COMPUTER SCIENCE - B.S.

College of Arts and Sciences
Department of Computer Science
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Kent Campus
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Description

The Bachelor of Science degree in Computer Science seeks to prepare students to have successful careers as computing professionals, with a solid understanding of software development and computer systems and the foundation for life-long learning in the field; to have an academic foundation suitable for graduate study in computer science or related areas; to be able to function effectively on software development teams, with oral and written communication skills. and with an understanding of professional ethics and responsibility.

Graduates of the B.S. degree in Computer Science have careers in developing, managing and building software in a variety of industries, including finance, health care, entertainment, telecommunications and manufacturing. The U.S. Bureau of Labor Statistics lists the following as top occupation choices for Computer Science majors: computer network architect; software developer; information security analyst; database administrator; computer systems analyst; computer programmer; and network and computer systems administrator.

Computer Science students may apply early to the M.S. degree in Computer Science and double count 9 credit hours of graduate courses toward both degree programs. See the Combined Bachelor's/Master's Degree Program policy in the University Catalog for more information.

The Computer Science major includes the following optional concentrations:

- The **Data Engineering** concentration prepares students to perform the data analysis and modeling needed by organizations and to process structured, semi-structured, and unstructured data using statistical and semantic analysis techniques to meet their employers' needs.
- The **Game Programming** concentration provides students with a solid understanding of the algorithms, techniques and software used to construct interactive virtual environments. Students work in teams with content specialists and artists to develop the teamwork skills required in this multidisciplinary field, which includes a range of opportunities, from the game industry to education to training design.
- The **Information Security** concentration prepares students to meet the security needs of industry and government through coursework that provides a thorough understanding of security, privacy and cryptographic techniques and protocols used in computing and communication.
- The **Robotics and Embedded Systems** concentration prepares students to work with devices that combine hardware and software. Such devices include robots and most high tech mechanical devices like cars, planes, farm equipment and construction equipment.

Fully Offered At:

- Kent Campus
- Stark Campus (no concentration and Information Security optional concentration)

Admission Requirements

The university affirmatively strives to provide educational opportunities and access to students with varied backgrounds, those with special talents and adult students who graduated from high school three or more years ago.

Freshman Students on the Kent Campus: The freshman admission policy on the Kent Campus is selective. Admission decisions are based upon the following: cumulative grade point average, ACT and/or SAT scores, strength of high school college preparatory curriculum and grade trends. The Admissions Office at the Kent Campus may defer the admission of students who do not meet admissions criteria but who demonstrate areas of promise for successful college study. Deferred applicants may begin their college coursework at one of seven regional campuses of Kent State University. For more information on admissions, including additional requirements for some academic programs, visit the admissions website for new freshmen.

Freshman Students on the Regional Campuses: Kent State campuses at Ashtabula, East Liverpool, Geauga, Salem, Stark, Trumbull and Tuscarawas, as well as the Twinsburg Academic Center, have open enrollment admission for students who hold a high school diploma, GED or equivalent.

English Language Proficiency Requirements for International Students: All international students must provide proof of English language proficiency (unless they meet specific exceptions) by earning a minimum 525 TOEFL score (71 on the Internet-based version), minimum 75 MELAB score, minimum 6.0 IELTS score, minimum 48 PTE score or minimum 100 DET score; or by completing the ESL level 112 Intensive Program. For more information on international admission, visit the Office of Global Education's admission website.

Transfer, Transitioning and Former Students: For more information about admission criteria for transfer, transitioning and former students, please visit the admissions website.

Program Learning Outcomes

Graduates of this program will be able to:

1. Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
2. Design, implement and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
3. Communicate effectively in a variety of professional contexts.
4. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
5. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
6. Apply computer science theory and software development fundamentals to produce computing-based solutions.

University Requirements

All students in a bachelor's degree program at Kent State University must complete the following university requirements for graduation.

NOTE: University requirements may be fulfilled in this program by specific course requirements. Please see Program Requirements for details.

