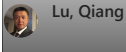


# Computer Engineering Curriculum



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The Zhejiang University/University of Illinois Urbana-Champaign Institute (ZJU-UIUC Institute) offers a joint dual-degree engineering program. Upon successful completion of the program, and after meeting the graduation requirements of both universities, students will obtain bachelor's degrees separately from Zhejiang University (ZJU) and University of Illinois Urbana-Champaign (UIUC).

## 1. Overview

Computer engineering focuses on the development of vital computing technologies, ranging from chips to computers to networks to programming tools to key algorithms for building exciting applications. Fundamentally, computer engineering addresses the problem of building scalable, trustworthy computing systems, and the faculty's interests span a broad spectrum of issues pertinent to this theme. Computer engineering has taken the lead in revolutionizing many science and engineering disciplines with parallel computing, from chips to clouds to planet-scale critical infrastructures, and has defined new standards of security, privacy, and dependability for systems ranging from small circuits to the electric power grids of many nations. Students need a broad and sound set of mathematical and computing skills and are well-served by a flexible curriculum that enables them to pursue topics of interest among the many sub-disciplines in computing.

The Computer Engineering program core curriculum focuses on fundamental computer engineering knowledge: circuits, systems, electromagnetics, computer systems, electronics for information processing and communication, and computer science. The rich set of ECE elective courses permits students to concentrate on any sub-discipline of computer engineering, including hardware systems; cyber physical systems; foundations and theory; software and languages; algorithms and mathematical tools; trust, reliability, security; networking, mobile and distributed computing; big data analytics and systems; artificial intelligence, robotics, cybernetics.

During their junior and senior years students are encouraged to take courses and involve themselves in research projects in cross-disciplinary areas with Civil and Environmental Engineering, Mechanical Engineering, Electrical Engineering, and others.

## 2. Graduation Requirement

### 1) Grade Point Average Requirement

A student must maintain a minimum GPA of 2.0 (A=4.0) to remain in good standing and graduate.

### 2) Junior Eligibility Requirement

To be eligible to enroll in the ECE courses listed in the third year of the curriculum, a student must have completed the mathematics, physics, computer science, and electrical and computer engineering courses listed in the first two years with a combined GPA of 2.25.

### 3) Curriculum Requirement

The curriculum leading to the degree of Bachelor of Science in Computer Engineering at UIUC requires 128 hours and is organized into required courses and elective courses.

I. Required courses, see section 3 for details.	2016-2017	2018-2020	2021	2022	2023-
a) Orientation and Professional Development	1	1	1	1	1
b) Foundational Mathematics and Science	31	31	29	29	29
c) Technical Core	36	36	36	36	36
d) Composition	6	8	8	8	8
e) Advanced Composition*	4	4	4	4	4
Total required	78	80	78	78	78
II. Elective courses, see section 4 for details.					
a) Technical Electives	27	27	29	29	30
b) Liberal Education.	18	18	18	12	12
c) Free Electives	9	7	7	13	12
Total required:	54	52	54	54	53

\*Students take ECE 445 to satisfy advance composition and technical elective requirement, and credits can be given for both.

For UIUC degree, in addition to the specific course and grade point average requirements listed above, each candidate for a bachelor's degree from UIUC must meet the following requirements:

- **Residency Requirement:** Earn a minimum 60 semester hours of UIUC credit, of which at least 21 hours must be 300 or 400 level UIUC credit courses.
- **Transfer Requirement:** Have a satisfactory English Proficiency Test score on TOEFL, IELTS or others approved by UIUC, and maintain a good standing on academic studies that all term GPAs, overall GPA on UIUC courses are suggested to be above 2.5, and get admission through transfer applications during junior year, changing status from non-degree student to degree student.

For ZJU degree, in addition to the 128-hour requirement listed above, the curriculum leading to the degree of Bachelor of Engineering from ZJU requires students to complete additional ZJU-required liberal education courses for domestic students and additional five courses in Chinese language and society study for international students. Please refer to section 5 for details.

### 3. Required Courses

#### 3.1 Orientation and Professional Development

This course introduces students to the opportunities and resources our institute and curriculum can offer you as you work to achieve your career goals. It also provides the skills to work effectively and successfully in the engineering profession.

Course Code	Course Name	Credit
ENG 100	Engineering Orientation	1

#### 3.2 Foundational Mathematics and Science

These courses emphasize the fundamental mathematical and scientific principles upon which the engineering discipline is based.

Course Code	Course Name	2016-2020	2021-
MATH 221	Calculus I	4	4
MATH 231	Calculus II	3	3
MATH 241	Calculus III	4	4
MATH 257	Linear Algebra with Computational Application		3
MATH 285	Introduction to Differential Equation		3
MATH 286	Introduction to Differential Equation Plus	4	
PHYS 211	University Physics: Mechanics	4	4
PHYS 212	University Physics: Elec & Mag	4	4
PHYS 213	Univ Physics: Thermal Physics	2	2
PHYS 214	Univ Physics: Quantum Physics	2	2
CHEM 102*	General Chemistry I	3	
CHEM 103*	General Chemistry Lab I	1	
	Total	31	29

*\*Elective for CompEs on the Fall 2021 or later catalog year.*

#### 3.3 Technical Core

These courses stress fundamental concepts and basic laboratory techniques that comprise the common intellectual understanding of computer engineering.

