

Department of Computer Science and Engineering

Program of Computer Science and Technology for International Students (2020)

I. Introduction

Computer Science and Technology is an area with great market demand and potential, in an acute shortage of fully developed talents. With the rapid development of data, information, and AI technologies, which boost modern enterprises, the shortage will grow exponentially. Predictably, those high-quality, innovative, interdisciplinary IT talents will be highly appreciated by the market as the up-to-date computer technology grows intensive, ubiquitous, interdisciplinary, and competitive.

II. Objectives and Learning Outcomes

This major will cultivate high-quality computer science and technology talents with solid theoretical foundations, modern system design principles, effective research and exploration methods, and useful English and computer application skills, who are competent to the positions from the design of computer systems to the development of computer applications. The graduates can continue the study in pursue of higher degrees or work in IT related education, management, scientific research and industrial applications in universities, research institutes, administrations, public sectors and industries.

III. Study Length and Graduation Requirements

Study length: 4 years

Degree conferred: Bachelor of Engineering

The minimum credit requirement for graduation: 131 credits (not including English courses);

| Category | Module | Minimum Credit Requirement |
|--|---|----------------------------|
| General Education (GE) Required Courses (48 credits) | Science | 28 |
| | Physical Education | 4 |
| | Chinese Languages & Culture | 16 |
| General Education (GE) Elective Courses (12 credits) | Humanities | 4 |
| | Social Sciences | 4 |
| | Arts | 2 |
| | Science | 2 |
| Major Course (71 credits) | Major Foundational Courses | 21 |
| | Major Core Courses | 24 |
| | Major Elective Courses | 16 |
| | Internship and Undergraduate Thesis / Projects | 10 |
| Total (not including English courses) | | 131 |

IV. Discipline

Computer Science and Technology

V. Main Courses

Data Structures and Algorithm Analysis, Digital Logic, Probability and Statistics, Principles of Database Systems, Discrete Mathematics, Computer Organization, Algorithm Design and Analysis, Embedded System and Microcomputer Principle, Artificial Intelligence, Computer Networks, Object-oriented Analysis and Design, Operating Systems, Software Engineering and so on.

VI. Practice-Based Courses

See the table 3 of Major Course Arrangement.

VII. Pre-requisites for Major Declaration

| Major Declaration Time | Course Code | Course Name | Prerequisite |
|---|-------------------------------|--|------------------|
| Declare major at the end of First Year | MA101B | Calculus I A | |
| | MA102B | Calculus II A | MA101B |
| | MA107A | Linear Algebra A | |
| | PHY103B | General Physics B (I) | |
| | PHY105B | General Physics B (II) | PHY103B |
| | CS102A | Introduction to Computer Programming A | |
| | BIO102B | Introduction to Life Science | |
| | PHY104B | Experiments of Fundamental Physics | |
| Remarks: In addition to the above 8 courses, a written test and interview are required. | | | |
| Declare major at the end of Second Year | MA101B | Calculus I A | |
| | MA102B | Calculus II A | MA101B |
| | MA107A | Linear Algebra A | |
| | PHY103B | General Physics B (I) | |
| | PHY105B | General Physics B (II) | PHY103B |
| | CS102A | Introduction to Computer Programming A | |
| | BIO102B | Introduction to Life Science | |
| | PHY104B | Experiments of Fundamental Physics | |
| | CS203 | Data Structures and Algorithm Analysis | CS102A |
| | CS207 | Digital Logic | |
| | MA212 | Probability and Statistics | MA102a or MA102B |
| | CS307 | Principles of Database Systems | CS102A |
| | CS201 | Discrete Mathematics | MA102B, MA107A |
| | CS202 | Computer Organization | CS207 |
| CS208 | Algorithm Design and Analysis | CS102A, CS203 | |