Destination Kent State: First Year Experience	1
Course is not required for students with 25 transfer credits, excluding College Credit Plus, or age 21+ at time of admission.	
Diversity Domestic/Global (DIVD/DIVG)	2 courses
Students must successfully complete one domestic and one global course, of which one must be from the Kent Core.	
Experiential Learning Requirement (ELR)	varies
Students must successfully complete one course or approved experience.	
Kent Core (see table below)	36-37
Writing-Intensive Course (WIC)	1 course
Students must earn a minimum C grade in the course.	
Upper-Division Requirement	39 (or 42)
Students must successfully complete 39 upper-division (numbered 30000 to 49999) credit hours to graduate. Students in a B.A. and/or B.S. degree in the College of Arts and Sciences must complete 42 upper-division credit hours.	
Total Credit Hour Requirement	120
Some bachelor's degrees require students to complete more than 120 credit hours.	

Kent Core Requirements

Kent Core Composition (KCMP)	6
Kent Core Mathematics and Critical Reasoning (KMCR)	3
Kent Core Humanities and Fine Arts (KHUM/KFA) (min one course each)	9
Kent Core Social Sciences (KSS) (must be from two disciplines)	6
Kent Core Basic Sciences (KBS/KLAB) (must include one laboratory)	6-7
Kent Core Additional (KADL)	6
Total Credit Hours:	**36-37**

Program Requirements

Major Requirements

Code	Title	Credit Hours
Major Requirements (courses count in major GPA)		
CS 13011 & CS 13012	COMPUTER SCIENCE IA: PROCEDURAL PROGRAMMING and COMPUTER SCIENCE IB: OBJECT ORIENTED PROGRAMMING (min C grade) [1]	4
or CS 13001	COMPUTER SCIENCE I: PROGRAMMING AND PROBLEM SOLVING	
CS 23001	COMPUTER SCIENCE II: DATA STRUCTURES AND ABSTRACTION (min C grade)	4
CS 23022	DISCRETE STRUCTURES FOR COMPUTER SCIENCE	3
CS 32301	HUMAN INTERFACE COMPUTING	3
CS 33007	INTRODUCTION TO DATABASE SYSTEM DESIGN	3
CS 33101	STRUCTURE OF PROGRAMMING LANGUAGES	3
CS 33211	OPERATING SYSTEMS	3
CS 33901	SOFTWARE ENGINEERING	3
CS 35101	COMPUTER ORGANIZATION	3
CS 35201	COMPUTER COMMUNICATION NETWORKS	3
CS 44001	COMPUTER SCIENCE III-PROGRAMMING PATTERNS	4
CS 46101	DESIGN AND ANALYSIS OF ALGORITHMS	3
MATH 12002	ANALYTIC GEOMETRY AND CALCULUS I (KMCR)	5
MATH 12013	BRIEF CALCULUS II	3
MATH 20011	DECISION-MAKING UNDER UNCERTAINTY	3
MATH 21002	APPLIED LINEAR ALGEBRA	3
Additional Requirements (courses do not count in major GPA)		
UC 10097	DESTINATION KENT STATE: FIRST YEAR EXPERIENCE	1
Foreign Language (see Foreign Language College Requirement below)		8
Kent Core Composition		6
Kent Core Humanities and Fine Arts (minimum one course from each)		9
Kent Core Social Sciences (must be from two disciplines)		6
Kent Core Basic Sciences (must include one laboratory)		6-7
Kent Core Additional		6
General Electives (total credit hours depends on earning 120 credit hours, including 42 upper-division credit hours)		6
Additional Requirements or Concentrations		
Choose from the following:		19
Additional Requirements for Students Not Declaring a Concentration		
Data Engineering Concentration		
Game Programming Concentration		
Information Security Concentration		
Robotics and Embedded Systems Concentration		
Minimum Total Credit Hours:		120

[1] Minimum C grade must be earned in CS 13001 or in both CS 13011 and CS 13012 for graduation.

ADDITIONAL REQUIREMENTS FOR STUDENTS NOT DECLARING A CONCENTRATION

Code	Title	Credit Hours
Major Requirements (courses count in major GPA)		
CS 49999	CAPSTONE PROJECT (ELR) (WIC)	4
Computer Science (CS) Upper-Division Electives (30000 or 40000 level)		6
Computer Science (CS) Upper-Division Electives (40000 level)		9
Minimum Total Credit Hours:		19

[1] A minimum C grade is required to fulfill the writing-intensive requirement.