Course Code	Course Name	2016-
ECE 110	Introduction to Electronics	3
ECE 120	Introduction to Computing	4
ECE 210	Analog Signal Processing	4
ECE 220	Computer Systems & Programming	4
CS 173*	Discrete Structures	3
CS 225	Data Structures	4

ECE 313**	Probability with Engineering Application	3
ECE 374	Introduction to Algorithms & Models of Computation	4
ECE 385	Digital Systems Laboratory	3
ECE 391	Computer Systems Engineering	4
	Total	36

\*CS 173 can be substituted by Math 213 (Basic Discrete Mathematics, 3 hours). \*\*ECE 313 can be substituted by STAT 410 (Statistics and Probability II, 3 hours).

### 3.4 Composition

These courses teach the fundamentals of expository writing.

Course Code	Course Name	2016-2017	2018-
RHET 101	Principles of Writing	3	4
RHET 102	Principles of Research	3	4
	Total	6	8

### 3.5 Advanced Composition

The Advanced Composition requirement is fulfilled by a writing-intensive course beyond basic composition. It is normally taken in the junior or senior years.

Course Code	Course Name	2016-
ECE 445*	Senior Design Project Lab	4
	Total required	4

\*ECE 445 is also a required technical elective. Students may also take other advanced composition courses from general education course list to satisfy this requirement.

## 4. Elective Courses

### 4.1 Technical Electives

These courses stress cross-disciplinary study, the rigorous analysis and design principles practiced in the major sub-disciplines of computer engineering, for example cyber physical systems; foundations and theory; software and languages; algorithms and mathematical tools; trust, reliability, security; networking, mobile and distributed computing; big data analytics and systems; artificial intelligence, robotics, cybernetics, etc.

Students must complete a minimum of total required hours on technical electives, which include at least:

		2016-2020	2021-2022	2023
1) 1 course	EE Foundations Courses, see section 4.1.1 for detail.			
2) 3 courses	Advanced Computing Electives, see section 4.1.2 for detail.			
3) 1 course	ECE 445 - Senior Design Project Lab			
4) Others	Others, see section 4.1.3 for detail			
	Total required	27	29	30

#### 4.1.1 EE Foundation Courses

Select one of 6 EE Foundation Courses: 310, 329, 330, 340, 461, 486

Course Code	Course Name	Credits
ECE 310	Digital Signal Processing	3
ECE 330	Power Circuits & Electromechanics	3
ECE 329	Fields and Waves I	3
ECE 340	Semiconductor Electronics	3

ECE 461	Digital Communications	3
ECE 486	Control Systems	4

#### 4.1.2 Advanced Computing Electives

Following CS and ECE courses are listed as advanced computing electives. Some ECE ones are cross listed with CS. Select three of them.

Course Code	Course Name	Credits
CS 357	Numerical Methods I	3
CS 411	Database Systems	3
CS 412	Introduction to Data Mining	3
CS 414	Multimedia Systems	3
CS 418	Interactive Computer Graphics	3
CS 419	Production Computer Graphics	3
CS 420	Parallel Programming: Scientists and Engineers	3
CS 421	Programming Languages & Compilers	3
CS 423	Operating Systems Design	3
CS 424	Real-Time Systems	3
CS 425	Distributed Systems	3
CS 426	Compiler Construction	3
CS 431	Embedded Systems	3
CS 436	Computer Networking Laboratory	3
CS 437	Topics in Internet of Things	3
CS 438	Communication Networks	3
CS 440	Artificial Intelligence	3
CS 441	Applied Machine Learning	3
CS 444	Deep Learning for Computer Vision	3
CS 446	Machine Learning	3
CS 450	Numerical Analysis	3
CS 461	Computer Security I	3
CS 473	Algorithms	4
CS 475	Formal Models of Computation	3
CS 476	Program Verification	3
CS 477	Formal Software Development Methods	3
CS 483	Applied Parallel Programming	3
ECE 407/CS 407	Cryptography	3
ECE 408/CS 483	Applied Parallel Programming	4
ECE 411	Computer Organization & Design	4
ECE 412	Microcomputer Laboratory	3
ECE 419/CS 460	Computer Security Laboratory	3
ECE 422/CS 461	Computer Security I	4
ECE 424/CS 463	Computer Security II	3
ECE 425	Intro to VLSI System Design	3
ECE 428/CS 425	Distributed Systems	3
ECE 434	Mobil Computing and Application	3
ECE 435/CS 436	Computer Networking Laboratory	3
ECE 438/CS 438	Communication Networks	3