VIII. Requirements for GE Required Courses

(I) Science Module

| Course Code | Course Name | Credit | Lab Credits | Hours/week | Term | Language Instruction | Prerequisite | Dept |
|-------------|--|--------|-------------|------------|----------|----------------------|--------------|------|
| MA101B | Calculus I A | 4 | | 4 | Spr/Fall | B/E | NA | MATH |
| MA102B | Calculus II A | 4 | | 4 | Spr/Fall | B/E | MA101B | MATH |
| MA107A | Linear Algebra A | 4 | | 4 | Spr/Fall | B/E | NA | MATH |
| PHY103B | General Physics B (I) | 4 | | 4 | Spr/Fall | B/E | NA | PHY |
| PHY105B | General Physics B (II) | 4 | | 4 | Spr/Fall | B/E | PHY103B | PHY |
| CS102A | Introduction to Computer Programming A | 3 | 1 | 4 | Spr/Fall | B/E | NA | CSE |
| BIO102B | Introduction to Life Science | 3 | | 3 | Spr/Fall | B/E | NA | BIO |
| PHY104B | Experiments of Fundamental Physics | 2 | 2 | 4 | Spr/Fall | B/E | NA | PHY |
| Total | | 28 | 3 | 31 | | | | |

(II) Physical Education

| Course Code | Course Name | Credits | Hours/week | Terms | Instruction language | Prerequisite | Dept. |
|-------------|-------------------------|---------|------------|-------|----------------------|--------------|-----------|
| GE131 | Physical Education I | 1 | 2 | Fall | C | NA | PE Center |
| GE132 | Physical Education II | 1 | 2 | Spr | C | NA | |
| GE231 | Physical Education III | 1 | 2 | Fall | C | NA | |
| GE232 | Physical Education IV | 1 | 2 | Spr | C | NA | |
| GE331 | Physical Education V | 0 | / | Fall | C | NA | |
| GE332 | Physical Education VI | 0 | / | Spr | C | NA | |
| GE431 | Physical Education VII | 0 | / | Fall | C | NA | |
| GE432 | Physical Education VIII | 0 | / | Spr | C | NA | |
| Total | | 4 | 8 | | | | |

Note: All physical education courses are general required courses. For Semester 1-4, each course (GE131, GE132, GE231, GE232) counted as 1 credit; for semester 5-8, (GE331, GE332, GE431, GE432) are extracurriculum courses without no credits, details can be referred to Physical Education Curriculum Program of Sustech.

(III) Chinese Languages & Culture

| Course Code | Course Name | Credit | Hours/week | Term | Language Instruction | Prerequisite | Dept |
|-------------|-------------------------|--------|------------|----------|----------------------|--------------|---------------------|
| CLE008 | Elementary Chinese I | 2 | 4 | 1/Fall | B | NA | CLE |
| CLE009 | Elementary Chinese II | 2 | 4 | 1/Spr | B | CLE008 | |
| CLE027 | Intermediate Chinese I | 2 | 4 | 2/Fall | B | CLE009 | |
| CLE028 | Intermediate Chinese II | 2 | 4 | 2/Spr | B | CLE027 | |
| CLE031 | Advanced Chinese I | 2 | 4 | 3/Fall | B | CLE028 | |
| CLE032 | Advanced Chinese II | 2 | 4 | 3/Spr | B | CLE031 | |
| CLE033 | Chinese Culture | 2 | 2 | Spr/Fall | B/E | NA | CLE/ HUM/ SSC |
| CLE034 | Chinese History | 2 | 2 | Spr/Fall | B/E | NA | |
| Total | | 16 | 28 | | | | |

(IV) English Language

Students will undertake the English Placement Test and be placed into three levels according to the result of the test and their performance in the National College Entrance Exam. Students at different levels are required to take the courses with a different credit value in total.

Level A: 6 credits; SUSTech English III, and English for Academic Purposes

Level B: 10 credits; SUSTech English II, SUSTech English III, and English for Academic Purposes

Level C: 14 credits; SUSTech English I, SUSTech English II, SUSTech English III, and English for Academic Purposes.

| Course Code | Course Name | Credit | Hours/week | Instruction Language | Prerequisite | Dept |
|-------------|-------------------------------|--------|------------|----------------------|--------------|------|
| CLE021 | SUSTech English I | 4 | 4 | E | NA | CLE |
| CLE022 | SUSTech English II | 4 | 4 | E | CLE021 | |
| CLE023 | SUSTech English III | 4 | 4 | E | CLE022 | |
| CLE030 | English for Academic Purposes | 2 | 2 | E | CLE023 | |

