

Program Director's Signature:

Date:

Department Chair's Signature:

Date:

## **Department of Electrical and Electronic Engineering**

### **Program of Communication Engineering (2019)**

#### **I. Introduction**

Communication engineering, especially wireless communications engineering, has become extremely important throughout the world and in particular for Shenzhen, which is recognized as a world-class center of communication industry. With the increasing demand on mobile data access, the development of next generation broadband communication systems has been initiated, which would boost up career opportunity in related academic and industrial fields. The offered 4-year undergraduate program on communication engineering is tailored for the most cutting-edge areas in communication engineering. In addition to lecturers and labs, students are also encouraged to work with supervisors on real research problems as early as the second year of the program. The key areas under study include: classic and modern communication theory, microwave engineering, wireless communications, optical communications, computer networks, embedded systems, microwave imaging, etc.

#### **II. Objectives and Learning Outcomes**

Attributes Communication Engineering alumni should demonstrate 5 years after graduation :

Technical Skills: are technically competent to conduct research and development in the industry and universities in the broad fields of Electronics and Information Engineering in general and Communication Engineering in particular.

Engineering Ethos: are able to think critically and creatively, use engineering principles to embrace challenging engineering and non-engineering problems encountered at work, apply an analytic mindset, make informed decisions and provide innovative solutions.

Attitude: are self-motivated with a desire for lifelong learning to adapt to the fast changing environment, able to operate with integrity and responsibility, have optimism and composure under tight schedule, and committed to make a positive impact in society locally and globally.

Leadership: are effective communicators, well-prepared to advance towards leadership positions, capitalize the individual strengths of team members, and nurture the team to achieve goals.

Student Outcomes (SOs) that prepare graduates to enter the professional practice of engineering:

SO 1: an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

SO 2: an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

SO 3: an ability to communicate effectively with a range of audiences.

SO 4: an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

SO 5: an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

SO 6: an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

SO 7: an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

SO 8: knowledge of probability and statistics including applications, differential and integral calculus, sciences, engineering sciences and computing science and application to analyze and design complex electrical and electronic devices, software, and systems containing hardware and software components.

SO 9: knowledge and application of advanced mathematics, such as differential equations, linear algebra, and complex variables.

SO 10: knowledge and application of communication theory and systems, and computer networks.

SO 11: an ability to analyze, design and develop communication systems and computer networks.

### **III. Study Length and Graduation Requirements**

Study length: 4 years

Degree conferred: Bachelor of Engineering

The minimum credit requirement for graduation: 147credits (not including English courses);

| Category                                                | Module                                                            | Minimum Credit Requirement |
|---------------------------------------------------------|-------------------------------------------------------------------|----------------------------|
| General Education (GE) Required Courses<br>(54 credits) | Science                                                           | 28                         |
|                                                         | Military Training and Physical Education                          | 8                          |
|                                                         | Ideological and Political Education                               | 16                         |
|                                                         | Writing and Communication Skills                                  | 2                          |
| General Education (GE) Elective Courses<br>(16 credits) | Humanities                                                        | 4                          |
|                                                         | Social Sciences                                                   | 4                          |
|                                                         | Arts                                                              | 2                          |
|                                                         | Science                                                           | 6                          |
| Major Course<br>(77 credits)                            | Major Foundational Courses                                        | 32                         |
|                                                         | Major Core Courses                                                | 15                         |
|                                                         | Major Elective Courses                                            | 18                         |
|                                                         | Research Projects, Internship and Undergraduate Thesis / Projects | 12                         |
| Total (not including English courses)                   |                                                                   | 147                        |

#### IV. Discipline

Major Discipline includes Communication Engineering, Electronic Engineering, and Information Engineering .etc.

#### V. Main Courses

Core courses include Fundamentals of Electric Circuits, Analog Circuits, Analog Circuits Laboratory, Digital Circuits, Digital Circuits Laboratory, Mathematical Methods in Physics, Signals and Systems, Communication Principles, Engineering Electromagnetics, Probability and Statistics, Data Structures and Algorithm Analysis B, Microwave Engineering, Frontier Seminars in Modern Electronic Science and Technology I/II/III, Antennas and Radio Propagation, Wireless Communications, Computer Networks, Design of Modern Communication Systems etc.

#### VI. Practice-Based Courses

Core practical training includes Industrial practice, Advanced Electronic Science Experiment (It is a subject elective course. Outstanding students after their junior year, can join research working by their professor), and all sorts of domestic and international academic and innovative competitions. See the table 3

## 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                 | NA              |
|                                                                                                        | MA102B      | Calculus II A                | MA101B          |
|                                                                                                        | MA107A      | Linear Algebra A             | NA              |
| Notes: At the end of First Year, In addition to the above 3 courses, students must pass the interview. |             |                              |                 |
| Declare major at the end of Second Year                                                                | MA102B      | Calculus II A                | MA101B          |
|                                                                                                        | EE205       | Signals and Systems          | MA101B          |
|                                                                                                        | EE208       | Engineering Electromagnetics | MA107A<br>EE104 |

## VIII. Requirements for of 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/<br>Fall | B/E                  | NA                  | MA   |
| MA102B      | Calculus II A                          | 4      |             | 4          | Spr/<br>Fall | B/E                  | Calculus I A        | MA   |
| MA103A      | Linear Algebra I-A                     | 4      |             | 4          | Spr/<br>Fall | B/E                  | NA                  | MA   |
| PHY103B     | General Physics B (I)                  | 4      |             | 4          | Spr/<br>Fall | B/E                  | NA                  | PHY  |
| PHY105B     | General Physics B (II)                 | 4      |             | 4          | Spr/<br>Fall | B/E                  | General Physics I B | PHY  |
| BIO102B     | Introduction to Life Science           | 3      |             | 3          | Spr/<br>Fall | B/E                  | NA                  | BIO  |
| CS102A      | Introduction to Computer Programming A | 3      | 1           | 4          | Spr/<br>Fall | B/E                  | NA                  | CS   |
| PHY104B     | Experiments of Fundamental Physics     | 2      | 2           | 4          | Spr/<br>Fall | B/E                  | NA                  | PHY  |
| Total       |                                        | 28     | 3           | 31         |              |                      |                     |      |

