computational Linear Algebra	1.0
*WRTG 316 - Technical Communication	3.0

**REQUIREMENT 4** Complete 1 course

BIO 250 - Evolutionary Medicine	2.0
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BIO 420 - Evolutionary Biology	4.0
<b>REQUIREMENT 5</b> Complete 1 course	
C S 472 - Introduction to Machine Learning	3.0
C S 474 - Introduction to Deep Learning	3.0

**REQUIREMENT 6** Complete 12.0 hours from the following option(s)  
**COURSES WILL NOT DOUBLE COUNT BETWEEN REQUIREMENT 5 AND REQUIREMENT 6.**

**OPTION 6.1** Complete up to 12.0 hours from the following course(s)  
**COMPLETE 4-5 ELECTIVE COURSES (12-15 CREDIT HOURS) FROM THE FOLLOWING LIST:**

BIO 463 - Genetics of Human Disease	3.0
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
<i>You may take up to 3 credit hours.</i>	
C S 405 - Creating and Managing a Software Business	3.0
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 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 486 - Verification and Validation	3.0
C S 493R - Computing Competitions	3.0

*You may take up to 3 credit hours.*

C S 513 - Robust Control	3.0
C S 580 - Theory of Predictive Modeling	3.0

**OPTION 6.2** Complete up to 6.0 hours from the following course(s)

C S 497R - Undergraduate Research	3.0
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*You may take up to 6 credit hours.*

C S 498R - Undergraduate Special Projects	3.0v
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*You may take up to 3 credit hours.*

**REQUIREMENT 7**

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

**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.

## **BS in Computer Science: Bioinformatics (693222)**

**2022-2023**

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

# Bioinformatics Emphasis

(82-84 Credit Hours)  
Fall 2022 Requirements

1. Grades below C- are not allowed in major courses.

**Core Course Requirements (82-84 Hours)**

2. Complete the following 8 courses: CS 111, 224, 235, 236, 240, 312, 324, 404, 2. Complete the following 7 courses: BIO 130, BIO 165, BIO 264, BIO 364, BIO 465, MMBIO 240, PWS 340

3. Complete the following 6 courses: CHEM 105, Math 112, Math 113, Math 213, Math 215, WRTG 316

4. Courses cannot double count between requirements: Complete 1 courses: BIO 250 or BIO 420

5. Complete 1 course: CS 472 or CS 474\*\*

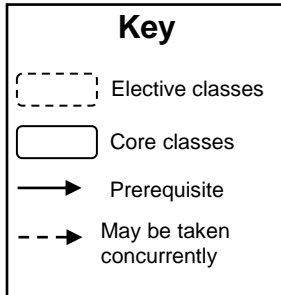
6. Complete 12 total hours from the following:

A. Complete 9 to 12 credit hours from the following: BIO 463, CS 260, 329, 330 345, 355, 356, 393 401R 405, 412, 428, 431,450, 452, 453, 455, 456, 460, 462,465, 470, 471, 472, 474, 480, 481, 482,483,486,493R, 513, 580