ECE 439/CS 439	Wireless Networks	3
ECE 448/CS 440	Artificial Intelligence	3
ECE 449/CS 446	Machine Learning	3
ECE 462	Logic Synthesis	3
ECE 470	Introduction to Robotics	4
ECE 478/CS 477	Formal Software Development Methods	3
ECE 484	Principles of Safe Autonomy	4
ECE 491/CS 450	Numerical Analysis	3
ECE 492/CS 420	Parallel Programming: Scientists and Engineers	3

### 4.1.3 Other Electives

Students are encouraged to build up their cross-discipline study by taking non-ECE technical courses from Civil Engineering, Mechanical Engineering, Computer Science, and others at ZJUI or during exchange at UIUC.

**Civil & Env. Eng. (CEE):** 310, 330, 408, 410, 416, 430, 447, 491

Course Code	Course Name	Credits
CEE 310	Transportation Engineering	3
CEE 330	Environmental Engineering	3
CEE 408	Railroad Transportation Engineering	3 or 4
CEE 410	Railway Signaling & Control	3 or 4
CEE 416	Traffic Capacity Analysis	3 or 4
CEE 430	Ecological Quality Engineering	2
CEE 447	Atmospheric Chemistry	4
CEE 491	Decision and Risk Analysis	3 or 4

**Mechanical Eng. (ME):** 200, 310, 320, 330, 340, 370, 371, 400, 401, 402, 403, 404, 410, 411, 412, 420, 430, 431, 440, 445, 450, 451, 452, 460, 461, 471, 472, 485, and 487

Course Code	Course Name	Credits
ME 200	Thermodynamics	3
ME 310	Fundamentals of Fluid Dynamics	4
ME 320	Heat Transfer	4
ME 330	Engineering Materials	4
ME 340	Dynamics of Mechanical Systems	3.5
ME 370	Mechanical Design I	3
ME 371	Mechanical Design II	3
ME 400	Energy Conversion Systems	3 or 4
ME 401	Refrigeration and Cryogenics	3 or 4
ME 402	Design of Thermal Systems	3 or 4
ME 403	Internal Combustion Engines	3 or 4
ME 404	Intermediate Thermodynamics	4
ME 410	Intermediate Gas Dynamics	3 or 4
ME 411	Viscous Flow & Heat Transfer	4
ME 412	Numerical Thermo-Fluid Mechs	2 to 4
ME 420	Intermediate Heat Transfer	4
ME 430	Failure of Engineering Materials	3 or 4
ME 431	Mechanical Component Failure	3 or 4

ME 440	Kinematics & Dynamics of Mechanical System	3 or 4
ME 445	Introduction to Robotics	4
ME 450	Modeling Materials Processing	3
ME 451	Computer-Aided Manufacture Systems	3 or 4
ME 452	Num Control of Manufacture Processes	3 or 4
ME 460	Industrial Control Systems	4
ME 461	Computer Control of Mechanical Systems	3 or 4
ME 471	Finite Element Analysis	3 or 4
ME 472	Introduction to Tribology	3 or 4
ME 485	MEMS Devices & Systems	3
ME 487	MEMS-NEMS Theory & Fabrication	4

**Theoretical & Applied Mechanics (TAM):** 211, 212, 251, 324, 335, 412, 435, 445, 451

Course Code	Course Name	Credits
TAM 211	Statics	3
TAM 212	Introductory Dynamics	3
TAM 251	Introductory Solid Mechanics	3
TAM 324	Behavior of Materials	4
TAM 335	Introductory Fluid Mechanics	4
TAM 412	Intermediate Dynamics	4
TAM 435	Intermediate Fluid Mechanics	4
TAM 445	Continuum Mechanics	4
TAM 451	Intermediate Solid Mechanics	4

**Computer Science (CS):** (101, by approval), 242, 357, 410, 411, 412, 413, 414, 415, 416, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 431, 433, 436, 438, 439, 440, 445, 446, 447, 450, 460, 461, 463, 465, 466, 467, 473, 475, 476; 477, 481, 484; CS 398 & 498 Special Topics, as approved.

Course Code	Course Name	Credits
CS 242	Programming Studio	3
CS 357	Numerical Methods I	3
CS 410	Text Information Systems	3 or 4
CS 411	Database Systems	3 or 4
CS 412	Introduction to Data Mining	3 or 4
CS 413	Intro to Combinatorics	3 or 4
CS 414	Multimedia Systems	3 or 4
CS 415	Game Development	3 or 4
CS 416	Data Visualization	3 or 4
CS 418	Interactive Computer Graphics	3 or 4
CS 419	Production Computer Graphics	3 or 4
CS 420	Parallel Program: Science & Engineering	3 or 4
CS 421	Programming Languages & Compilers	3 or 4
CS 422	Programming Language Design	3 or 4
CS 423	Operating Systems Design	3 or 4
CS 424	Real-Time Systems	3 or 4
CS 425	Distributed Systems	3 or 4