### (II) Military Training and Physical Education

| Course Code | Course Name | Credit | Lab Credits | Hours/week | Term | Language Instruction | Prerequisite | Dept |
|-------------|-------------|--------|-------------|------------|------|----------------------|--------------|------|
|             |             |        | 4           |            |      |                      |              |      |

|       |                        |   |  |   |        |   |    |                            |
|-------|------------------------|---|--|---|--------|---|----|----------------------------|
| GE102 | Military Theory        | 2 |  |   |        | C |    | Office of Students Affairs |
| GE104 | Military Skills        | 2 |  |   |        | C |    |                            |
| GE131 | Physical Education I   | 1 |  | 2 | 1/Fall | C | NA | PE Center                  |
| GE132 | Physical Education II  | 1 |  | 2 | 1/Spr  | C | NA |                            |
| GE231 | Physical Education III | 1 |  | 2 | 2/Fall | C | NA |                            |
| GE232 | Physical Education IV  | 1 |  | 2 | 2/Spr  | C | NA |                            |
| Total |                        | 8 |  | 8 |        |   |    |                            |

### (III) Ideological and Political Education

| Course Code | Course Name                                                                                                           | Credit | Lab Credits | Hours/week | Term          | Language Instruction | Prerequisite | Dept       |
|-------------|-----------------------------------------------------------------------------------------------------------------------|--------|-------------|------------|---------------|----------------------|--------------|------------|
| IPE105      | Situation and Policy                                                                                                  | 2      |             | 2          | Fall/Spr      | C                    |              | IPE Center |
| IPE103      | The Outline of Modern and Contemporary History of China y                                                             | 2      |             | 2          | Fall/Spr      | C                    |              |            |
| IPE101      | Cultivation of Ethic Thought and Fundamentals of Law                                                                  | 2      |             | 2          | Fall/Spr      | C                    |              |            |
| IPE104      | Mao Zedong Thought and Introduction to the Theoretical System of Socialism with Chinese Characteristic                | 3      |             | 3          | Fall/Spr      | C                    |              |            |
| IPE102      | The Basic Principles of Marxism                                                                                       | 2      |             | 2          | Fall/Spr      | C                    |              |            |
| IPE107      | Practice Course of the Basic Principles of Marxism                                                                    | 1      | 1           |            | Fall/Spr /Smr | C                    |              |            |
| IPE108      | Practice Course of Introduction to Mao Zedong Thought and Theoretical System of Socialism with Chinese Characteristic | 3      | 3           |            | Fall/Spr /Smr | C                    |              |            |
| IPE106      | Practice Course of Cultivation of Ethics and Fundamentals of Law                                                      | 1      | 1           |            | Fall/Spr /Smr | C                    |              |            |
| Total       |                                                                                                                       | 16     | 5           |            |               |                      |              |            |

#### (IV) English Language

All students are required to undertake the English Placement Test before selecting courses, based on which students will be assigned to 3 levels to be ready for the courses with English as the instruction language.

SUSTech English III , English for Academic Purposes for Level A.

SUSTech English II, SUSTech English III, English for Academic Purposes for Level B.

SUSTech English I, SUSTech English II, SUSTech English III, English for Academic for Level C.

| Course Code | Course Name                   | Credit | Hours/week | Instruction Language | Prerequisite |
|-------------|-------------------------------|--------|------------|----------------------|--------------|
| CLE021      | SUSTech English I             | 4      | 4          | E                    | NA           |
| 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 of 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. In particular, a course with contents of Ethics of Science and Technology or Engineering Ethics is compulsory, and the credits of the course are counted to the Social Sciences Module. (Information about the available courses and the instruction language will be announced before the course selection session).

(II).Students are required to complete 6 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/<br>Fall | B/E                  | NA                  | CH   |
| CS201       | Discrete Mathematics        | 3      |             | 3          | Spr          | B                    | MA102B<br>MA107A    | CS   |
| CS202       | Computer Organization       | 3      | 1           | 4          | Spr          | B                    | CS207or<br>EE202-17 | CS   |
| CS205       | C/C++ Program Design        | 3      | 1           | 4          | Spr/Fall     | E                    | NA                  | CS   |
| ME102       | CAD and Engineering Drawing | 3      | 1.5         | 4.5        | Spr/Fall     | B                    | NA                  | ME   |
| Total       |                             | 15     | 3.5         | 18.5       |              |                      |                     |      |

## X. Major Course Arrangement

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

| Category Course            | Course Code | Course Name                                                      | Credits | Lab Credits | Hours/week | Terms        | course to take the Advised term | language instruction | Prerequisite                | Dept. |
|----------------------------|-------------|------------------------------------------------------------------|---------|-------------|------------|--------------|---------------------------------|----------------------|-----------------------------|-------|
| Major Foundational Courses | EE104       | Fundamentals of Electric Circuits                                | 2       |             | 2          | Spr/<br>Fall | 1/ Spr<br>or Fall               | B/E                  | MA101B<br>MA107A            | EE    |
|                            | EE201-17    | Analog Circuits                                                  | 3       |             | 3          | Fall         | 2/ Fall                         | B/E                  | PHY105<br>B<br>EE104        | EE    |
|                            | EE201-17L   | Analog Circuits Laboratory                                       | 1       | 1           | 2          | Fall         | 2/ Fall                         | B/E                  | EE201-17                    | EE    |
|                            | EE202-17    | Digital Circuits                                                 | 3       |             | 3          | Spr/<br>Fall | 2/ Spr<br>/ Fall                | B/E                  | PHY105<br>B                 | EE    |
|                            | EE202-17L   | Digital Circuits Laboratory                                      | 1       | 1           | 2          | Spr/<br>Fall | 2/ Spr<br>/Fall                 | B/E                  | EE202-17                    | EE    |
|                            | PHY203-15   | Mathematical Methods in Physics                                  | 4       |             | 4          | Fall         | 2/ Fall                         | B                    | MA102BP<br>HY105B<br>MA107A | PHY   |
|                            | EE205       | Signals and Systems                                              | 3       | 1           | 4          | Fall         | 2/ Fall                         | B                    | MA101B                      | EE    |
|                            | EE206       | Communication Principles                                         | 3       | 1           | 4          | Spr          | 2/ Spr                          | E                    | EE205                       | EE    |
|                            | EE208       | Engineering Electromagnetics                                     | 3       | 1           | 4          | Spr          | 2/ Spr                          | B                    | MA107A<br>EE104             | EE    |
|                            | MA212       | Probability and Statistics                                       | 3       |             | 3          | Spr          | 2/ Spr                          | B/E                  | MA102B<br>Or<br>MA102a      | MA    |
|                            | CS203B      | Data Structures and Algorithm Analysis B                         | 3       | 1           | 4          | Fall         | 2/ Fall                         | E                    | CS102A                      | CS    |
|                            | EE316       | Microwave Engineering                                            | 3       | 1           | 4          | Fall         | 3/ Fall                         | E                    | EE201-17<br>EE208           | EE    |
|                            | Total       |                                                                  | 32      | 7           | 39         |              |                                 |                      |                             |       |
| Major Core Courses         | EE301       | Frontier Seminars in Modern Electronic Science and Technology I  | 1       |             | 1          | Fall         | 3/ Fall                         | B                    | EE201-17<br>or<br>EE202-17  | EE    |
|                            | EE302       | Frontier Seminars in Modern Electronic Science and Technology II | 1       |             | 1          | Spr          | 3/ Spr                          | B                    | EE201-17<br>or<br>EE202-17  | EE    |
|                            | EE307       | Antennas and Radio Propagation                                   | 3       | 1           | 4          | Spr          | 3/ Spr                          | E                    | EE208<br>EE104              | EE    |