IX. Requirements for GE Elective Courses

(I) Students are required to complete 4 credits for the Humanities Module and Social Sciences Module respectively, and 2 credits for the Music and Art Module. (Information about the available courses and the instruction language will be announced before the course selection session)

(II) Students are required to complete 2 credits for Science Module

| Course Code | Course Name | Credit | Lab Credits | Hours/week | Term | Language Instruction | Prerequisite | Dept |
|-------------|---|--------|-------------|------------|----------|----------------------|----------------|------|
| CH101B | General Chemistry B | 3 | | 3 | Spr/Fall | B/E | NA | CHEM |
| EE104 | Fundamentals of Electric Circuits | 2 | | 2 | Spr | E | MA101B, MA107A | EE |
| ME112 | Introduction to Matlab | 2 | 1 | 3 | Spr | E | NA | MEE |
| ME232 | Prolegomenon to Robotics | 3 | | 3 | Spr | E | NA | MEE |
| CS103 | Introduction to Artificial Intelligence | 2 | | 2 | Fall | E | NA | CSE |
| Total | | 12 | 1 | 13 | | | | |

X. Major Course Arrangement

Table 1: Major Required Course (Foundational and Core Courses)

| Course Category | Course Code | Course Name | Credits | Lab Credits | Hours/week | Terms | take the course Advised term to | language Instruction | Prerequisite | Dept. |
|----------------------------|--------------------|---|---------|-------------|------------|-----------|---------------------------------|----------------------|----------------------|-------|
| Major Foundational Courses | CS203 | Data Structures and Algorithm Analysis | 3 | 1 | 4 | Fall /Spr | 2/Fall | E | CS102A | CSE |
| | CS207 | Digital Logic | 3 | 1 | 4 | Fall /Spr | 2/Fall | E | NA | CSE |
| | MA212 | Probability and Statistics | 3 | | 3 | Fall /Spr | 2/Fall | E | MA102a or MA102B | MATH |
| | CS307 | Principles of Database Systems | 3 | 1 | 4 | Fall /Spr | 2/Fall | E | CS102A | CSE |
| | CS201 | Discrete Mathematics | 3 | | 3 | Fall /Spr | 2/Spr | E | MA102B, MA107A | CSE |
| | CS202 | Computer Organization | 3 | 1 | 4 | Fall /Spr | 2/Spr | E | CS207 | CSE |
| | CS208 | Algorithm Design and Analysis | 3 | 1 | 4 | Fall /Spr | 2/Spr | E | CS102A, CS203 | CSE |
| | Total | | | 21 | 5 | 26 | | | | |
| Major Core Courses | CS301 | Embedded System and Microcomputer Principle | 3 | 1 | 4 | Fall | 3 / Fall | E | CS207 | CSE |
| | CS303 | Artificial Intelligence | 3 | 1 | 4 | Fall | 3 / Fall | E | CS102A, CS203, MA212 | CSE |
| | CS305 | Computer Networks | 3 | 1 | 4 | Fall | 3 / Fall | E | CS102A | CSE |
| | CS309 | Object-oriented Analysis and Design | 3 | 1 | 4 | Fall | 3 / Fall | E | CS102A, CS203 | CSE |
| | CS321 | Group Projects I | 2 | 2 | 4 | Fall | 3 / Fall | B | NA | CSE |
| | CS317 | Frontier Seminars in Computer Science and Technology I | 1 | | 1 | Fall | 3 / Fall | E | NA | CSE |
| | CS302 | Operating Systems | 3 | 1 | 4 | Spr | 3 / Spr | E | CS102A, CS203 | CSE |
| | CS304 | Software Engineering | 3 | 1 | 4 | Spr | 3 / Spr | E | CS102A, CS203 | CSE |
| | CS326 | Group Projects II | 2 | 2 | 4 | Spr | 3 / Spr | B | NA | CSE |
| | CS318 | Frontier Seminars in Computer Science and Technology II | 1 | | 1 | Spr | 3 / Spr | E | NA | CSE |
| CS413 | Group Projects III | 2 | 2 | 4 | Fall | 4 / Fall | B | NA | CSE | |