CS 426	Compiler Construction	3 or 4
CS 427	Software Engineering I	3 or 4
CS 428	Software Engineering II	3 or 4
CS 429	Software Engineering II, ACP	3
CS 431	Embedded Systems	3 or 4
CS 433	Computer System Organization	3 or 4
CS 436	Computer Networking Laboratory	3 or 4
CS 438	Communication Networks	3 or 4
CS 439	Wireless Networks	3 or 4
CS 440	Artificial Intelligence	3 or 4
CS 445	Computational Photography	3 or 4
CS 446	Machine Learning	3 or 4
CS 447	Natural Language Processing	3 or 4
CS 450	Numerical Analysis	3 or 4
CS 460	Security Laboratory	3 or 4
CS 461	Computer Security I	4
CS 463	Computer Security II	3 or 4
CS 465	User Interface Design	3 or 4
CS 466	Introduction to Bioinformatics	3 or 4
CS 467	Social Visualization	3 or 4
CS 473	Algorithms	4
CS 475	Formal Models of Computation	3 or 4
CS 476	Program Verification	3 or 4
CS 477	Formal Software Development Methods	3 or 4
CS 481	Advanced Topics in Stochastic Processes & Applications	3 or 4
CS 484	Parallel Programming	3 or 4
CS 398	Special Topics (As Approved)	1 to 4
CS 498	Special Topics (As Approved)	1 to 4

ECE: 297, 304, 307, 310, 311, 314, 329, 330, 333, 340, 342, 343, 350, 365, 380, 395, 396, 397, 402, 403, 408, 411, 412, 414, 415, 416, 417, 418, 419, 420, 422, 424, 425, 428, 431, 432, 435, 437, 438, 439, 441, 443, 444, 446, 447, 448, 451, 452, 453, 454, 455, 456, 457, 458, 459, 461, 460, 462, 463, 464, 465, 466, 467, 468, 469, 470, 472, 473, 476, 478, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 495, 496, 499; ECE 398 & 498 Special Topics, as approved.

Course Code	Course Name	Credits
ECE 297	Individual Study	1
ECE 304	Photonic Devices	3
ECE 307	Techniques for Engineering Decisions	3
ECE 310	Digital Signal Processing	3
ECE 311	Digital Signal Processing Lab	1
ECE 314	Probability in Engineering Lab	1
ECE 329	Fields and Waves I	3
ECE 330	Power Circuits & Electromechanics	3
ECE 333	Green Electric Energy	3
ECE 340	Semiconductor Electronics	3
ECE 342	Electronic Circuits	3

ECE 343	Electronic Circuits Laboratory	1
ECE 350	Fields and Waves II	3
ECE 365	Data Science and Engineering	3
ECE 380	Biomedical Imaging	3
ECE 395	Advanced Digital Projects Lab	2 or 3
ECE 396	Honors Project	1 to 4
ECE 397	Individual Study in ECE	0 to 4
ECE 402	Electronic Music Synthesis	3
ECE 403	Audio Engineering	3
ECE 408	Applied Parallel Programming	4
ECE 411	Computer Organization & Design	4
ECE 412	Microcomputer Laboratory	3
ECE 414	Biomedical Instrumentation	3
ECE 415	Biomedical Instrumentation Lab	2
ECE 416	Biosensors	3
ECE 417	Multimedia Signal Processing	4
ECE 418	Image & Video Processing	4
ECE 419	Security Laboratory	3 or 4
ECE 420	Embedded DSP Laboratory	2
ECE 422	Computer Security I	4
ECE 424	Computer Security II	3 or 4
ECE 425	Intro to VLSI System Design	3
ECE 428	Distributed Systems	3 or 4
ECE 431	Electric Machinery	4
ECE 432	Advanced Electric Machinery	3
ECE 435	Computer Networking Laboratory	3 or 4
ECE 437	Sensors and Instrumentation	3
ECE 438	Communication Networks	3 or 4
ECE 439	Wireless Networks	3 or 4
ECE 441	Physics & Modeling Semiconductor Devices	3
ECE 443	LEDs and Solar Cells	4
ECE 444	IC Device Theory & Fabrication	4
ECE 445	Senior Design Project Lab	4
ECE 446	Principles of Experimental Research in Electrical Engineering	4
ECE 447	Active Microwave Circuit Design	3
ECE 448	Artificial Intelligence	3 or 4
ECE 451	Adv Microwave Measurements	3
ECE 452	Electromagnetic Fields	3
ECE 453	Wireless Communication Systems	4
ECE 454	Antennas	3
ECE 455	Optical Electronics	3 or 4
ECE 456	Global Nav Satellite Systems	4
ECE 457	Microwave Devices & Circuits	3
ECE 458	Application of Radio Wave Propagation	3
ECE 459	Communications Systems	3



