

Computer Science Concentrations

Students must complete at least 9 credit hours of 'CS' prefix courses. You may mix and match electives OR complete all requirements of one of the listed concentrations. If you do not do a concentration, you may still take the CS courses listed within the concentrations as electives.

1. **Data Science** – this concentration is about teaching students the fundamentals of how data mining and analytics works. It's critical to have a good understanding of how databases work, as that's where all the data is stored. Data mining involves the creation and/or refining of algorithms designed to pull specific data out of large datasets, process it, and identify patterns in the data that can be useful. The HPC & Parallel Programming course is included in this concentration as it's becoming more necessary to access multiple places that data is stored, and being able to run multiple complex processes simultaneously allows the system to utilize large amounts of data more efficiently.

Course			Prerequisite(s)		
1	CS 4265	Big Data Analytics	CS 3305 & CS 3410	3	
2	CS 4412	Data Mining	CS 3305 & CS 3410	3	
3	CS 4422	Information Retrieval	CS 3305 & CS 3410	3	
4	CS 4522	HPC & Parallel Programming	CS 4504	3	
5	Choose 1				
	CS 4524	Cloud Computing	CS 4504	3	
	CS 4722	Computer Graphics & Multimedia	CS 3305	3	
If the topic is within the Data Science domain: CS 4491 Advanced Topics, CS 4492 Undergraduate Research, or CSE 4983 CSE Computing Internship					

2. **Cyber and Network Security** – This concentration is teaching an introduction to information security concepts. Encryption/decryption keeps information safe. The courses in this concentration explain how that works (cryptography), how to design and program secure software, and how networks work at a fundamental level. Also, students learn how to keep information safe while it is transversing the network (introducing a network allows a point of entry for malicious actors to attack data and systems).

Course			Prerequisite(s)		
1	CS 3626	Cryptography	MATH 2345 & CS 3305 (concurrent)	3	
2	CS 4612	Software Security	CS 3626 & CS 3502	3	
3	CS 4622	Computer Networks	CS 3503 & CS 3622	3	
4	CS 4626	Computer & Network Security	CS 3626 & CS 4622	3	
5	Choose 1				
	IT 4823	Information Security Administration & Privacy	MATH 2345 & CS 3503	3	
	IT 4833	Wireless Security	CS 4622	3	
	IT 4843	Ethical Hacking	CS 4622	3	
	IT 4853	Computer Forensics	CS 4622	3	
	IT 4883	Infrastructure Defense	CS 4622	3	
If the topic is within the cybersecurity/networking domain: CS 4491 Advanced Topics, CS 4492 Undergraduate Research, or CSE 4983 CSE Computing Internship					

3. **Artificial Intelligence** - This concentration teaches the basic concepts of AI. The AI course introduces how AI is structured and created. Machine learning is about how we train AI systems to handle large amounts of data and become responsive. Machine vision is about AI interacting with images/video. Natural language processing is how AI deals with human language and interpreting that into something the software/machine can understand. Deep learning is about applying machine learning to large amounts of data, sometimes by accessing the internet.

Course			Prerequisite(s)		
1	CS 3642	Artificial Intelligence	CS 3305	3	
2	CS 4267	Machine Learning	CS 3642	3	
3	CS 4732	Machine Vision	CS 3642	3	
4	CS 4742	Natural Language Processing	CS 3642	3	
5	Choose 1				
	CS 4277	Deep Learning	CS 3642 & CS 4267 (concurrent)	3	
If the topic is within the Artificial Intelligence domain: CS 4491 Advanced Topics, CS 4492 Undergraduate Research, or CSE 4983 CSE Computing Internship					

4. **Major Electives** - Broad expansion of your major. You cannot use courses already required for the major. Use the Course Catalog for a list of CS courses. Nine out of the 15 credits hours must be CS 3000-4000 level coursework and 0-6 credit hours from the following list of courses: SWE 3633, SWE 3643, SWE 3683, SWE 4633, or CSE 4983. Total of 15 credits.

Course			Prerequisite(s)		
1	CS			3	
2	CS			3	
3	CS			3	
4	Can be CS, SWE or CSE				
5	You may choose from any CS 3000 or 4000 level course not already required, including concentration courses. All CS courses are 3 hours, except CS 4400 Directed Studies, which can be 1-3 hours. You may choose up to 6 credit hours from the list below.				

Course		Prerequisite(s)	
SWE 3633 Software Architecture & Design		SWE 3313	3
SWE 3643 Software Testing & Quality Assurance		SWE 3313	3
SWE 3683 Embedded Systems Analysis & Design		CS 3305	3
SWE 4633 Cloud Software Development		CS 3305	3
CSE 4983 CSE Computing Internship		Permission of Internship Coordinator	3

Notes:

- It is best to declare a concentration by the end of your freshman year/beginning of your sophomore year
- When you have made your decision, you will declare your concentration in Owl Express:
 - Owl Express -> Student Records -> "Declare or Change Major/Minor"
- Concentration courses are seasonal, meaning they are not offered every semester (e.g. a course may only be offered in the fall semester and not the spring)
- Utilize the [Course Forecast](#) for a tentative prediction of when courses will be offered
- Meet with your advisor if you have any questions!