Data Engineering Concentration Requirements

Code	Title	Credit Hours
Concentration Requirements (courses count in major GPA)		
CS 43016	BIG DATA ANALYTICS	3
CS 43105	DATA MINING TECHNIQUES	3
CS 43118	GRAPH AND SOCIAL NETWORK ANALYSIS	3
CS 49999	CAPSTONE PROJECT (ELR) (WIC)	4

Computer Science (CS) Upper-Division Electives (30000 or 40000 level)	3
Computer Science (CS) Upper-Division Elective (40000 level only)	3
Minimum Total Credit Hours:	19

[1] A minimum C grade is required to fulfill the writing-intensive requirement.

Game Programming Concentration requirements

Code	Title	Credit Hours
Concentration Requirements (courses count in major GPA)		
CS 38101	INTRODUCTION TO GAME PROGRAMMING	3
CS 47101	COMPUTER GRAPHICS	3
CS 48101	GAME ENGINE CONCEPTS	3
CS 48102	GAME DEVELOPMENT PRACTICUM (ELR) (WIC)[1]	4
Computer Science (CS) Upper-Division Electives (40000 level)		6
Minimum Total Credit Hours:		19

[1] A minimum C grade is required to fulfill the writing-intensive requirement.

Information Security Concentration requirements

Code	Title	Credit Hours
Concentration Requirements (courses count in major GPA)		
CS 43203	SYSTEMS PROGRAMMING	3
CS 45203	COMPUTER NETWORK SECURITY	3
CS 47205	INFORMATION SECURITY	3
CS 47221	INTRODUCTION TO CRYPTOLOGY	3
CS 49999	CAPSTONE PROJECT (ELR) (WIC)	4
Concentration Electives, choose from the following:		3
CS 43401	SECURE PROGRAMMING	
CS 47206	DATA SECURITY AND PRIVACY	
CS 47207	DIGITAL FORENSICS	
Minimum Total Credit Hours:		19

[1] A minimum C grade is required to fulfill the writing-intensive requirement.

Robotic and Embedded Systems Concentration Requirements

Code	Title	Credit Hours
Concentration Requirements (courses count in major GPA)		
CS 23301	ROBOTICS AND EMBEDDED SYSTEMS LABORATORY I	1
CS 23302	ROBOTICS AND EMBEDDED SYSTEMS LABORATORY II	2
CS 33301	EMBEDDED SYSTEM PROGRAMMING	3
CS 43302	ALGORITHMIC ROBOTICS	3
or CS 43303	INTERNET OF THINGS	
or CS 43334	HUMAN-ROBOT INTERACTION	
CS 49999	CAPSTONE PROJECT (ELR) (WIC)	4
Concentration Elective, choose from the following:		6
CS 43203	SYSTEMS PROGRAMMING	
CS 43301	SOFTWARE DEVELOPMENT FOR ROBOTICS	
CS 43302	ALGORITHMIC ROBOTICS	
CS 43303	INTERNET OF THINGS	
CS 43334	HUMAN-ROBOT INTERACTION	
CS 44201	ARTIFICIAL INTELLIGENCE	
CS 45102	CENTRAL PROCESSING UNIT (CPU) ARCHITECTURES	
CS 45203	COMPUTER NETWORK SECURITY	
CS 45231	INTERNET ENGINEERING	
CS 47201	HUMAN COMPUTER INTERACTION	
Minimum Total Credit Hours:		19

[1] A minimum C grade is required to fulfill the writing-intensive requirement.