ECE 460	Optical Imaging	4
ECE 461	Digital Communications	3
ECE 462	Logic Synthesis	3
ECE 463	Digital Communications Lab	2
ECE 464	Power Electronics	3
ECE 465	Optical Communications Systems	3
ECE 466	Optical Communications Lab	1
ECE 467	Biophotonics	3
ECE 468	Optical Remote Sensing	3
ECE 469	Power Electronics Laboratory	2
ECE 470	Introduction to Robotics	4
ECE 472	Biomedical Ultrasound Imaging	3
ECE 473	Fund of Engineering Acoustics	3 or 4
ECE 476	Power System Analysis	3
ECE 478	Formal Software Development Methods	3 or 4
ECE 479	IoT and Cognitive Computing	4
ECE 480	Magnetic Resonance Imaging	3 or 4
ECE 481	Nanotechnology	4
ECE 482	Digital IC Design	3
ECE 483	Analog IC Design	3
ECE 485	MEMS Devices & Systems	3
ECE 486	Control Systems	4
ECE 487	Introduction to Quantum Electronic	3
ECE 488	Compound Semiconductors & Devices	3
ECE 489	Robot Dynamics and Control	4
ECE 490	Introduction to Optimization	3 or 4
ECE 491	Numerical Analysis	3 or 4
ECE 492	Parallel Program: Sci & Engineering	3 or 4
ECE 493	Advanced Engineering Math	3 or 4
ECE 495	Photonic Device Laboratory	3
ECE 496	Senior Research Project	2
ECE 499	Senior Thesis	2
ECE 398	Special Topics in ECE (As approved)	0 to 4
ECE 498	Special Topics in ECE (As approved)	0 to 4

Technical electives approved in other areas are as below:

**Aerospace Eng. (AE):** 202, 302, 311, 312, 321, 352, 353, 402, 403, 410, 412, 416, 419, 420, 428, 433, 434, 435, 451, 460

**Agri. Bio Eng. (ABE):** any 300- and 400-level<sup>1</sup> course EXCEPT 440

**Astronomy (ASTR):** 210, 310, 330, 350, 404, 405, 406, 414, 450

**Atmospheric Science (ATMS):** 201, 301, 302, 303, 304, 305, 404, 405, 406, 410, 411, 420, 421, 447, 449

**Biochemistry (BIOC):** 406, 440, 446, 455

**Bioengineering (BIOE):** 201, 202, 302, 414, 415, 461, 467, 473, 476, 480, 485

**Biophysics (BIOP):** all 400-level courses<sup>1</sup>

Chem & Bio Eng (CHBE): 221, 321, 421, 422, 424, 430, 431, 440, 451, 452, 453, 456, 457, 471, 472, 473, 474

Chemistry (CHEM): 102\*, 103\*, 104, 105, any 200/300/400-level class EXCEPT 396/7, 497, 499

\*Elective for CompEs on the fall 2021 or later catalog year.

Crop Sciences (CPSC): 265

Geology (GEOL): 107, 208, 333, 380, 411, 417, 432, 436, 440, 450, 452, 460

Industrial Eng. (IE): 310, 330, 360, 361, 400, 410, 411, 412, 413, 420, 430, 431

Integrative Biology (IB): 150, 202, 203, 204, 302, 335, 348, 368, 401, 405, 420, 421, 426, 427, 431, 432, 440, 443, 444, 451, 452, 453, 461, 462, 463, 464, 467, 468, 471, 472, 473, 481, 482, 483, 485, 486

Linguistics (LING): 300, 406, 407, 427

Material Science & Engineering (MSE): 280, any 300/400-level<sup>1</sup> class EXCEPT 304, 460, 461

Math: 257\*, 347, 348, 357, 402, 403, 412, 413, 414, 415\*, 416\*, 417, 418, 423, 424, 425, 427, 428, 432, 442, 444, 446, 447, 448, 450, 453, 473, 475, 481, 482, 484, 487, 489, 494

\*Electives for CompEs prior to Fall 2021 catalog year

Molecular & Cellular Biology (MCB): 150, 250, 251, 252, 253, 300, 301, 314, 316, 354, 400, 401, 402, 403, 404, 406, 408, 410, 413, 419, 421, 424, 426, 430, 431, 433, 435, 446, 480

Music (MUS): 407, 409

Neuroscience (NEUR): 453

Nuclear Plasma & Radiological (NPRE): 201, 247, 402, 412, 421, 423, 429, 431, 432, 435, 441, 442, 444, 446, 447, 448, 451, 455, 457, 458, 470, 475

Physics (PHYS): 225, 246, 325, 326, 370, 371, 401, 402, 403, 406, 419, 420, 427, 460, 466, 470, 485, 486, 487