| | | | | | | | | | | |
|------------------------|---|--|----|----|----|------|--------|---|----|-----|
| | CS415 | Frontier Seminars in Computer Science and Technology III | 1 | | 1 | Fall | 4/Fall | E | NA | CSE |
| | Total | | 27 | 12 | 39 | | | | | |
| | Remarks: Students can choose to study one course of them (Embedded System and Microcomputer Principle, Object-oriented Analysis and Design). | | | | | | | | | |
| Major Practice Courses | CS470 | Industrial Practice | 2 | | | | | | | |
| | CS490 | Undergraduate Thesis/Projects | 8 | | | | | | | |
| | Total | | 10 | | | | | | | |
| | Remarks: Students who have completed Comprehensive Design I & II (COE491 & COE492) are not required to take Undergraduate Thesis/Projects (CS490) | | | | | | | | | |

Table 2: Major Elective Courses

| Course Code | Course Name | Credits | Lab Credits | Hours/week | Terms | take the course Advised term to | language Instruction | Prerequisite | Dept. |
|-------------|---|---------|-------------|------------|----------|---------------------------------|----------------------|----------------------------|-------|
| CS101A | Introduction to Computer Science A | 2 | | 2 | Fall | 1/Fall | E | NA | CSE |
| CS106 | Introduction to Cognitive Science | 2 | | 2 | Fall | 1/Fall | B | NA | CSE |
| CS104 | Introduction to Mathematical Logic | 2 | | 2 | Spr | 1/Spr | E | NA | CSE |
| CS209A | Computer System Design and Applications A | 3 | 1 | 4 | Fall/Spr | 1/Spr | E | CS102A or CS102B | CSE |
| EE205 | Signals and Systems | 3 | 1 | 4 | Fall/Spr | 2/Fall | E | MA101B | EE |
| CS205 | C/C++ Program Design | 3 | 1 | 4 | Fall/Spr | 2/Fall | E | NA | CSE |
| MA309 | Time Series Analysis | 3 | | 3 | Fall | 3/Fall | B | MA212 or MA204 | MATH |
| MA305 | Numerical Analysis | 3 | | 3 | Fall | 3/Fall | B | MA203a or MA213 | MATH |
| EE323 | Digital Signal Processing | 3 | 1 | 4 | Fall | 3/Fall | E | EE205 | EE |
| CS308 | Computer Vision | 3 | 1 | 4 | Fall | 3/Fall | B | CS102A,CS203,MA102B,MA107A | CSE |
| CS323 | Compilers | 3 | 1 | 4 | Fall | 3/Fall | B | CS102A or CS205, CS202 | CSE |
| CS315 | Computer Security | 3 | 1 | 4 | Fall | 3/Fall | B | CS205 | CSE |
| MA333 | Introduction to Big Data Science | 3 | | 3 | Spr | 3/Spr | B | MA212 or MA215 | MATH |
| EE326 | Digital Image Processing | 3 | 1 | 4 | Spr | 3/Spr | E | EE205 | EE |
| CS306 | Data Mining | 3 | 1 | 4 | Spr | 3/Spr | E | CS203 or CS203B | CSE |
| CS324 | Deep Learning | 3 | 1 | 4 | Spr | 3/Spr | E | CS303 | CSE |
| CS312 | Computer Graphics | 3 | 1 | 4 | Spr | 3/Spr | E | NA | CSE |
| CS314 | Internet of Things | 3 | 1 | 4 | Spr | 3/Spr | E | CS305 | CSE |
| CS310 | Natural Language Processing | 3 | 1 | 4 | Spr | 3/Spr | E | CS303 | CSE |
| CS330 | Multimedia Information Processing | 3 | 1 | 4 | Spr | 3/Spr | B | NA | CSE |
| CS332 | Information Retrieval | 3 | 1 | 4 | Spr | 3/Spr | B | CS203 | CSE |
| CS328 | Distributed and Cloud Computing | 3 | 1 | 4 | Spr | 3/Spr | E | CS102A, CS305 | CSE |
| CS401 | Intelligent Robotics | 3 | 1 | 4 | Spr | 3/Spr | E | CS102A, CS203, | CSE |

