MINISTRY OF EDUCATION & TRAINING
HO CHI MINH CITY UNIVERSITY OF TECHNOLOGY & EDUCATION

UNDERGRADUATE PROGRAM
Major of
COMPUTER ENGINEERING TECHNOLOGY

(Issued under Decision No. 3744 /QĐ-ĐHSPKT dated 06 / 10 /2025 by the President of Ho Chi Minh City University of Technology and Education)

Education Name: Computer Engineering Technology
Level: Undergraduate
Major: Computer Engineering Technology
Major Code: 7480108A

Ho Chi Minh City, 2025

THE MINISTRY OF EDUCATION & TRAINING
HO CHI MINH CITY UNIVERSITY OF TECHNOLOGY & EDUCATION

SOCIALIST REPUBLIC OF VIETNAM
Independence - Freedom - Happiness

UNDERGRADUATE PROGRAM

Education Name: COMPUTER ENGINEERING TECHNOLOGY

Level: Undergraduate

Major: Computer Engineering Technology

Major Code: 7480108A

Type of Training: FULL-TIME

Graduation Diploma: ENGINEER

(Issued under Decision No. 3744 /QĐ-ĐHSPKT dated 06 / 10 /2025 by the President of Ho Chi Minh City University of Technology and Education)

1. **Training Duration:** 4 years
2. **Admission Requirements:** High School Graduate
3. **Grading Scale, Training Process, and Graduation Requirements**
    - Grading Scale: 10
    - Training Process: According to Decision No. 3116/QD-ĐHSPKT dated 22/08/2025 of Ho Chi Minh City University of Technology and Education on promulgating the university-level training regulations.
    - Graduation Requirements:
        - General Requirements: According to Decision No. 3116/QD-ĐHSPKT dated 22/08/2025 of Ho Chi Minh City University of Technology and Education on promulgating the university-level training regulations.
        - Specialized Requirements: According to the general regulations of Ho Chi Minh City University of Technology and Education.
4. **Training Goals and Learning Outcomes**

Goals:

Graduates will be able to work in the design and implementation of computer systems, equipped to identify and solve critical problems across a broad range of application domains. They will be prepared to build successful careers in industry, academia, and community service, demonstrating technical leadership in business, the profession, and society. Leveraging their technical expertise, leadership skills, and entrepreneurial mindset, they can help drive comprehensive economic development in the Southern region. Graduates may pursue positions in companies specializing in embedded systems, semiconductor IC design, and other related areas.

Objectives: Graduates will possess the following knowledge, skills, and competencies:

1. Develop the ability to apply knowledge of mathematics and basic sciences, as well as technical knowledge from fundamental to advanced levels in computer engineering, to analyze, evaluate, and solve complex technical problems.
2. Develop engineering design capabilities to address the requirements in the field of computer engineering, including both hardware and software aspects.
3. Develop communication and teamwork skills, along with a professional attitude that meets the evolving demands of the industry and society.
4. Develop the capacity to adapt to new technologies, methodologies, and tools in order to keep pace with advancements in the computer engineering field and respond effectively to challenges in a dynamic environment.

Program outcomes

Code	Expected Learning Outcomes	Competency Level
ELO1	Ability to apply knowledge of mathematics, natural sciences, and engineering principles to identify, propose, and solve complex technical problems.	4
ELO2	Ability to apply engineering design to create solutions, components, devices, and systems that meet specific requirements, taking into account issues related to health, safety, and public welfare, as well as economic, environmental, and social factors.	4
ELO3	Ability to communicate effectively with diverse audiences and use English proficiently in various contexts.	4
ELO4	Awareness of professional and ethical responsibilities in technical situations, and ability to make reasoned judgments by considering the impact of engineering solutions in economic, social, environmental, and global contexts.	3
ELO5	Ability to function effectively in a team setting, where members collectively demonstrate leadership, foster a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.	4
ELO6	Ability to design and conduct appropriate experiments, analyze and interpret data, and use engineering judgment to draw conclusions.	4
ELO7	Ability to acquire and apply new knowledge as needed, using appropriate learning strategies.	5