Psychology (PSYC): 204

Speech & Hearing Science (SHS): 200, 240, 300, 301, 320, 450, and 470

Statistics (STAT): 420, 424, 425, 428, 429, and 440

Systems Eng (SE): 411, 420, 423, 424

#### 4.2 Liberal Education

The liberal education courses develop students' understanding of human culture and society, build skills of inquiry and critical thinking, and lay a foundation for civic engagement and lifelong learning. To satisfy the General Education requirements, students must take all courses for grade and complete courses based on the table below:

	2016-2017	2018-2019	2020-2021	2022-
1) Humanities & Arts (Two courses)	6	6	6	6
2) Social & Behavioral Sciences (Two courses)	6	6	6	6
3) Culture Studies				
Western/Comparative Culture(s) (One course)	3	3	3	3
Non-Western Culture(s) (One course)	3	3	3	3
U.S. Minority Culture(s) <sup>1</sup> (One course)		3	3	3
4) Aesthetic Education <sup>2</sup> (One course)			3	3
Total required	18	18	18	12

<sup>1</sup>Not required if students pursue ZJU degree only. <sup>2</sup>Required only for ZJU degree.

One of the Social and Behavioral Science courses is recommended to be an introductory economics course (ECON 102\_or ECON 103).

Proper selection of Social and Behavioral Sciences and in Humanities and the Arts will assure that these courses also fulfill Western, non-Western and US Minority Culture requirements.

#### 4.3 Free Electives

These unrestricted electives give the student the opportunity to explore any intellectual area of unique interest. This freedom plays a critical role in helping students to define research specialties. Students are encouraged to take cross-discipline courses as free electives.

Free electives	2016-2017	2018-2020	2021	2022	2023-
Total	9	7	9	13	12

#### 5. ZJU Required Liberal Education

These courses introduce Chinese modern history, social development, government policies, etc., help students to improve their English and maintain a healthy lifestyle.

Domestic students must complete all courses below, which can be taught in Chinese, to fulfill the graduate requirement along with the above 128 credit hour courses towards the Bachelor of Engineering Degree from ZJU.

Course Code	Course Name	2016-2017	2018	2019	2020	2021	2022
LAW1001	Mental Education and Foundation of Law	2.5	3	3	3		
LAW1002	Ideology, Morality and Rule of Law					3	3
HIST2001	Modern Chinese History	2.5	3	3	3	3	3
PHIL2001	Introduction to the Principle of Marxism	2.5	3	3	3		
PHIL2002	Introduction to the Principle of Marxism					3	3
PS2011	Intro.to Mao Thought & Theoretical System of China Socialism	4	5	5	5	5	3
PS3011	General Introduction to Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era		2	2	2	2	3
PS1001	Situation and Policy I	1	1	1	1	1	1
PS2001	Situation and Policy II	1	1	1	1	1	1
ENGL1001	Integrated English I	4	4	1.5	1.5	1.5	1.5
ENGL1002	Integrated English II	2	2	1.5	1.5	1.5	1.5
ENGL2001	Advanced Spoken English I				1.5	1.5	1.5
ENGL2002	Advanced Spoken English II				1.5	1.5	1.5
PE1001	Physical Education I	1	1	1	1	1	1
PE1002	Physical Education II	1	1	1	1	1	1
PE2001	Physical Education III	1	1	1	1	1	1
PE2002	Physical Education IV	1	1	1	1	1	1
PE3001	Physical Education V			1	1	1	1
PE3002	Physical Education VI			1	1	1	1
PE3011	Physical-fitness Test I	0.5	0.5				
PE4011	Physical-fitness Test II	0.5	0.5				
PE4021	Physical Education VII--Fitness test and exercise			0.5	0.5	0.5	0.5
MITR1001	Military Training	2	2	2	2	2	2
MITR2001	Military Theory	1.5	1.5	2	2	2	2
	Total	28	32.5	31.5	34.5	34.5	33.5

International students are required to complete the following courses in Chinese language study and Chinese society to fulfill the graduation requirements along with the above 128 credit hours of courses towards the Bachelor of Engineering Degree at ZJU.

		2016-2022	2023
Course Code	Course Name	Credits	Credits
CHIN 1001	Chinese I	4	4
CHIN 1002	Chinese II	5	4
CHIN 1003	Chinese III	4	4
CHIN 1004	Chinese IV	4	4
CHIN 1005	Language Proficiency and Testing		2
CULT 2001	China Survey	3	3
	Total	20	21

## 6. Sample Schedule by Semester

### 6.1 First Year-First (Fall) Semester

No	Course Code	Course Name	Credit Hours
1	Rhet 101	Principles of Writing	4
2	Chem 102*	General Chemistry I	3
3	Chem 103*	General Chemistry Lab I	1
4	Math 221	Calculus I	4
5	ECE 110	Intro to Electronics	3
6	CS 101*	Introduction to Computing: Engineering & Science	3
7	Eng 100	Engineering Orientation	1
		Total	19

\*Electives to CompEs; CompE may also select Math 213 or GenEd if not select Chem 102/103