| | | | | | | | | | |
|-------|---|----|----|-----|------|----------|---|---------------------|-----|
| | | | | | | | | MA212 | |
| EE411 | Information Theory and Coding | 2 | | 2 | Fall | 4 / Fall | B | MA212 | EE |
| CS403 | Cryptography and Network Security | 2 | | 2 | Fall | 4 / Fall | B | CS201, MA212, CS203 | CSE |
| CS405 | Machine Learning | 3 | 1 | 4 | Fall | 4 / Fall | E | MA212, MA107A | CSE |
| CS407 | Advanced Computer Networks and Big Data | 3 | 1 | 4 | Fall | 4 / Fall | B | CS305 | CSE |
| CS409 | Software Testing | 3 | 1 | 4 | Fall | 4 / Fall | E | CS304 | CSE |
| CS419 | Advanced Algorithms | 3 | 1 | 4 | Fall | 4 / Fall | E | CS208 | CSE |
| CS421 | Advanced Artificial Intelligence | 3 | 1 | 4 | Fall | 4 / Fall | B | CS303 | CSE |
| CS408 | Evolutionary Computation and Its Applications | 3 | 1 | 4 | Spr | 4 / Spr | B | CS303 | CSE |
| CS406 | Advanced Optimization Algorithms | 3 | 1 | 4 | Spr | 4 / Spr | E | CS419 | CSE |
| CS402 | Frontier Seminars in Computer Science and Technology IV | 1 | | 1 | Spr | 4 / Spr | E | NA | CSE |
| Total | | 92 | 24 | 116 | | | | | |

Table 3: Overview of Practice-Based Courses

| Course Code | Course Name | Credits | Lab Credits | Hours/week | Terms | take the course Advised term to | language Instruction | Prerequisite | Dept. |
|-------------|---|---------|-------------|------------|----------|---------------------------------|----------------------|-------------------------------|-------|
| CS209A | Computer System Design and Applications A | 3 | 1 | 4 | Fall/Spr | 1/Spr | E | CS102A or CS102B | CSE |
| EE205 | Signals and Systems | 3 | 1 | 4 | Fall/Spr | 2/Fall | E | MA101B | EE |
| CS205 | C/C++ Program Design | 3 | 1 | 4 | Fall/Spr | 2/Fall | E | NA | CSE |
| CS203 | Data Structures and Algorithm Analysis | 3 | 1 | 4 | Fall/Spr | 2/Fall | E | CS102A | CSE |
| CS207 | Digital Logic | 3 | 1 | 4 | Fall/Spr | 2/Fall | E | NA | CSE |
| CS307 | Principles of Database Systems | 3 | 1 | 4 | Fall/Spr | 2/Fall | E | CS102A | CSE |
| CS202 | Computer Organization | 3 | 1 | 4 | Fall/Spr | 2/Spr | E | CS207 | CSE |
| CS208 | Algorithm Design and Analysis | 3 | 1 | 4 | Fall/Spr | 2/Spr | E | CS102A, CS203 | CSE |
| EE323 | Digital Signal Processing | 3 | 1 | 4 | Fall | 3/Fall | E | EE205 | EE |
| CS308 | Computer Vision | 3 | 1 | 4 | Fall | 3/Fall | B | CS102A, CS203, MA102B, MA107A | CSE |
| CS323 | Compilers | 3 | 1 | 4 | Fall | 3/Fall | B | CS102A or CS205, CS202 | CSE |
| CS315 | Computer Security | 3 | 1 | 4 | Fall | 3/Fall | B | CS205 | CSE |
| CS301 | Embedded System and Microcomputer Principle | 3 | 1 | 4 | Fall | 3/Fall | E | CS207 | CSE |
| CS303 | Artificial Intelligence | 3 | 1 | 4 | Fall | 3/Fall | E | CS102A, CS203, MA212 | CSE |
| CS305 | Computer Networks | 3 | 1 | 4 | Fall | 3/Fall | E | CS102A | CSE |
| CS309 | Object-oriented Analysis and Design | 3 | 1 | 4 | Fall | 3/Fall | E | CS102A, CS203 | CSE |
| CS321 | Group Projects I | 2 | 2 | 4 | Fall | 3/Fall | B | NA | CSE |
| CS302 | Operating Systems | 3 | 1 | 4 | Spr | 3/Spr | E | CS102A, CS203 | CSE |
| CS304 | Software Engineering | 3 | 1 | 4 | Spr | 3/Spr | E | CS102A, CS203 | CSE |
| CS326 | Group Projects II | 2 | 2 | 4 | Spr | 3/Spr | B | NA | CSE |
| CS306 | Data Mining | 3 | 1 | 4 | Spr | 3/Spr | E | CS203 or CS203B | CSE |
| CS324 | Deep Learning | 3 | 1 | 4 | Spr | 3/Spr | E | CS303 | CSE |
| CS312 | Computer Graphics | 3 | 1 | 4 | Spr | 3/Spr | E | NA | CSE |
| CS314 | Internet of Things | 3 | 1 | 4 | Spr | 3/Spr | E | CS305 | CSE |

