Department of Computer Science and Engineering

Program of Intelligence Science and Technology for International Students (2022)

I. Introduction

Intelligence Science and Technology is emerging as a new high-tech frontier major which combines many other fields of study, such as Computer Science, Control Science, Information Science and Cognitive Science. It involves data mining, machine leaning, human-machine interactive, mathematical logic, intelligent sensing, robots, and the new era of network computing technology. This major can dramatically promote the rapid development of various kinds of intelligent systems and key technologies closely related to national economy, industrial manufacturing and people's daily life.

Intelligent science has been recognized as the key engine that drives the world's technology development since this century, and thus Intelligent Science and Technology is one of the most promising majors worldwide.

Academic subject area: Computer Science; Program code: 080907T

II. Objectives and Learning Outcomes

1. Objectives

This major is aiming at cultivating talents who possess a high standard of ethics and rich cultural scientific literacy, with basic theory, knowledge and skills of computational intelligence, data intelligence, machine intelligence, and information intelligence and so on, as well as strong adaptability and modern scientific sense of innovation. After graduation, students can not only engage in research, exploitation, management, or teaching in intelligent science and technology field in corporations, scientific research institutes, universities, but also continue their postgraduate studies in Intelligence Science and Technology and related or interdisciplinary fields.

2. Learning Outcomes

Graduates should acquire the following knowledge and abilities:

1. Solid fundamental knowledge of mathematics, physics, information processing, computer and computing technology.

2. Master the basic skills of computational intelligence, data intelligence, machine intelligence and information intelligence.

3. Strong self-study ability, hands-on ability, sense of innovation and high comprehensive quality.

4. Understanding of the frontiers, latest developments and trends in the field of computer and information systems, and intelligent science and technology.

5. Understanding of the frontier theories of artificial intelligence and intelligent system. Possess the preliminary ability to do researches, develop new systems, and technologies.

III. Study Length, Degree, and Graduation Requirements

1. Study length: 4 years. The academic credit system of SUSTech allows flexible study years, but not less than 3 years or more than 6 years

2. Degree conferred: Students who complete and meet the degree requirements of the undergraduate program will be awarded a bachelor's degree in Engineering

3. The minimum credit requirement for graduation: 146 credits. The specific requirements are as follows.

<table>
<tr><th colspan="2">Module</th><th>Category</th><th>Minimum Credit Requirement</th></tr>
<tr><td rowspan="15">General Education Courses</td><td>Chinese Language and Culture Module</td><td>Chinese Language and Culture</td><td>16</td></tr>
<tr><td rowspan="2">Arts and Physical Education Module</td><td>Physical Education</td><td>4</td></tr>
<tr><td>Arts</td><td>2</td></tr>
<tr><td rowspan="4">Competence Development Module</td><td>Computer Programming</td><td>3</td></tr>
<tr><td>Writing</td><td>2</td></tr>
<tr><td>Chinese Studies</td><td>2</td></tr>
<tr><td>Foreign Languages</td><td>14</td></tr>
<tr><td rowspan="2">Humanities and Social Sciences Module</td><td>Humanities</td><td rowspan="2">6</td></tr>
<tr><td>Social Sciences</td></tr>
<tr><td rowspan="4">Mathematics and Natural Sciences Module</td><td>Mathematics</td><td>12</td></tr>
<tr><td>Physics</td><td>10</td></tr>
<tr><td>Chemistry</td><td>3</td></tr>
<tr><td>Biology</td><td>3</td></tr>
<tr><td>Introduction to Majors Module</td><td>Introduction to Majors</td><td>2</td></tr>
<tr><td rowspan="4">Major Courses</td><td rowspan="3">Major Required Courses</td><td>Major Foundational Courses</td><td>20</td></tr>
<tr><td>Major Core Courses</td><td>15</td></tr>
<tr><td>Practice-based Learning
(Undergraduate Thesis, Internships)</td><td>14</td></tr>
<tr><td>Major Elective Courses</td><td>Major Elective Courses</td><td>18</td></tr>
<tr><td colspan="3">Total</td><td>146</td></tr>
<tr><td colspan="4">Note: please see the General Education Requirement for more details on Chinese Language and Culture Module, Arts and Physical Education Module, Competence Development Module（Foreign Languages & Chinese Studies & Writing）, Humanities and Social Sciences Module, and Introduction to Majors Module.</td></tr>
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IV. Course Requirements for the Mathematics and Natural Sciences Module and Computer Programming