No	Course Code	Course Name	Credit Hours
1	MITR 1001	Military Training	2
2	ENGL 1001	Integrated English I	1.5
3	PE 1001	Physical Education I	1
4	PS 1001	Chinese Social Development Situation and Policies I	
5	CHIN1001*	Chinese I	4.0

\*International students required only

### 6.2 First Year-Second (Spring) Semester

No	Course Code	Course Name	Credit Hours
1	Rhet 102	Principles of Research	3
2	Math 231	Calculus II	3
3	Phys 211	University Physics: Mechanics	4
4	ECE 120	Intro to Computing	4
5	MATH 257	Linear Algebra with Computational Application	3
		Total	17

No	Course Code	Course Name	Credit Hours
1	LAW1001	Mental Education and Foundation of	2.5

		Law	
2	LAW1002	<i>Ideology, Morality and Rule of Law</i>	
3	ENGL1002	<i>Integrated English II</i>	2
4	PE1002	<i>Physical Education II</i>	1
5	PS 1001	<i>Chinese Social Development Situation and Policies I</i>	1
6	CHIN1002*	<i>Chinese II</i>	5

\*International students required only

### 6.3 Second Year-First (Fall) Semester

No	Course Code	Course Name	Credit Hours
1	Math 241	Calculus III	4
2	Phys 212	University Physics: Elec& Mag	4
3	ECE 220	Computer Systems & Programming	4
4	Math 213	Basic Discrete Mathematics	3
5	GenEd 1*	Liberal Education Elective	3
		Total	18

\*Suggest selecting ECON 102 or ECON 103

No	Course Code	Course Name	Credit Hours
1	PS2011	<i>Intro.to Mao Thought &amp; Theoretical System of China Socialism</i>	3
2	ENGL2001	<i>Advanced Spoken English I</i>	1.5
3	PE2001	<i>Physical Education III</i>	1
4	MITR2001	<i>Military Theory</i>	2
5	PS2001	<i>Situation and Policy II</i>	
6	CHIN1003*	<i>Chinese III</i>	4
7	CULT2001*	<i>China Survey</i>	3

### 6.4 Second Year-Second (Spring) Semester

No	Course Code	Course Name	Credit Hours
1	Math 285	Intro to Differential Eq	3
2	Phys 213	Univ Physics: Thermal Physics	2
3	Phys 214	Univ Physics: Quantum Physics	2
4	ECE 210	Analog Signal Processing	4
5	CS 225	Data Structure	4
6	GenEd 2	Liberal Education Elective	3
		Total	18

No	Course Code	Course Name	Credit Hours
1	HIST2001	<i>Modern Chinese History</i>	3
2	PHIL2002	<i>Introduction to the Principle of Marxism</i>	3
3	ENGL2002	<i>Advanced Spoken English II</i>	1.5
5	PS2001	<i>Situation and Policy II</i>	
5	PE2002	<i>Physical Education IV</i>	1
6	CHIN1004	<i>Chinese IV</i>	4

\*International students required only

### 6.5 Third Year-First (Fall) Semester

Juniors exchange to UIUC (dual degree only)

No	Course Code	Course Name	Credit Hours
1	EE Foundation	One of ECE 310, 329, 330, 340, 486	3
2	ECE 391	Computer Systems Engineering	4
3	ECE 313	Probability with Engrg Applic	3
4	Tech Elec	Technical Elective	3
5	GenEd 3	Liberal Education Elective	3
		Total	16

### 6.6 Third Year- Second (Spring) Semester

Juniors continue exchange to UIUC (dual degree only)

No	Course Code	Course Name	Credit Hours
1	ECE 374	Introduction to Algorithms & Models of Computation	4
2	ECE 385	Digital Systems Laboratory	3
3	Tech Elec	Technical Elective	3
4	Tech Elec	Technical Elective	3
5	GenEd 4	Liberal Education Elective	3
		Total	16

No	Course Code	Course Name	Credit Hours
1	ECE 374	Introduction to Algorithms & Models of Computation	4
2	ECE 385	Digital Systems Laboratory	3
3	Tech Elec	Technical Elective	3
4	Tech Elec	Technical Elective	3
5	GenEd 4	Liberal Education Elective	3
		Total	16

### 6.7 Fourth Year-First (Fall) Semester

No	Course Code	Course Name	Credit Hours
1	Tech Elec	Technical Elective	3
2	Tech Elec	Technical Elective	3
3	Tech Elec	Technical Elective	3
4	Free Elec	Free Elective	3
5	Free Elec	Free Elective	3
		Total	15

No	Course Code	Course Name	Credit Hours
1	PS3011	General Introduction to Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era	3