Competency Level Scale

Competency Level	Description

0.0 ≤ Competency Level ≤ 1.0: Basic	**Remember:** Students recall/recognize/retrieve knowledge through actions such as defining, repeating, listing, identifying, determining, etc.
1.0 ≤ Competency Level ≤ 2.0: Satisfactory	**Understand:** Students construct knowledge from materials and existing knowledge through actions such as explaining, classifying, illustrating, inferring, etc.
2.0 ≤ Competency Level ≤ 3.0: Apply	Students perform/apply knowledge to create products such as models, physical objects, simulated products, reports, etc.
3.0 ≤ Competency Level ≤ 4.0: Proficient	**Analyze:** Students analyze materials/knowledge into details/components and point out their relationships within the whole through actions such as analyzing, classifying, comparing, synthesizing, etc.
4.0 ≤ Competency Level ≤ 5.0: Evaluate	Students provide assessments and predictions about knowledge/information according to predefined standards, criteria, and measurement indicators through actions such as commenting, critiquing, proposing, etc.
5.0 ≤ Competency Level ≤ 6.0: Excellent	**Create:** Students construct/arrange/organize/design/generalize details/components in a different/new way to create new structures/models/products.

5. Total program credits: 158 credits

(not including physical, national defense education and Enterprise Seminar)

Foreign Language Knowledge:

- Students with an IELTS >= 4.5 or equivalent (as per Decisions No. 2146/QĐ-ĐHSPKT dated 05/8/2024 and No. 2930/QĐ-ĐHSPKT dated 12/10/2020 and announcement No. 3022/TB-DHSPKT date 29/8/2025) will be exempted from the English placement test. Their scores will be converted for English courses in the program and English proficiency requirement (Outcome).
- English Placement Test for Level Classification: Students without IELTS certificate must participate in an English placement test to determine their proficiency level.
    - If a student achieves Level 1, they will study Communicative English 1,2.
    - If a student achieves Level 2, they will study Academic English 1,2.
- Sequence of English courses: Communicative English 1,2 → Academic English 1, 2.

Note:

- Communicative English 1 and 2 are supplementary courses designed to enhance English communication skills for students not accumulating credits in the program.
- Academic English 1 and 2 are academic courses that accumulate credits in the program.

6. Allocation of Knowledge Group

Groups of Courses	**Credits**		
	Total	**Compulsory**	**Elective**

General Knowledge	**59**	**55**	**4**
General Politics + Laws	14	14	
Social Sciences and Humanities	4		4
English (Academic English 1 Academic English 2)	8	8	
Mathematics and Natural Sciences	27	27	
Introduction to CET	3	3	
Informatics	3	3	
Professional knowledge	**99**	**90**	**9**
Foundation of Major	31	31	
Professional Major	40	31	9
Practices	16	16	
Internship	2	2	
Capstone project (final thesis)	10	10	
Physical and National Defense Education	Non-accumulation		
National Defence Education 1	1		
National Defence Education 2	1		
National Defence Education 3	1		
National Defence Education 4	1		
Physical Education 1	1		
Physical Education 2,3	2		
Comunicative English	Non-accumulation		
Communicative English 1	4		
Communicative English 2	4		
Enterprise Seminar	1		
Total	**158**	**145**	**13**

7. Content of Program

A – Compulsory Courses

7.1. General Knowledge

No.	Course's ID	Course name	Credits	Prerequisite

	General Politics + Laws		**14**	
1.	LLCT130105E	Philosophy of Marxism and Leninism	3	
2.	LLCT120205E	Political economics of Marxism and Leninism	2	
3.	LLCT120405E	Scientific socialism	2	
4.	LLCT220514E	History of Vietnamese communist party	2	
5.	LLCT120314E	Ho Chi Minh's ideology	2	
6.	GELA236939E	General Law	3	
	Mathematics and Natural Sciences		**27**	
7.	MATH132401E	Calculus 1	3	
8.	MATH132501E	Calculus 2	3	
9.	MATH132601E	Calculus 3	3	
10.	MATH132901E	Mathematical Statistics for Engineers	3	
11.	PHYS130902E	Physics 1	3	
12.	PHYS131002E	Physics 2	3	
13.	PHYS111202E	Physics - Laboratory 1	1	
14.	PHYS111302E	Physics - Laboratory 2	1	
15.	GCHE130603E	Chemistry for Engineers	3	
16.	AMCE245164E	Advanced Mathematics for Computer Engineering	4	
17.	ICET135064E	Introduction to CET	**3** (2+1)	
	Informatics		**3**	
18.	CPRL130064E	C Programming language	3	
19.	ACEN340535E	Academic English 1	4	
20.	ACEN340635E	Academic English 2	4	
21.	COEN140135E	Communicative English 1	4	Non-accumulation
22.	COEN140235E	Communicative English 2	4	Non-accumulation
23.	GDQP110131	Giáo dục quốc phòng 1 (*National Defence Education 1)*	1	Non-accumulation
24.	GDQP110231	Giáo dục quốc phòng 2 (*National Defence Education 2)*	1	Non-accumulation