Graduation Requirements

Minimum Major GPA	Minimum Overall GPA
2.000	2.000

- A minimum grade may be required in some courses

Foreign Language College Requirement

- Students pursuing the Bachelor of Science degree in the College of Arts and Sciences must complete 8 credit hours of foreign language.[1]
- Minimum Elementary I and II of the same language

[1] All students with prior foreign language experience should take the foreign language placement test to determine the appropriate level at which to start. Some students may begin their university foreign language experience beyond the Elementary I level and will complete the requirement with fewer credit hours and fewer courses. This may be accomplished by: (1) passing a course beyond the Elementary I through Intermediate II level or (2) receiving credit through Credit by Exam (CBE), the College Level Examination Program (CLEP), the Advanced Placement (AP) exam or credit through the International Baccalaureate (IB) program; or (3) being designated a 'native speaker' of a non-English language (consult with the College of Arts and Sciences Advising Office for additional Information) . When students complete the requirement with fewer than 8 credit hours and two courses, they will complete the remaining hours with general electives.

Roadmaps

- Computer Science Major (no concentration)
- Data Engineering Concentration
- Game Programming Concentration
- Information Security Concentration
- Robotics and Embedded Systems Concentration

Computer Science Major (no concentration)

This roadmap is a recommended semester-by-semester plan of study for this major. However, courses designated as critical (!) must be completed in the semester listed to ensure a timely graduation.

	Semester One		Credits
!	CS 13011 & CS 13012 or CS 13001	COMPUTER SCIENCE IA: PROCEDURAL PROGRAMMING and COMPUTER SCIENCE IB: OBJECT ORIENTED PROGRAMMING or COMPUTER SCIENCE I: PROGRAMMING AND PROBLEM SOLVING	4
	MATH 12002	ANALYTIC GEOMETRY AND CALCULUS I (KMCR)	5
	UC 10097	DESTINATION KENT STATE: FIRST YEAR EXPERIENCE	1
	Kent Core Requirement		3
	General Electives		3
		Credit Hours	16
	Semester Two		
!	CS 23001	COMPUTER SCIENCE II: DATA STRUCTURES AND ABSTRACTION	4
!	CS 23022	DISCRETE STRUCTURES FOR COMPUTER SCIENCE	3
	MATH 12013	BRIEF CALCULUS II	3
	MATH 20011	DECISION-MAKING UNDER UNCERTAINTY	3
	Kent Core Requirement		3
		Credit Hours	16
	Semester Three		
!	CS 33211	OPERATING SYSTEMS	3
!	CS 35101	COMPUTER ORGANIZATION	3
	MATH 21002	APPLIED LINEAR ALGEBRA	3
	Foreign Language		4
		Credit Hours	13
	Semester Four		
	CS 32301	HUMAN INTERFACE COMPUTING	3
	CS 33007	INTRODUCTION TO DATABASE SYSTEM DESIGN	3
	CS 35201	COMPUTER COMMUNICATION NETWORKS	3
	Foreign Language		4
		Credit Hours	13
	Semester Five		
!	CS 33901	SOFTWARE ENGINEERING	3
	CS 44001	COMPUTER SCIENCE III-PROGRAMMING PATTERNS	4
!	CS 46101	DESIGN AND ANALYSIS OF ALGORITHMS	3
	Kent Core Requirement		3
	Kent Core Requirement		3
		Credit Hours	16
	Semester Six		
!	CS 33101	STRUCTURE OF PROGRAMMING LANGUAGES	3
	Computer Science (CS) Upper-Division Electives (30000 or 40000 level)		3
	Kent Core Requirement		3
	Kent Core Requirement		3
	Kent Core Requirement		3
		Credit Hours	15
	Semester Seven		
	CS 49999	CAPSTONE PROJECT (ELR) (WIC)	4
	Computer Science (CS) Upper-Division Electives (30000 or 40000 level)		3
	Computer Science (CS) Upper-Division Electives (40000 level)		3
	Kent Core Requirement		3
	Kent Core Requirement		3
		Credit Hours	16
	Semester Eight		
	Computer Science (CS) Upper-Division Electives (40000 level)		6
	Kent Core Requirement		3
	Kent Core Requirement		3
	General Electives		3
		Credit Hours	15
		Minimum Total Credit Hours:	120

Data Engineering Concentration

This roadmap is a recommended semester-by-semester plan of study for this major. However, courses designated as critical (!) must be completed in the semester listed to ensure a timely graduation.