Course Category	Course Code	Course Name	Credits	Terms	Prerequisite	Dept.
Mathematics	MA117	Calculus I	4	1 Fall	NA	MATH
	MA127	Calculus II	4	1Spr	Calculus I	
	MA113	Linear Algebra	4	1 Spr/Fall	NA	
Physics	PHY105	College Physics I	4	1 Fall	NA	PHY
	PHY106	College Physics II	4	1Spr	College Physics I	
	PHY104B	Experiments of Fundamental Physics	2	1-2 Spr/Fall	NA	
Chemistry	CH105	Chemistry：the Central Science	3	1-2 Spr/Fall	NA	CHM
Biology	BIO102B	Introduction to Life Science	3	1-2 Spr/Fall	NA	BIO
Computer Programming	CS109	Introduction to Computer Programming	3	1-2 Spr/Fall	NA	CSE

Note:

1. Students can take Mathematical Analysis I II as an alternative to Calculus I II.
2. Students can take Advanced Linear Algebra I as an alternative to Linear Algebra.
3. Students can take General Physics I II as an alternative to College Physics I II.
4. Students can take General Chemistry as an alternative to Chemistry：the Central Science.
5. Students can take Principles of Biology as an alternative to Introduction to Life Science.
6. The above alternatives are also applicable to "Prerequisites for Major Declaration."

V. Prerequisites for Major Declaration

Major Declaration Time	Course Code	Course Name	Prerequisite
Declare major at the end of the first academic year	MA117	Calculus I	NA
	MA127	Calculus II	Calculus I
	MA113	Linear Algebra	NA
	PHY105	College Physics I	NA
	PHY106	College Physics II	College Physics I
	PHY104B	Experiments of Fundamental Physics	NA
	CH105	Chemistry：the Central Science	NA
	BIO102B	Introduction to Life Science	NA
	CS109	Introduction to Computer Programming	NA
Declare major at the end of the second academic year	MA117	Calculus I	NA
	MA127	Calculus II	Calculus I
	MA113	Linear Algebra	NA
	PHY105	College Physics I	NA
	PHY106	College Physics II	College Physics I
	PHY104B	Experiments of Fundamental Physics	NA
	CH105	Chemistry：the Central Science	NA
	BIO102B	Introduction to Life Science	NA
	CS109	Introduction to Computer Programming	NA

Note:

1. **If the number of students entering a major at the end of the first academic year in the department is greater than or equal to the total number of the teaching-research faculty (PI)*2*60%, all majors in the department may implement the prerequisites for major declaration at the end of the second academic year.**
2. **If the number of students entering a major at the end of the first academic year in the department is less than the total number of the teaching-research faculty (PI)*2*60%, all majors in the department do not implement the prerequisites for major declaration at the end of the second academic year.**
3. **Suppose the number of students applying for a major at the end of the first academic year exceeds four times the total number of the teaching-research faculty (PI), then the department may select students according to predetermined rules. In principle, the rules set by the department shall examine the students' suitability for the major and not based on weighted GPA (Specific rules shall be set by the department and announced in advance).**
4. **For departments that do not implement prerequisites for major declaration at end of the second academic year, if the cumulative number of students applying for a major at the end of the second academic year and the number of students who have entered a major at the end of the first academic year exceeds four times the total number of the teaching-research faculty (PI), the department may select students according to predetermined rules. In principle, the rules set by the department shall examine the students' suitability for the major and not based on weighted GPA (Specific rules shall be set by the department and announced in advance).**

VI: Major Course Arrangement

Table 1: Major Required Courses

Program of Intelligence Science and Technology

Course Category	Course Code	Course Name	Credits	Practice-based Learning Credits	Terms	Prerequisite	Dept.
Major Foundational Courses	CS104	Introduction to Mathematical Logic	2		1/Spr	NA	CSE
	MA212	Probability and Statistics	3		2/Fall	MA102a or MA127	MATH
	CS203	Data Structures and Algorithm Analysis	3	1	2/Fall	CS109	CSE
	CS307	Principles of Database Systems	3	1	2/Fall	CS109	CSE
	EE205	Signals and Systems	3	1	2/Fall	MA117	EE
	CS201	Discrete Mathematics	3		2/Spr	MA127,MA113	CSE
	CS208	Algorithm Design and Analysis	3	1	2/Spr	CS109, CS203	CSE
	Total		20	4			
Major Core Courses	CS303	Artificial Intelligence	3	1	3 / Fall	CS109, CS203, MA212	CSE
	CS405	Machine Learning	3	1	3 / Fall	MA113, MA212	CSE
	CS321	Group Projects I	2	2	3 / Fall	NA	CSE
	CS302	Operating Systems	3	1	3 / Spr	CS109, CS203	CSE
	CS326	Group Projects II	2	2	3 / Spr	NA	CSE
	CS413	Group Projects III	2	2	4 / Fall	NA	CSE
	Total		15	9			
Practice-based Courses	CS470	Industrial Practice	2	2			
	CS491	Undergraduate Thesis/Projects	12	12			
	Total		14	14			
Total			49	27			