|                                                                                                                                                                                                                                                                                                                                                          |       |                                                                   |    |    |    |            |              |    |                                 |    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------------------------------------------------------|----|----|----|------------|--------------|----|---------------------------------|----|
|                                                                                                                                                                                                                                                                                                                                                          | EE313 | Wireless Communications                                           | 3  | 1  | 4  | Fall       | 3/ Fall      | E  | EE206                           | EE |
|                                                                                                                                                                                                                                                                                                                                                          | CS305 | Computer Networks                                                 | 3  | 1  | 4  | Fall       | 3/ Fall      | E  | CS102A                          | CS |
|                                                                                                                                                                                                                                                                                                                                                          | EE312 | Design of Modern Communication Systems                            | 3  | 1  | 4  | Spr        | 3/ Spr       | B  | EE206<br>EE313                  | EE |
|                                                                                                                                                                                                                                                                                                                                                          | EE401 | Frontier seminars in modern electronic science and technology III | 1  |    | 1  | Fall       | 4/ Fall      | B  | EE201-1<br>7 or<br>EE202-1<br>7 | EE |
|                                                                                                                                                                                                                                                                                                                                                          | Total |                                                                   | 15 | 4  | 19 |            |              |    |                                 |    |
| Practice                                                                                                                                                                                                                                                                                                                                                 | EE470 | Internship                                                        | 2  | 2  | 16 | Smr        | 3/Smr        | NA | NA                              | EE |
|                                                                                                                                                                                                                                                                                                                                                          | EE480 | Research Projects*                                                | 2  | 2  |    |            |              | NA | NA                              | EE |
|                                                                                                                                                                                                                                                                                                                                                          | EE490 | Undergraduate Thesis/Projects**                                   | 8  | 8  | 8  | Fall & Spr | 4/Fall & Spr | NA | NA                              | EE |
| Total                                                                                                                                                                                                                                                                                                                                                    |       |                                                                   | 12 | 12 | 24 |            |              |    |                                 |    |
| Notes:<br>1. Students can choose the term most appropriate for the course of Research Projects based on their study plan, The minimum study load for this course is 64 hours in total, see the Syllabus.<br>2. Students who have completed Comprehensive Design I & II (COE491 & COE492) are not required to take the Graduation Projects/Thesis(EE490). |       |                                                                   |    |    |    |            |              |    |                                 |    |



**Table 2: Major Elective Courses**

| Course Code | Course Name                                                  | Credits | Lab Credits | Hours/week | Terms      | course to take the Advised term | language Instruction | Prerequisite            | Dept. |
|-------------|--------------------------------------------------------------|---------|-------------|------------|------------|---------------------------------|----------------------|-------------------------|-------|
| EE106       | Introduction to Optoelectronic                               | 2       |             | 2          | Spr        | 1/Spr                           | C                    | NA                      | EE    |
| EE203       | Solid-state Electronics                                      | 3       |             | 3          | Fa II      | 2/ Spr /Fal I                   | B/E                  | PHY105B                 | EE    |
| EE204       | Introduction to Semiconductor Devices                        | 3       | 1           | 4          | Spr        | 2/ Spr                          | B                    | EE203                   | EE    |
| EE210       | Fundamentals of Optics                                       | 3       |             | 3          | Spr        | 2/ Spr                          | B                    | PHY105B                 | EE    |
| EE303       | Fundamentals of Optoelectronic Technology                    | 3       | 1           | 4          | Fall       | 3/Fall                          | B                    | PHY105B                 | EE    |
| EE304       | Integrated Circuit Design                                    | 3       | 2           | 5          | Spr        | 3/ Spr                          | E                    | EE202-17<br>EE204       | EE    |
| EE305       | Introduction to VLSI Technology                              | 3       | 1           | 4          | Fall       | 3/Fall                          | B                    | EE203                   | EE    |
| EE306       | Introduction to MEMS                                         | 3       | 1           | 4          | Spr        | 3/ Spr                          | E                    | PHY105B                 | EE    |
| EE308       | Fiber Communication Principles and Techniques                | 3       | 1           | 4          | Spr        | 3/ Spr                          | B                    | MA102B                  | EE    |
| EE309       | Introduction to Semiconductor Optics                         | 3       |             | 3          | Fall       | 3/Fall                          | B                    | MA102B<br>EE203         | EE    |
| EE310       | Principles and Technologies of Lasers                        | 3       |             | 3          | Spr        | 3/ Spr                          | B                    | MA102B<br>EE210         | EE    |
| EE311       | Optical Design                                               | 3       | 1           | 4          | Fall       | 3/Fall                          | B                    | EE210                   | EE    |
| EE317       | Advanced Electronic Science Experiment I                     | 1       | 1           | 2          | Fall       | 3/Fall                          | B                    | EE201-17 or<br>EE202-17 | EE    |
| EE318       | Advanced Electronic Science Experiment II                    | 1       | 1           | 2          | Spr        | 3/ Spr                          | B                    | EE201-17 or<br>EE202-17 | EE    |
| EE320-15    | Integrated Circuit Fabrication Laboratory                    | 3       | 1.5         | 4.5        | Spr/ Fa II | 3/ Spr or Fall                  | C                    | EE204                   | EE    |
| EE321       | Spectral Technology and Application                          | 3       |             | 3          | Spr        | 3/Spr                           | B                    | NA                      | EE    |
| EE322       | Optoelectronics Devices Fabrication Laboratory               | 2       | 1           | 3          | Spr        | 3/ Spr                          | B                    | EE204                   | EE    |
| EE323       | Digital Signal Processing                                    | 3       | 1           | 4          | Fall       | 3/Fall                          | E                    | EE205                   | EE    |
| EE325       | Nonlinear Optimization Techniques for Electrical Engineering | 3       | 1           | 4          | Fall       | 3/Fall                          | E                    | MA102B<br>MA107A        | EE    |