	Semester One		Credits
!	CS 13011 & CS 13012 or CS 13001	COMPUTER SCIENCE IA: PROCEDURAL PROGRAMMING and COMPUTER SCIENCE IB: OBJECT ORIENTED PROGRAMMING or COMPUTER SCIENCE I: PROGRAMMING AND PROBLEM SOLVING	4
	MATH 12002	ANALYTIC GEOMETRY AND CALCULUS I (KMCR)	5
	UC 10097	DESTINATION KENT STATE: FIRST YEAR EXPERIENCE	1
	Kent Core Requirement		3
	General Electives		2
		Credit Hours	15
	Semester Two		
!	CS 23001	COMPUTER SCIENCE II: DATA STRUCTURES AND ABSTRACTION	4
!	CS 23022	DISCRETE STRUCTURES FOR COMPUTER SCIENCE	3
	MATH 12013	BRIEF CALCULUS II	3
	MATH 20011	DECISION-MAKING UNDER UNCERTAINTY	3
	Kent Core Requirement		3
		Credit Hours	16
	Semester Three		
!	CS 33211	OPERATING SYSTEMS	3
!	CS 35101	COMPUTER ORGANIZATION	3
	MATH 21002	APPLIED LINEAR ALGEBRA	3
	Foreign Language		4
		Credit Hours	13
	Semester Four		
	CS 32301	HUMAN INTERFACE COMPUTING	3
!	CS 33007	INTRODUCTION TO DATABASE SYSTEM DESIGN	3
!	CS 35201	COMPUTER COMMUNICATION NETWORKS	3
	Foreign Language		4

	Kent Core Requirement		3
		Credit Hours	16
	Semester Five		
!	CS 33901	SOFTWARE ENGINEERING	3
	CS 43105	DATA MINING TECHNIQUES	3
!	CS 46101	DESIGN AND ANALYSIS OF ALGORITHMS	3
	Kent Core Requirement		3
	General Elective		2
		Credit Hours	14
	Semester Six		
!	CS 33101	STRUCTURE OF PROGRAMMING LANGUAGES	3
	CS 43016	BIG DATA ANALYTICS	3
	CS 44001	COMPUTER SCIENCE III-PROGRAMMING PATTERNS	4
	Kent Core Requirement		3
	Kent Core Requirement		3
		Credit Hours	16
	Semester Seven		
	CS 43118	GRAPH AND SOCIAL NETWORK ANALYSIS	3
	Computer Science (CS) Upper-Division Elective (30000 or 40000 level)		3
	Kent Core Requirement		3
	Kent Core Requirement		3
	Kent Core Requirement		3
		Credit Hours	15
	Semester Eight		
	CS 49999	CAPSTONE PROJECT (ELR) (WIC)	4
	Computer Science (CS) Upper-Division Elective (40000 level)		3
	Kent Core Requirement		3
	Kent Core Requirement		3
	General Electives		2
		Credit Hours	15
		Minimum Total Credit Hours:	120

Game Programming Concentration

This roadmap is a recommended semester-by-semester plan of study for this major. However, courses designated as critical (!) must be completed in the semester listed to ensure a timely graduation.