| | | | | | | | | | |
|-------|---|-----|----|-----|------|--------|---|----------------------|-----|
| CS310 | Natural Language Processing | 3 | 1 | 4 | Spr | 3/Spr | E | CS303 | CSE |
| CS330 | Multimedia Information Processing | 3 | 1 | 4 | Spr | 3/Spr | B | NA | CSE |
| CS332 | Information Retrieval | 3 | 1 | 4 | Spr | 3/Spr | B | CS203 | CSE |
| CS328 | Distributed and Cloud Computing | 3 | 1 | 4 | Spr | 3/Spr | E | CS102A, CS305 | CSE |
| CS401 | Intelligent Robotics | 3 | 1 | 4 | Spr | 3/Spr | E | CS102A, CS203, MA212 | CSE |
| EE326 | Digital Image Processing | 3 | 1 | 4 | Spr | 3/Spr | E | EE205 | EE |
| CS413 | Group Projects III | 2 | 2 | 4 | Fall | 4/Fall | B | NA | CSE |
| CS405 | Machine Learning | 3 | 1 | 4 | Fall | 4/Fall | E | MA212, MA107A | CSE |
| CS407 | Advanced Computer Networks and Big Data | 3 | 1 | 4 | Fall | 4/Fall | B | CS305 | CSE |
| CS409 | Software Testing | 3 | 1 | 4 | Fall | 4/Fall | E | CS304 | CSE |
| CS419 | Advanced Algorithms | 3 | 1 | 4 | Fall | 4/Fall | E | CS208 | CSE |
| CS421 | Advanced Artificial Intelligence | 3 | 1 | 4 | Fall | 4/Fall | B | CS303 | CSE |
| CS408 | Evolutionary Computation and Its Applications | 3 | 1 | 4 | Spr | 4/Spr | B | CS303 | CSE |
| CS406 | Advanced Optimization Algorithms | 3 | 1 | 4 | Spr | 4/Spr | E | CS419 | CSE |
| CS470 | Industrial Practice | 2 | | | | | | | |
| CS490 | Undergraduate Thesis/Projects | 8 | | | | | | | |
| Total | | 121 | 41 | 152 | | | | | |

Table 4: Overview of Course Hours and Credits

| Course Category | Total Course Hours | Total Credits | Credit Requirements | Percentage of the Total* |
|--|---------------------------|----------------------|----------------------------|---------------------------------|
| General Education (GE) Required Courses (not including English courses) | | | 48 | |
| General Education (GE) Elective Courses | | | 12 | |
| Major Foundational Courses | 416 | 21 | 21 | 100% |
| Major Core Courses | 624 | 27 | 24 | 88.89% |
| Major Elective Courses | 1856 | 92 | 16 | 17.39% |
| Internship and Undergraduate Thesis/Projects | | 10 | 10 | 100% |
| Total (not including English courses) | | | 131 | |

* Percentage of the total= Credit requirements of each line / Total credit requirements

Curriculum Structure of Computer Science and Technology Major