|          |                                                                   |     |     |   |      |           |   |                               |    |
|----------|-------------------------------------------------------------------|-----|-----|---|------|-----------|---|-------------------------------|----|
| EE326    | Digital Image Processing                                          | 3   | 1   | 4 | Spr  | 3/<br>Spr | E | EE205                         | EE |
| EE327    | Fundamentals of Information Optics                                | 3   | 1   | 4 | Fall | 3/Fall    | B | EE205                         | EE |
| EE328    | Speech Signal Processing                                          | 3   | 1   | 4 | Spr  | 3/<br>Spr | B | EE323                         | EE |
| EE330    | DSP Design and Simulation                                         | 1.5 | 1.5 | 3 | Spr  | 3/<br>Spr | B | EE323                         | EE |
| EE332    | Digital System Design                                             | 3   | 1   | 4 | Spr  | 3/<br>Spr | E | EE202-17                      | EE |
| EE334    | Advanced integrated circuit design: machine learning on chip      | 3   | 1   | 4 | Spr  | 3/<br>Spr | E | EE202-17                      | EE |
| EE335    | Liquid crystal optoelectronics                                    | 3   | 1   | 4 | Fall | 3/Fall    | C | EE210                         | EE |
| EE336    | Fundamentals of Photovoltaics                                     | 3   | 1   | 4 | Fall | 3/Fall    | E | EE204                         | EE |
| EE337    | Analog Integrated Circuit Design                                  | 3   | 1   | 4 | Fall | 3/Fall    | B | EE201-17<br>EE204             | EE |
| EE338    | Application Specific IC ( ASIC ) Designs Methodology and Practice | 3   | 1   | 4 | Spr  | 3/Spr     | B | EE201-17<br>EE202-17<br>EE204 | EE |
| EE339    | Analog IC Layout Design                                           | 1   | 1   | 2 | Fall | 3/Fall    | B | EE304                         | EE |
| EE340    | Statistical Learning for Data Science                             | 3   | 1   | 4 | Spr  | 3/<br>Spr | B | MA107A                        | EE |
| EE341    | Advanced Integrated Circuit Design: Microprocessor                | 3   | 1   | 4 | Fall | 3/Fall    | B | EE202-17                      | EE |
| EE342    | Sensors and Applications                                          | 3   |     | 3 | Spr  | 3/<br>Spr | B | PHY103B                       | EE |
| EE343    | Optoelectronic Instrumentation                                    | 3   | 1   | 4 | Fall | 3/Fall    | B | EE106 or<br>EE204             | EE |
| EE345    | Introduction of Wide Bandgap Semiconductors                       | 3   |     | 3 | Fall | 3/Fall    | B | EE203 or<br>EE204             | EE |
| EE347    | Power Semiconductor Devices and Application                       | 3   |     | 3 | Fall | 3/Fall    | B | EE203 or<br>EE204             | EE |
| EE349    | Power Semiconductor Devices and Application Laboratory            | 1   | 1   | 2 | Fall | 3/Fall    | B | EE347                         | EE |
| EE402    | Frontier Seminars in Modern Electronic Science and Technology IV  | 1   |     | 1 | Spr  | 4/<br>Spr | B | EE201-17 or<br>EE202-17       | EE |
| EE403    | Introduction to Display and Lighting Technologies                 | 2   |     | 2 | Fall | 4/Fall    | B | EE204                         | EE |
| EE405    | Advanced Electronic Science Experiment III                        | 1   | 1   | 2 | Fall | 4/Fall    | B | EE201-17 or<br>EE202-17       | EE |
| EE411    | Information Theory and Coding                                     | 2   |     | 2 | Fall | 4/Fall    | B | MA212                         | EE |
| EE417    | Communications System Design II                                   | 2   | 2   | 4 | Fall | 4/Fall    | E | EE316 EE206<br>EE307          | EE |
| EE423-14 | Pattern Recognition                                               | 3   | 1   | 4 | Fall | 4/Fall    | B | EE323 EE326                   | EE |
| EE427    | Principles of Remote                                              | 2   |     | 2 | Fall | 4/Fall    | B | EE323 EE326                   | EE |