	Semester One		**Credits**
!	CS 13011 & CS 13012 or CS 13001	COMPUTER SCIENCE IA: PROCEDURAL PROGRAMMING and COMPUTER SCIENCE IB: OBJECT ORIENTED PROGRAMMING or COMPUTER SCIENCE I: PROGRAMMING AND PROBLEM SOLVING	4
	MATH 12002	ANALYTIC GEOMETRY AND CALCULUS I (KMCR)	5
	UC 10097	DESTINATION KENT STATE: FIRST YEAR EXPERIENCE	1
	Kent Core Requirement		3
	General Electives		2
		Credit Hours	15
	Semester Two		
!	CS 23001	COMPUTER SCIENCE II: DATA STRUCTURES AND ABSTRACTION	4
!	CS 23022	DISCRETE STRUCTURES FOR COMPUTER SCIENCE	3
	MATH 12013	BRIEF CALCULUS II	3
	MATH 20011	DECISION-MAKING UNDER UNCERTAINTY	3
	Kent Core Requirement		3
		Credit Hours	16
	Semester Three		
!	CS 33211	OPERATING SYSTEMS	3
!	CS 35101	COMPUTER ORGANIZATION	3
	MATH 21002	APPLIED LINEAR ALGEBRA	3
	Foreign Language		4
		Credit Hours	13
	Semester Four		
	CS 32301	HUMAN INTERFACE COMPUTING	3
!	CS 33007	INTRODUCTION TO DATABASE SYSTEM DESIGN	3
!	CS 35201	COMPUTER COMMUNICATION NETWORKS	3
	Computer Science (CS) Upper-Division Electives (40000 level)		3
	Foreign Language		4
		Credit Hours	16
	Semester Five		
!	CS 33901	SOFTWARE ENGINEERING	3
!	CS 46101	DESIGN AND ANALYSIS OF ALGORITHMS	3
!	CS 38101	INTRODUCTION TO GAME PROGRAMMING	3
	Kent Core Requirement		3
	General Electives		2
		Credit Hours	14
	Semester Six		
!	CS 33101	STRUCTURE OF PROGRAMMING LANGUAGES	3
!	CS 44001	COMPUTER SCIENCE III-PROGRAMMING PATTERNS	4
!	CS 48101	GAME ENGINE CONCEPTS	3
	Kent Core Requirement		3
	Kent Core Requirement		3
		Credit Hours	16
	Semester Seven		
!	CS 48102	GAME DEVELOPMENT PRACTICUM (ELR) (WIC)	4
!	CS 47101	COMPUTER GRAPHICS	3
	Computer Science (CS) Upper-Division Elective (40000 level)		3
	Kent Core Requirement		3
	Kent Core Requirement		3
		Credit Hours	16
	Semester Eight		
	Kent Core Requirement		3
	Kent Core Requirement		3
	Kent Core Requirement		3
	Kent Core Requirement		3
	General Electives		2
		Credit Hours	14
		Minimum Total Credit Hours:	120

Information Security Concentration

This roadmap is a recommended semester-by-semester plan of study for this major. However, courses designated as critical (!) must be completed in the semester listed to ensure a timely graduation.

	Semester One		**Credits**
!	CS 13011 & CS 13012 or CS 13001	COMPUTER SCIENCE IA: PROCEDURAL PROGRAMMING and COMPUTER SCIENCE IB: OBJECT ORIENTED PROGRAMMING or COMPUTER SCIENCE I: PROGRAMMING AND PROBLEM SOLVING	4
	MATH 12002	ANALYTIC GEOMETRY AND CALCULUS I (KMCR)	5
	UC 10097	DESTINATION KENT STATE: FIRST YEAR EXPERIENCE	1
	Kent Core Requirement		3
	General Electives		2
		Credit Hours	15
	Semester Two		
!	CS 23001	COMPUTER SCIENCE II: DATA STRUCTURES AND ABSTRACTION	4
!	CS 23022	DISCRETE STRUCTURES FOR COMPUTER SCIENCE	3
	CS 32301	HUMAN INTERFACE COMPUTING	3
	MATH 12013	BRIEF CALCULUS II	3
	MATH 20011	DECISION-MAKING UNDER UNCERTAINTY	3
		Credit Hours	16
	Semester Three		
!	CS 33211	OPERATING SYSTEMS	3
!	CS 35101	COMPUTER ORGANIZATION	3
	CS 47221	INTRODUCTION TO CRYPTOLOGY	3
	MATH 21002	APPLIED LINEAR ALGEBRA	3
	Foreign Language		4
		Credit Hours	16
	Semester Four		
!	CS 33007	INTRODUCTION TO DATABASE SYSTEM DESIGN	3
!	CS 35201	COMPUTER COMMUNICATION NETWORKS	3
	CS 43203	SYSTEMS PROGRAMMING	3
	Foreign Language		4
	Kent Core Requirement		3
		Credit Hours	16
	Semester Five		
!	CS 33901	SOFTWARE ENGINEERING	3
!	CS 46101	DESIGN AND ANALYSIS OF ALGORITHMS	3
!	CS 47205	INFORMATION SECURITY	3
	Kent Core Requirement		3
	General Electives		2
		Credit Hours	14
	Semester Six		
!	CS 33101	STRUCTURE OF PROGRAMMING LANGUAGES	3
!	CS 44001	COMPUTER SCIENCE III-PROGRAMMING PATTERNS	4
	CS 45203	COMPUTER NETWORK SECURITY	3
	Concentration Elective		3
	Kent Core Requirement		3
		Credit Hours	16
	Semester Seven		
	CS 49999	CAPSTONE PROJECT (ELR) (WIC)	4
	Kent Core Requirement		3
	Kent Core Requirement		3
	Kent Core Requirement		3
		Credit Hours	13
	Semester Eight		
	Kent Core Requirement		3
	Kent Core Requirement		3
	Kent Core Requirement		3
	Kent Core Requirement		3
	General Electives		2
		Credit Hours	14
		Minimum Total Credit Hours:	120