2	PS2001	Situation and Policy II	1
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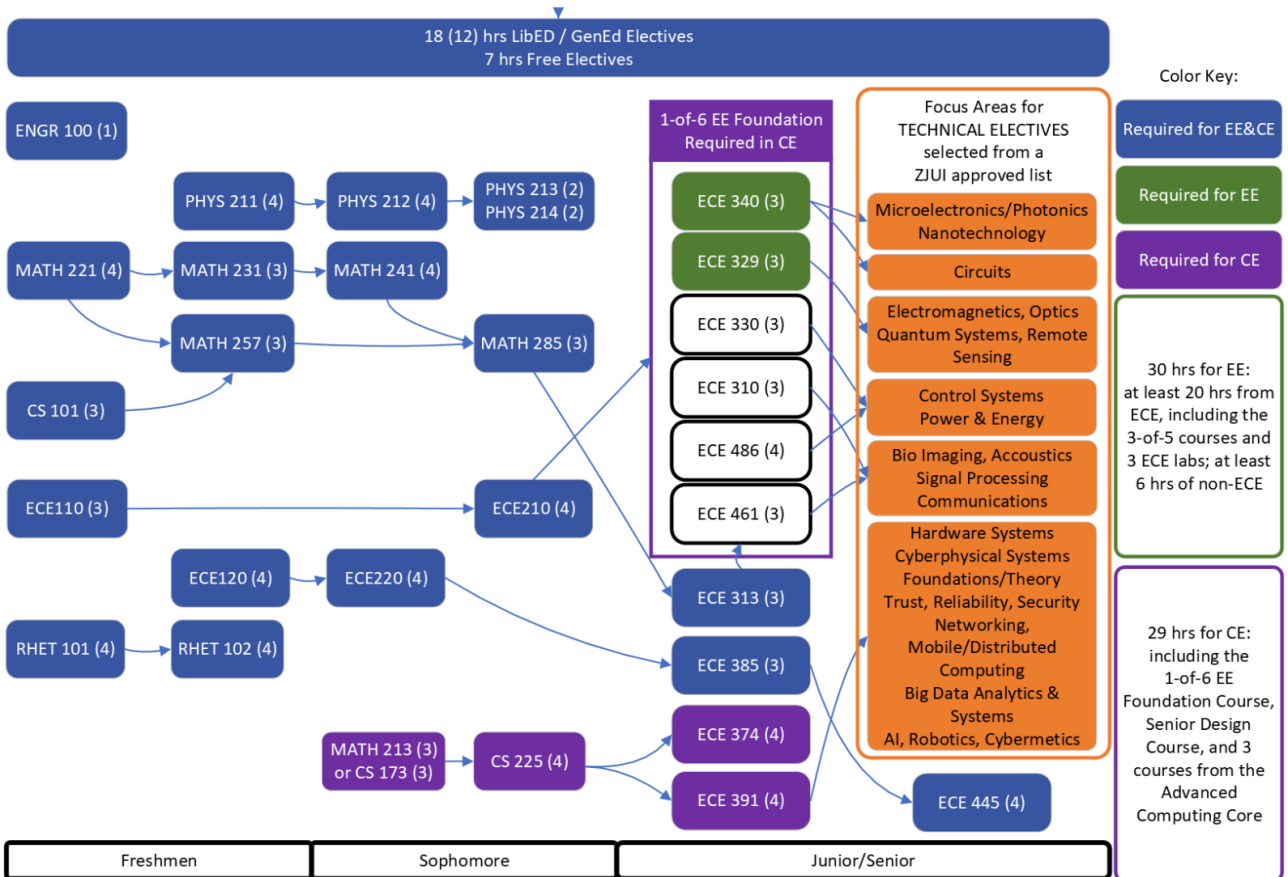
### 6.8 Fourth Year- Second (Spring) Semester

No	Course Code	Course Name	Credit Hours
1	ECE 445	Senior Design Project Lab	4
2	Tech Elec	Technical Elective	3
3	Tech Elec	Technical Elective	3
4	Free Elec	Free Elective	3
5	Free Elec	Free Elective	3
		Total	16

No	Course Code	Course Name	Credit Hours
1	PE4021	Physical Education VII--Fitness test and exercise	3
2	PS2001	Situation and Policy II	1

### 7. Curriculum Flow Map

The following flow map offers a quick summary of the main features of the Electrical Engineering curriculum.



ZJU Required Liberal Education Course

Domestic Students

MITR 1001 (2)

MITR 2001 (2)

HIST2001 (3)

LAW 1002 (3)

PS 2011 (5)

PHIL 2002 (3)

PS 3011 (2)

ENGL 1001 (1.5)

ENGL 1002 (1.5)

ENGL 2001 (1.5)

ENGL 2002 (1.5)

PE 1001 (1)

PE 1002 (1)

PE 2001 (1)

PE 2002 (1)

PE 3001 (1)

PE 3002 (1)

PE 4021 (0.5)

PS 1001 (1)

PS 2001 (1)

International Students

CHIN001 (4)

CHIN002 (4)

CHIN003 (4)

CHIN004 (4)

CHIN005 (2)

CULT2001 (3)

Freshmen

Sophomore

Junior

Senior