|        |                                                     |     |     |   |      |           |   |                           |      |
|--------|-----------------------------------------------------|-----|-----|---|------|-----------|---|---------------------------|------|
|        | Sensing                                             |     |     |   |      |           |   |                           |      |
| EE429  | Image and Video Processing                          | 3   | 1   | 4 | Fall | 4/Fall    | E | EE205<br>MA107A<br>MA212  | EE   |
| EE431  | Bio MEMS and Lab-on-a-Chip                          | 3   |     | 3 | Fall | 4/Fall    | E | PHY105B                   | EE   |
| EE433  | Modern Electric Vehicle Technologies                | 2   |     | 2 | Fall | 4/Fall    | B | EE208                     | EE   |
| EES101 | Brief Introduction of Creative Electronic Design I  | 1   | 0.5 | 6 | smr  | 1/<br>smr | C | PHY105B                   | EE   |
| EES102 | DIY Project: Assembling an iPhone6                  | 2   | 2   | 8 | smr  | 1/<br>smr | C | EE104                     | EE   |
| EES201 | Brief Introduction of Creative Electronic Design II | 0.5 | 0.5 | 4 | smr  | 2/<br>smr | C | NA                        | EE   |
| EES202 | Design Based on LabVIEW Programming                 | 1   | 1   | 8 | smr  | 2/<br>smr | C | NA                        | EE   |
| EES203 | Innovation and Entrepreneurship                     | 0.5 | 0.5 | 4 | smr  | 2/<br>smr | C | NA                        | EE   |
| EES204 | Fiber Sensor Design                                 | 1   | 1   | 8 | smr  | 2/<br>smr | C | NA                        | EE   |
| EES205 | Advanced Technology Forecasting                     | 1.5 |     | 6 | smr  | 2/<br>smr | E | NA                        | EE   |
| EES301 | Statistical Machine Learning                        | 2   |     | 8 | smr  | 3/<br>smr | E | MA107A<br>MA212           | EE   |
| EES302 | 2D Materials: Properties and Devices                | 2   |     | 8 | smr  | 3/<br>smr | E | 无                         | EE   |
| EES303 | Convex optimization                                 | 2   |     | 2 | smr  | 3/<br>smr | E | MA107A;MA215 or MA212     | EE   |
| EES305 | Electronic Materials                                | 2   |     | 2 | smr  | 3/<br>smr | E | NA                        | EE   |
| BMEB21 | Biomedical Instrumentation and Experiment           | 4   | 2   | 6 | Spr  | 2/<br>Spr | C | NA                        | BMEB |
| CS208  | Algorithm Design and Analysis                       | 3   | 1   | 4 | Spr  | 2/<br>Spr | B | CS102A<br>CS203B          | CS   |
| CS209A | Computer System Design and Applications A           | 3   | 1   | 4 | Spr  | 1/<br>Spr | E | CS102A or<br>CS102B       | CS   |
| CS301  | Embedded System and Microcomputer Principle         | 3   | 1   | 4 | Fall | 3/Fall    | B | CS207 or<br>EE202-17      | CS   |
| CS302  | Operating Systems                                   | 3   | 1   | 4 | Spr  | 3/<br>Spr | B | CS102A<br>CS203B          | CS   |
| CS303B | Artificial Intelligence B                           | 3   | 1   | 4 | Fall | 3/Fall    | B | CS203B<br>CS102A<br>MA212 | CS   |
| CS306  | Data Mining                                         | 3   | 1   | 4 | Spr  | 3/<br>Spr | B | CS203                     | CS   |
| CS309  | Object-Oriented Analysis and Design                 | 3   | 1   | 4 | Fall | 3/Fall    | B | CS203B<br>CS102A          | CS   |
| CS401  | Intelligent Robotics                                | 3   | 1   | 4 | Spr  | 3/<br>Spr | B | CS102A<br>CS203B<br>MA212 | CS   |
| CS403  | Cryptography and Network Security                   | 2   |     | 2 | Fall | 4/Fall    | B | CS201<br>CS203B<br>MA212  | CS   |

|              |                                         |         |          |           |              |            |   |                     |    |
|--------------|-----------------------------------------|---------|----------|-----------|--------------|------------|---|---------------------|----|
| CS405        | Machine Learning                        | 3       | 1        | 4         | Fall         | 4/Fall     | B | MA212<br>MA107A     | CS |
| CS407        | Advanced Computer Networks and Big Data | 3       | 1        | 4         | Fall         | 4/Fall     | B | CS305               | CS |
| MA109        | Advanced Linear Algebra                 | 4       |          | 4         | Spr          | 1/<br>Spr  | B | MA107A              | MA |
| MA110        | MATLAB Programming and Application      | 3       | 1        | 4         | Spr          | 1/<br>Spr  | B | NA                  | MA |
| MA201b       | Ordinary Differential Equations B       | 4       |          | 4         | Fall         | 2/Fall     | B | MA102B              | MA |
| MA202        | Complex Analysis                        | 3       |          | 3         | Spr          | 2/<br>Spr  | B | MA203AorMA<br>213   | MA |
| MA206        | Mathematical Modelling                  | 3       |          | 3         | Spr          | 2/<br>Spr  | B | MA201a or<br>MA201b | MA |
| MA208        | Basic Stochastic Processes              | 3       |          | 3         | Spr          | 2/<br>Spr  | E | MA213MA212<br>MA109 | MA |
| MA213-16     | Real Analysis                           | 5       |          | 5         | Spr/<br>Fall | 2/<br>Fall | B | MA102B              | MA |
| MA303        | Partial Differential Equations          | 3       |          | 3         | Fall         | 3/Fall     | B | MA201b              | MA |
| MA305        | Numerical Analysis                      | 3       |          | 3         | Fall         | 3/Fall     | B | MA203AorMA<br>213   | MA |
| MA333        | Introduction to Big Data Science        | 3       |          | 3         | Fall         | 3/Fall     | B | MA204<br>orMA212    | MA |
| <b>Total</b> |                                         | 20<br>6 | 53.<br>5 | 302<br>.5 |              |            |   |                     |    |