Robotics and Embedded Systems Concentration

This roadmap is a recommended semester-by-semester plan of study for this major. However, courses designated as critical (!) must be completed in the semester listed to ensure a timely graduation.

	Semester One		**Credits**
!	CS 13011 & CS 13012 or CS 13001	COMPUTER SCIENCE IA: PROCEDURAL PROGRAMMING and COMPUTER SCIENCE IB: OBJECT ORIENTED PROGRAMMING or COMPUTER SCIENCE I: PROGRAMMING AND PROBLEM SOLVING	4
	MATH 12002	ANALYTIC GEOMETRY AND CALCULUS I (KMCR)	5
	UC 10097	DESTINATION KENT STATE: FIRST YEAR EXPERIENCE	1
	Kent Core Requirement		3
	General Electives		2
		Credit Hours	15
	Semester Two		
!	CS 23001	COMPUTER SCIENCE II: DATA STRUCTURES AND ABSTRACTION	4
!	CS 23022	DISCRETE STRUCTURES FOR COMPUTER SCIENCE	3
	MATH 20011	DECISION-MAKING UNDER UNCERTAINTY	3
	MATH 12013	BRIEF CALCULUS II	3
	Kent Core Requirement		3
		Credit Hours	16
	Semester Three		
!	CS 33211	OPERATING SYSTEMS	3
!	CS 35101	COMPUTER ORGANIZATION	3
	CS 33301	EMBEDDED SYSTEM PROGRAMMING	3
	MATH 21002	APPLIED LINEAR ALGEBRA	3
	Foreign Language		4
		Credit Hours	16
	Semester Four		
	CS 23301	ROBOTICS AND EMBEDDED SYSTEMS LABORATORY I	1
	CS 32301	HUMAN INTERFACE COMPUTING	3
!	CS 33007	INTRODUCTION TO DATABASE SYSTEM DESIGN	3
!	CS 35201	COMPUTER COMMUNICATION NETWORKS	3
	Foreign Language		4
		Credit Hours	14
	Semester Five		
!	CS 33901	SOFTWARE ENGINEERING	3
!	CS 46101	DESIGN AND ANALYSIS OF ALGORITHMS	3
	Concentration Elective		3
	Kent Core Requirement		3
	Kent Core Requirement		3
		Credit Hours	15

	Semester Six		
	CS 23302	ROBOTICS AND EMBEDDED SYSTEMS LABORATORY II	2
!	CS 33101	STRUCTURE OF PROGRAMMING LANGUAGES	3
	CS 44001	COMPUTER SCIENCE III-PROGRAMMING PATTERNS	4
	Kent Core Requirement		3
	Kent Core Requirement		3
		Credit Hours	15
	Semester Seven		
	CS 43334 or CS 43302 or CS 43303	HUMAN-ROBOT INTERACTION or ALGORITHMIC ROBOTICS or INTERNET OF THINGS	3
	Concentration Elective		3
	Kent Core Requirement		3
	Kent Core Requirement		3
	Kent Core Requirement		3
		Credit Hours	15
	Semester Eight		
	CS 49999	CAPSTONE PROJECT (ELR) (WIC)	4
	Kent Core Requirement		3
	Kent Core Requirement		3
	General Electives		4
		Credit Hours	14
		Minimum Total Credit Hours:	120