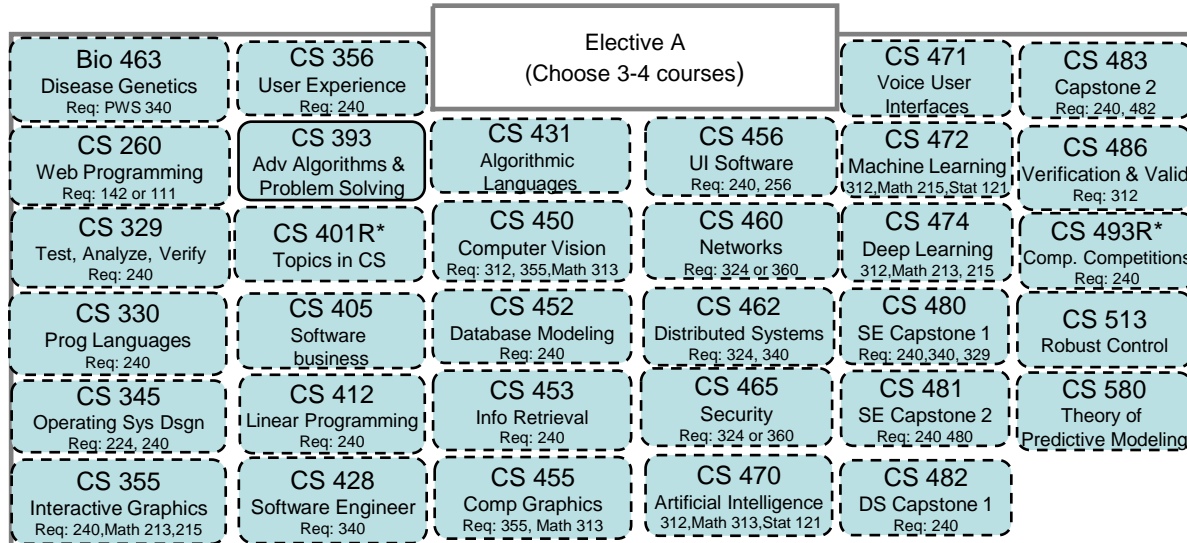
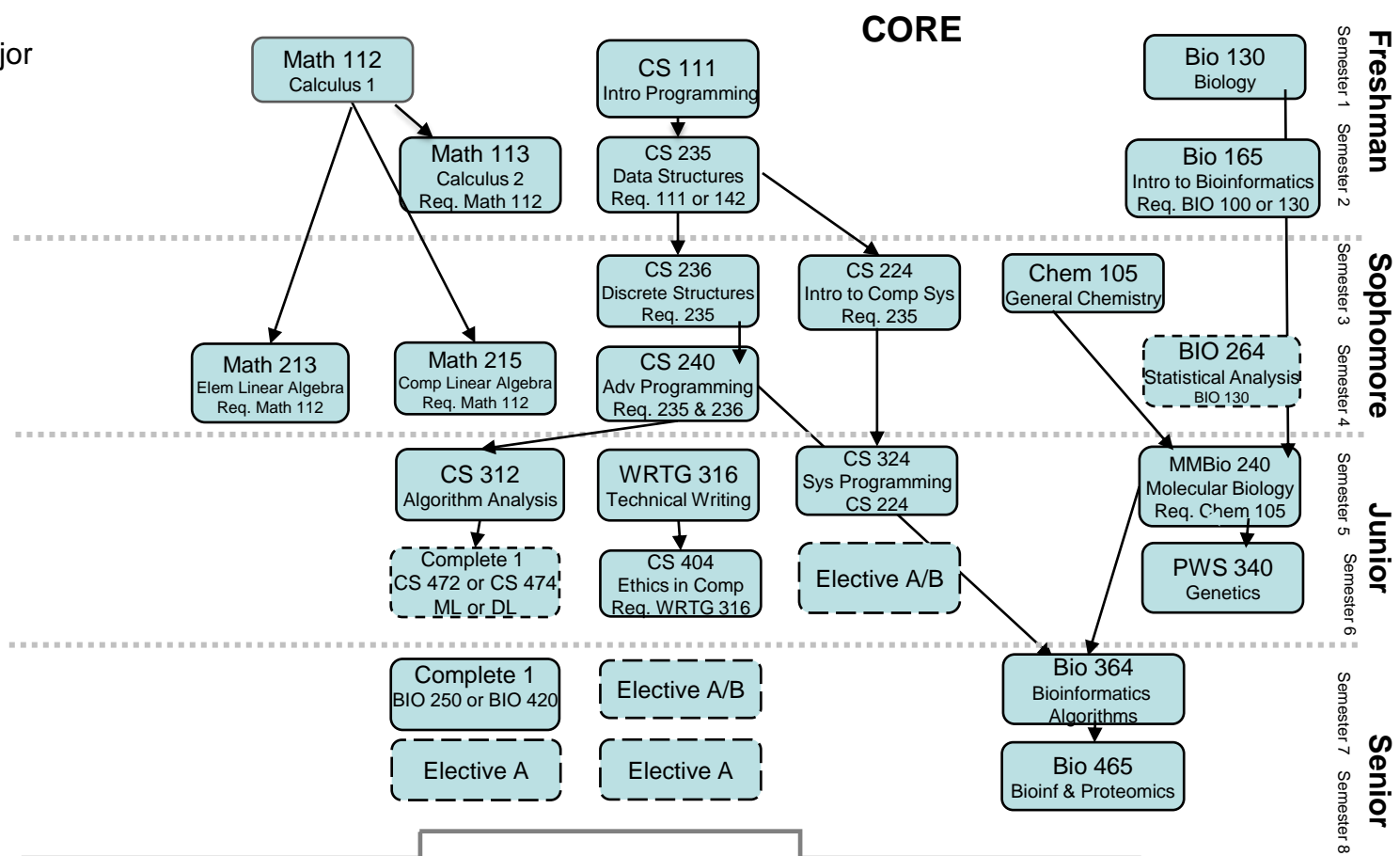
B. Complete 0-2 elective courses  
CS 497R\*, 498R\*

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

\*\* Courses may not double count between requirements 5 and 6



Guide only – Consult MyMap for your major/minor requirements



## 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](https://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 your 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

### 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](mailto: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



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!

# 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/>*