**Table 3: Overview of Practice-Based Courses**

| Course Code | Course Name                                   | Credits | Lab Credits | Hours/week | Terms     | Advised term to take the course | language instruction | Prerequisite               | Dept. |
|-------------|-----------------------------------------------|---------|-------------|------------|-----------|---------------------------------|----------------------|----------------------------|-------|
| EE201-17L   | Analog Circuits Laboratory                    | 1       | 1           | 2          | Fall      | 2/ Fall                         | B                    | EE201-17                   | EE    |
| EE202-17L   | Digital Circuits Laboratory                   | 1       | 1           | 2          | Spr/ Fall | 2/ Spr/ Fall                    | B/E                  | EE202-17                   | EE    |
| EE204       | Introduction to Semiconductor Devices         | 3       | 1           | 4          | Spr       | 2/ Spr                          | B                    | EE203                      | EE    |
| EE205       | Signals and Systems                           | 3       | 1           | 4          | Fall      | 2/ Fall                         | B                    | MA101 B                    | EE    |
| EE206       | Communication Principles                      | 3       | 1           | 4          | Spr       | 2/ Spr                          | E                    | EE205                      | EE    |
| EE208       | Engineering Electromagnetics                  | 3       | 1           | 4          | Spr       | 2/ Spr                          | B                    | MA107 A<br>EE104           | EE    |
| EE303       | Fundamentals of Optoelectronic Technology     | 3       | 1           | 4          | Fall      | 3/ Fall                         | B                    | PHY105 B                   | EE    |
| EE304       | Integrated Circuit Design                     | 3       | 2           | 5          | Spr       | 3/ Spr                          | E                    | EE202-17<br>EE204          | EE    |
| EE305       | Introduction to VLSI technology               | 3       | 1           | 4          | Fall      | 3/ Fall                         | B                    | EE203                      | EE    |
| EE306       | Introduction to MEMS                          | 3       | 1           | 4          | Spr       | 3/ Spr                          | E                    | PHY105 B                   | EE    |
| EE307       | Antennas and Radio Propagation                | 3       | 1           | 4          | Spr       | 3/ Spr                          | E                    | EE208<br>EE104             | EE    |
| EE308       | Fiber Communication Principles and Techniques | 3       | 1           | 4          | Spr       | 3/ Spr                          | B                    | MA102 B                    | EE    |
| EE311       | Optical Design                                | 3       | 1           | 4          | Fall      | 3/ Fall                         | B                    | EE210                      | EE    |
| EE313       | Wireless Communications                       | 3       | 1           | 4          | Fall      | 3/ Fall                         | E                    | EE206                      | EE    |
| EE312       | Design of Modern Communication Systems        | 3       | 1           | 4          | Spr       | 3/ Spr                          | B                    | EE206<br>EE313             | EE    |
| EE316       | Microwave Engineering                         | 3       | 1           | 4          | Fall      | 3/ Fall                         | E                    | EE104<br>EE201-17<br>EE208 | EE    |
| EE317       | Advanced Electronic Science Experiment I      | 1       | 1           | 2          | Fall      | 3/ Fall                         | B                    | EE201-17 or<br>EE202-17    | EE    |
| EE318       | Advanced electronic science experiment II     | 1       | 1           | 2          | Spr       | 3/ Spr                          | B                    | EE201-17 or<br>EE202-17    | EE    |

|          |                                                                   |     |             |         |              |                 |    |                                    |    |
|----------|-------------------------------------------------------------------|-----|-------------|---------|--------------|-----------------|----|------------------------------------|----|
| EE320-15 | Integrated Circuit Fabrication Laboratory                         | 3   | 1<br>·<br>5 | 4.<br>5 | Spr/<br>Fall | 3/ Spr/<br>Fall | C  | EE204                              | EE |
| EE322    | Optoelectronics Devices Fabrication Laboratory                    | 2   | 1           | 3       | Spr          | 3/ Spr          | B  | EE204                              | EE |
| EE323    | Digital Signal Processing                                         | 3   | 1           | 4       | Fall         | 3/ Fall         | E  | EE205                              | EE |
| EE325    | Nonlinear Optimization Techniques for Electrical Engineering      | 3   | 1           | 4       | Fall         | 3/ Fall         | E  | MA102<br>B<br>MA107<br>A           | EE |
| EE326    | Digital Image Processing                                          | 3   | 1           | 4       | Spr          | 3/ Spr          | E  | EE205                              | EE |
| EE327    | Fundamentals of Information Optics                                | 3   | 1           | 4       | Fall         | 3/ Fall         | B  | EE205                              | EE |
| EE328    | Speech Signal Processing                                          | 3   | 1           | 4       | Spr          | 3/ Spr          | B  | EE323                              | EE |
| EE330    | DSP Design and Simulation                                         | 1.5 | 1<br>·<br>5 | 3       | Spr          | 3/ Spr          | C  | EE323                              | EE |
| EE332    | Digital System Design                                             | 3   | 1           | 4       | Spr          | 3/ Spr          | E  | EE202-1<br>7                       | EE |
| EE334    | Advanced Integrated Circuit Design: Machine Learning on Chip      | 3   | 1           | 4       | Fall         | 3/ Fall         | E  | EE202-1<br>7                       | EE |
| EE335    | Liquid Crystal Optoelectronics                                    | 3   | 1           | 4       | Fall         | 3/ Fall         | C  | EE210                              | EE |
| EE336    | Fundamentals of Photovoltaics                                     | 3   | 1           | 4       | Fall         | 3/ Fall         | E  | EE204                              | EE |
| EE337    | Analog Integrated Circuit Design                                  | 3   | 1           | 4       | Fall         | 3/ Fall         | B  | EE201-1<br>7<br>EE204              | EE |
| EE338    | Application Specific IC ( ASIC ) Designs Methodology and Practice | 3   | 1           | 4       | Spr          | 3/Spr           | B  | EE201-1<br>7<br>EE202-1<br>7 EE204 | EE |
| EE339    | Analog IC Layout Design                                           | 1   | 1           | 2       | Fall         | 3/ Fall         | B  | EE304                              | EE |
| EE340    | Statistical Learning for Data Science                             | 3   | 1           | 4       | Spr          | 3/ Spr          | B  | MA107A                             | EE |
| EE341    | Advanced Integrated Circuit Design: Microprocessor                | 3   | 1           | 4       | Fall         | 3/ Fall         | B  | EE202-1<br>7                       | EE |
| EE343    | Optoelectronic Instrumentation                                    | 3   | 1           | 4       | Fall         | 3/ Fall         | B  | EE106<br>or<br>EE204               | EE |
| EE349    | Power Semiconductor Devices and Application Laboratory            | 1   | 1           | 2       | Fall         | 3/ Fall         | B  | EE347                              | EE |
| EE405    | Advanced Electronic Science Experiment III                        | 1   | 1           | 2       | Fall         | 4/ Fall         | NA | EE201-1<br>7 or<br>EE202-1<br>7    | EE |