Table 2: Major Elective Courses

Program of Intelligence Science and Technology

Course Code	Course Name	Credits	Practice-based Learning Credits	Terms	Prerequisite	Dept.
CS101A	Introduction to Computer Science A	2		1/ Fall	NA	CSE
CS106	Introduction to Cognitive Science	2		1/ Fall	NA	CSE
CS105	Lab of Introduction to Cognitive Science	1	1	1 / Fall	NA	CSE
CS209A	Computer System Design and Applications A	3	1	1 / Spr	CS109 or CS110	CSE
CS205	C/C++ Program Design	3	1	2/ Fall	NA	CSE
CS207	Digital Logic	3	1	2/ Fall	NA	CSE
CS202	Computer Organization	3	1	2/ Spr	CS207	CSE
CS306	Data Mining	3	1	2 / Spr	CS203 or CS203B	CSE
CS327	The Theory of Computation	2		3 / Fall	CS101A, CS104	CSE
MA309	Time Series Analysis	3		3/ Fall	MA212 or MA204	STAT
MA305	Numerical Analysis	3		3/ Fall	MA203a or MA213-16	MATH
EE323	Digital Signal Processing	3	1	3/ Fall	EE205	EE
CS301	Embedded System and Microcomputer Principle	3	1	3/ Fall	CS207	CSE
CS305	Computer Networks	3	1	3/ Fall	CS109	CSE
CS309	Object-oriented Analysis and Design	3	1	3/ Fall	CS109, CS203	CSE
CS313	Automated Reasoning	3	1	3/ Fall	CS104	CSE
CS323	Compilers	3	1	3/ Fall	CS109 or CS205, CS202	CSE
CS308	Computer Vision	3	1	3/ Fall	CS109,CS203,MA127, MA113	CSE
CS315	Computer Security	3	1	3/ Fall	CS109	CSE
CS325	Multi-agent Systems	3	1	3/ Fall	CS109, CS203, MA212	CSE
CS304	Software Engineering	3	1	3/ Spr	CS109, CS203	CSE
CS312	Computer Graphics	3	1	3 / Spr	NA	CSE
CS314	Internet of Things	3	1	3 / Spr	CS305	CSE
CS324	Deep Learning	3	1	3 / Spr	CS303	CSE
CS310	Natural Language Processing	3	1	3 / Spr	CS303	CSE
CS330	Multimedia Information Processing	3	1	3 / Spr	NA	CSE
CS332	Information Retrieval	3	1	3 / Spr	CS203	CSE
CS328	Distributed and Cloud Computing	3	1	3 / Spr	CS109, CS305	CSE
CS401	Intelligent Robotics	3	1	3 / Spr	CS109, CS203, MA212	CSE
MA234	Introduction to Theoretical and Practical Data Science	4	1	3 / Spr	MA212	MATH
EE326	Digital Image Processing	3	1	3 / Spr	EE205	EE
EE411	Information Theory and Coding	2		4/ Fall	MA212	EE
CSE5014	Cryptography and Network Security	2		4/ Fall	CS201, MA212, CS203	CSE
CSE5005	Advanced Computer Networks and Big Data	3	1	4/ Fall	CS305	CSE
CS409	Software Testing	3	1	4/ Fall	CS304	CSE

CSE5003	Advanced Algorithms	3	1	4/ Fall	CS208	CSE
CSE5001	Advanced Artificial Intelligence	3	1	4/ Fall	CS303	CSE
CSE5012	Evolutionary Computation and Its Applications	3	1	4 / Spr	CS303	CSE
CSE5018	Advanced Optimization Algorithms	3	1	4 / Spr	CSE5003	CSE
CS402	Frontier Seminars in Computer Science and Technology IV	1		4 / Spr	NA	CSE
Total		112	32			

Note

1. Students are required to study three courses of them (Computer Vision, Intelligent Robotics, Multi-agent Systems, Deep Learning).