|          |                                                       |     |     |    |            |              |    |                           |          |
|----------|-------------------------------------------------------|-----|-----|----|------------|--------------|----|---------------------------|----------|
| EE417    | Communications System Design II                       | 2   | 2   | 4  | Fall       | 4/ Fall      | E  | EE316<br>EE206<br>EE307   | EE       |
| EE423-14 | Pattern Recognition                                   | 3   | 1   | 4  | Fall       | 4/ Fall      | B  | EE323<br>EE326            | EE       |
| EE429    | Image and Video Processing                            | 3   | 1   | 4  | Fall       | 4/ Fall      | E  | EE205<br>MA107 A<br>MA212 | EE       |
| EE470    | Internship                                            | 2   | 2   | 16 | Smr        | 3/Smr        | NA | NA                        | EE       |
| EE480    | Research Projects                                     | 2   | 2   |    |            |              | NA | NA                        | EE       |
| EE490    | Undergraduate Thesis/Projects                         | 8   | 8   | 8  | Fall & Spr | 4/Fall & Spr | NA | NA                        | EE       |
| EES101   | Brief Introduction of "Creative Electronic Design I"  | 1   | 0.5 | 6  | Smr        | 1/ Smr       | C  | PHY102 B                  | EE       |
| EES102   | DIY Project: Assembling an iPhone6                    | 2   | 2   | 8  | Smr        | 1/ Smr       | C  | EE104                     | EE       |
| EES201   | Brief Introduction of "Creative Electronic Design II" | 0.5 | 0.5 | 4  | Smr        | 2/ Smr       | C  | NA                        | EE       |
| EES202   | Design based on LabVIEW Programming                   | 1   | 1   | 8  | Smr        | 2/ Smr       | C  | NA                        | EE       |
| EES203   | Innovation and Entrepreneurship                       | 0.5 | 0.5 | 4  | Smr        | 2/ Smr       | C  | NA                        | EE       |
| EES204   | Fiber Sensor Design                                   | 1   | 1   | 8  | Smr        | 2/ Smr       | C  | NA                        | EE       |
| BMEB 221 | Biomedical Instrumentation                            | 4   | 2   | 6  | Spr        | 2/ Spr       | C  | NA                        | BM<br>EB |
| CS202    | Computer Organization                                 | 3   | 1   | 4  | Spr        | 2/ Spr       | B  | CS207                     | CS       |
| CS205    | C/C++ Program Design                                  | 3   | 1   | 4  | Spr/Fall I | 2/Spr/Fall   | E  | NA                        | CS       |
| CS203 B  | Data Structures and Algorithm Analysis B              | 3   | 1   | 4  | Fall       | 2/ Fall      | E  | CS102A                    | CS       |
| CS301    | Embedded System and Microcomputer Principle           | 3   | 1   | 4  | Fall       | 3/ Fall      | B  | CS207                     | CS       |
| CS302    | Operating Systems                                     | 3   | 1   | 4  | Spr        | 3/ Spr       | B  | CS301                     | CS       |
| CS303 B  | Artificial Intelligence B                             | 3   | 1   | 4  | Fall       | 3/ Fall      | E  | CS203B<br>CS102A<br>MA212 | CS       |
| CS305    | Computer Networks                                     | 3   | 1   | 4  | Fall       | 3/ Fall      | E  | CS102A                    | CS       |
| CS309    | Object-oriented Analysis and Design                   | 3   | 1   | 4  | Fall       | 3/ Fall      | B  | CS202<br>CS203<br>CS102A  | CS       |
| MA110    | MATLAB Programming and Application                    | 3   | 1   | 4  | Spr        | 1/ Spr       | B  | NA                        | MA       |
| CS208    | Algorithm Design and Analysis                         | 3   | 1   | 4  | Spr        | 2/ Spr       | B  | CS102A<br>CS203B          | CS       |

|              |                                           |           |          |           |      |         |   |                           |    |
|--------------|-------------------------------------------|-----------|----------|-----------|------|---------|---|---------------------------|----|
| CS209A       | Computer System Design and Applications A | 3         | 1        | 4         | Spr  | 1/ Spr  | E | CS102A                    | CS |
| CS306        | Data Mining                               | 3         | 1        | 4         | Spr  | 3/ Spr  | B | CS203                     | CS |
| CS401        | Intelligent Robotics                      | 3         | 1        | 4         | Spr  | 3/ Spr  | B | CS102A<br>CS203B<br>MA212 | CS |
| CS405        | Machine Learning                          | 3         | 1        | 4         | Fall | 4/ Fall | B | MA212<br>MA103A           | CS |
| <b>Total</b> |                                           | 169.<br>5 | 77<br>.5 | 273<br>.5 |      |         |   |                           |    |