2. Students are required to study one course of them (Automated Reasoning, Natural Language Processing, Multimedia Information Processing).

Table 3: Overview of Practice-based Learning

Program of Intelligence Science and Technology

Course Code	Course Name	Credits	Practice-based Learning Credits	Terms	Prerequisite	Dept.
CS105	Lab of Introduction to Cognitive Science	1	1	1 / Fall	NA	CSE
CS209A	Computer System Design and Applications A	3	1	1/ Spr	CS109 or CS110	CSE
CS203	Data Structures and Algorithm Analysis	3	1	2/ Fall	CS109	CSE
CS307	Principles of Database Systems	3	1	2/ Fall	CS109	CSE
EE205	Signals and Systems	3	1	2/ Fall	MA117	EE
CS205	C/C++ Program Design	3	1	2/ Fall	NA	CSE
CS207	Digital Logic	3	1	2/ Fall	NA	CSE
CS208	Algorithm Design and Analysis	3	1	2/ Spr	CS109, CS203	CSE
CS202	Computer Organization	3	1	2/ Spr	CS207	CSE
CS306	Data Mining	3	1	2/ Spr	CS203 or CS203B	CSE
CS303	Artificial Intelligence	3	1	3/ Fall	CS109,CS203, MA212	CSE
CS405	Machine Learning	3	1	3/ Fall	MA113, MA212	CSE
CS321	Group Projects I	2	2	3/ Fall	NA	CSE
EE323	Digital Signal Processing	3	1	3/ Fall	EE205	EE
CS301	Embedded System and Microcomputer Principle	3	1	3/ Fall	CS207	CSE
CS305	Computer Networks	3	1	3/ Fall	CS109	CSE
CS309	Object-oriented Analysis and Design	3	1	3/ Fall	CS109, CS203	CSE
CS313	Automated Reasoning	3	1	3/ Fall	CS104	CSE
CS323	Compilers	3	1	3/ Fall	CS109 or CS205, CS202	CSE
CS308	Computer Vision	3	1	3/ Fall	CS109,CS203,MA127,MA113	CSE
CS315	Computer Security	3	1	3/ Fall	CS109	CSE
CS325	Multi-agent Systems	3	1	3/ Fall	CS109, CS203, MA212	CSE
CS302	Operating Systems	3	1	3/ Spr	CS109, CS203	CSE
CS326	Group Projects II	2	2	3/ Spr	NA	CSE
CS304	Software Engineering	3	1	3/ Spr	CS109, CS203	CSE
CS312	Computer Graphics	3	1	3/ Spr	NA	CSE
CS314	Internet of Things	3	1	3/ Spr	CS305	CSE
CS324	Deep Learning	3	1	3 / Spr	CS303	CSE
CS310	Natural Language Processing	3	1	3 / Spr	CS303	CSE
CS330	Multimedia Information Processing	3	1	3 / Spr	NA	CSE
CS332	Information Retrieval	3	1	3 / Spr	CS203	CSE
CS328	Distributed and Cloud Computing	3	1	3 / Spr	CS109, CS305	CSE
CS401	Intelligent Robotics	3	1	3/ Spr	CS109, CS203, MA212	CSE
EE326	Digital Image Processing	3	1	3/ Spr	EE205	EE
MA234	Introduction to Theoretical and Practical Data Science	4	1	3 / Spr	MA212	MATH
CS413	Group Projects III	2	2	4/ Fall	NA	CSE

CSE5005	Advanced Computer Networks and Big Data	3	1	4/ Fall	CS305	CSE
CS409	Software Testing	3	1	4/ Fall	CS304	CSE
CSE5003	Advanced Algorithms	3	1	4/ Fall	CS208	CSE
CSE5001	Advanced Artificial Intelligence	3	1	4/ Fall	CS303	CSE
CSE5012	Evolutionary Computation and Its Applications	3	1	4 / Spr	CS303	CSE
CSE5018	Advanced Optimization Algorithms	3	1	4/ Spr	CSE5003	CSE
CS470	Industrial Practice	2				
CS491	Undergraduate Thesis/Projects	12				
Total		136	45			

Curriculum Structure of Intelligence Science and Technology