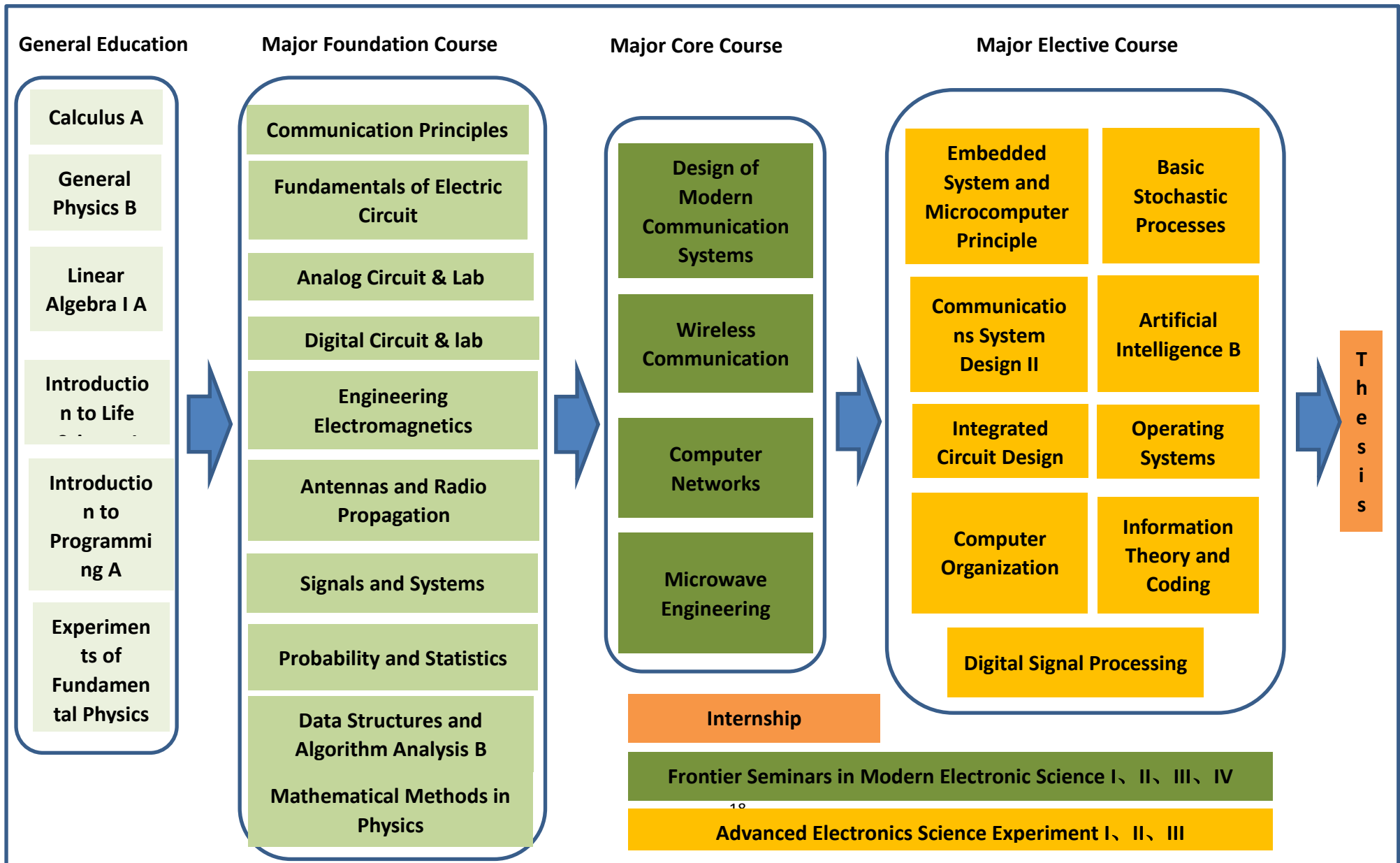


**Table 4: Overview of Course Hours and Credits**

| Course Category                                                         | Total Course Hours | Total Credits | Credit Requirements | Percentage of the Total* |
|-------------------------------------------------------------------------|--------------------|---------------|---------------------|--------------------------|
| General Education (GE) Required Courses (not including English courses) | 832                | 54            | 54                  | 36.7                     |
| General Education (GE) Elective Courses                                 |                    |               | 16                  | 10.9                     |
| Major Foundational Courses                                              | 624                | 32            | 32                  | 21.8                     |
| Major Core Courses                                                      | 304                | 15            | 15                  | 10.2                     |
| Major Elective Courses                                                  | 4840               | 206           | 18                  | 12.2                     |
| Research Projects, Internship and Undergraduate Thesis/Projects         | 约 380              | 12            | 12                  | 8.2                      |
| Total (not including English courses)                                   | 6980               | 319           | 147                 | 100                      |

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

## Curriculum Structure of Communication Engineering



Note: The Subject Elective course lists include only part of the courses, see more in Program.

### Recommended Plan for Courses Selection of Communication Engineering Program (not including English courses)

|        | First Year                                           | Credits | Second Year                                               | Credits | Third Year                                                       | Credits | Fourth Year                                                       | Credits |
|--------|------------------------------------------------------|---------|-----------------------------------------------------------|---------|------------------------------------------------------------------|---------|-------------------------------------------------------------------|---------|
| Fall   | Calculus I A                                         | 4       | Analog Circuits                                           | 3       | Frontier Seminars in Modern Electronic Science and Technology I  | 1       | Frontier Seminars in Modern Electronic Science and Technology III | 1       |
|        | Linear Algebra A                                     | 4       | Analog Circuits Laboratory                                | 1       | Microwave Engineering                                            | 3       | Projects of Science and                                           | 2       |
|        | General Physics B (I)                                | 4       | Mathematical Methods in Physics                           | 4       | Wireless Communications                                          | 3       |                                                                   |         |
|        | Writing and Communication Skills                     | 2       | Signals and Systems                                       | 3       | Computer networks                                                | 3       |                                                                   |         |
|        | Introduction to Computer                             | 3       | Data Structures and Algorithm Analysis                    | 3       | Situation and Policy                                             | 2       |                                                                   |         |
|        | Cultivation of Ethic Thought and Fundamentals of Law | 2       | The Outline of Modern and Contemporary History of China y | 2       | GE Elective Courses                                              | 4       |                                                                   |         |
|        | Physic Education I                                   | 1       | Physic Education III                                      | 1       | Elective Courses                                                 | 5       |                                                                   |         |
|        | GE Elective Courses                                  | 1       | GE Elective Courses                                       | 4       |                                                                  |         |                                                                   |         |
|        | Total                                                | 21      | Total                                                     | 21      | Total                                                            | 21      | Total                                                             | 3       |
| Spring | Calculus II A                                        | 4       | Digital Circuits                                          | 3       | Frontier Seminars in Modern Electronic Science and Technology II | 1       | Thesis(Graduation Project)                                        | 8       |
|        | General Physics B (II)                               | 4       | Digital Circuits Laboratory                               | 1       | Antennas and Radio                                               | 3       |                                                                   |         |
|        | Experiments of Fundamental Physics                   | 2       | Communication Principles                                  | 3       | Design of Modern Communication Systems                           | 3       |                                                                   |         |
|        | Introduction to Life Science                         | 3       | Engineering Electromagnetics                              | 3       | Elective Courses                                                 | 13      |                                                                   |         |
|        | Fundamentals of Electric Circuits                    | 2       | Probability and Statistics                                | 3       |                                                                  |         |                                                                   |         |
|        | Physic Education II                                  | 1       | Physic Education IV                                       | 1       |                                                                  |         |                                                                   |         |
|        | The Basic Principles of Marxism                      | 2       | Mao Zedong Thought and Introduction                       | 3       |                                                                  |         |                                                                   |         |
|        | GE Elective Courses                                  | 3       | GE Elective Courses                                       | 4       |                                                                  |         |                                                                   |         |
|        | Total                                                | 21      | Total                                                     | 21      | Total                                                            | 20      | Total                                                             | 8       |
| Summer | Cultivation of Ethics and                            | 1       | Introduction to Mao Zedong Thought                        | 3       | Internship                                                       | 2       |                                                                   |         |
|        | The Basic Principles of Marxism                      | 1       |                                                           |         |                                                                  |         |                                                                   |         |
|        | Total                                                | 2       | Total                                                     | 3       | Total                                                            | 2       | Total                                                             |         |