25.	GDQP110331	Giáo dục quốc phòng (*National Defence Education 3)*	1	Non-accumulation
26.	GDQP110431	Giáo dục quốc phòng 4 (*National Defence Education 4)*	1	Non-accumulation
27.	PHED110513	Giáo dục thể chất 1 (*Physical Education 1)*	1	Non-accumulation
	Giáo dục thể chất 2,3 (*Physical Education 2,3)*		**2**	**Choose 2**
28.	FOOT112330	Bóng đá (*Football)*	1	Non-accumulation
29.	VOLL112330	Bóng chuyền (*Volleyball)*	1	Non-accumulation
30.	BASK112330	Bóng rổ (*Basketball)*	1	Non-accumulation
31.	BADM112330	Cầu lông (*Badminton)*	1	Non-accumulation
32.	TENN112330	Quần vợt (*Tennis)*	1	Non-accumulation
33.	KARA112330	Không thủ đạo (*Karate)*	1	Non-accumulation
34.	CHES112330	Cờ vua (*Chess)*	1	Non-accumulation
35.	CHIN112330	Cờ tướng (Chinese Chess)	1	Non-accumulation
36.	YOGA112330	Yoga (Yoga)	1	Non-accumulation
37.	PICK112330	Pickleball	1	Non-accumulation
Total			**55**	

7.2. Professional knowledge

7.2.1. Foundation of major

No.	Course's ID	Course name	Credits	Prerequisite
1.	ELCI140144E	Electric Circuits	4	
2.	ELEC230262E	Electronic Circuits 1	3	
3.	ELEC330362E	Electronic Circuits 2	3	
4.	DIGI330163E	Digital Systems	3	
5.	SISY330164E	Signals and Systems	3	

6.	DACO430664E	Data Communication	3	
7.	DSCC235864E	Discrete Structures	3	
8.	COOA335364E	Computer Organization and Architecture	3	
9.	EMSY435664E	Embedded Systems	3	
10.	PRPY238164E	Python Programming	3	
Total			**31**	

7.2.2.a Professional Major Courses (Theory and Practice courses)

– Compulsory subjects

No.	Course's ID	Course name	Credits	Prerequisite
1.	DDCS336764E	Digital Systems and Integrated Circuit Design	3	
2.	DSPR431264E	Digital Signal Processing	3	
3.	CNIN435464E	Computer Networking and Internet	3	
4.	RTOS345264E	Real Time Operating System	4(3+1)	
5.	HSCD446164E	Hardware/Software Codesign	4(3+1)	
6.	DICD436264E	VLSI Circuits Design	3	
7.	ITFA336064E	Internet of Things: Foundations and Applications	3	
8.	MLAI338364E	Machine Learning and Artificial Intelligence	3	
9.	OPEP338564E	Object-Oriented Programming and Software Engineering	3	
10.	SEMI3I0026E	Business Seminar	0 (1)	
11.	SEPR415564E	Senior Project 1	1	
12.	SEPR415964E	Senior Project 2	1	
13.		**Professional knowledge Elective**	9	
Total			**40**	

7.2.2.b Major Practices

No.	Course's ID	Course name	Credits	Prerequisite
1.	ELPR320762E	Electronics Practice	2	
2.	PRDI310263E	Digital Systems Lab	1	
3.	PRPL218164E	Python Programming Lab	1	
4.	DACL411164E	Data Communication Lab	1	
5.	COOL325364E	Computer Architecture and Organization Lab	2	

6.	EMSL425664E	Embedded Systems Lab	2	
7.	DDCL316764E	Digital Systems and Integrated Circuit Design Lab	1	
8.	DSPL411264E	Digital Signal Processing Lab	1	
9.	DICL426264E	VLSI Circuits Design Lab	2	
10.	MLAL318364E	Machine Learning and Artificial Intelligence Lab	1	
11.	ITFL316064E	Internet of Things: Foundations and Applications Lab	1	
12.	CNIL415464E	Computer Networking and Internet Lab	1	
Total			**16**	

7.2.3. Internship and Capstone project

No.	Course's ID	Course name	Credits	Prerequisite
1.	INTE427464E	Internship Program	2	
2.	CAPR408964E	Capstone Design Project	10	
Total			**12**	

B – Optional Subjects

Knowledge of Social Sciences and Humanities: 4 Credits *(Choose 2 courses)*

No.	Course's ID	Course name	Credits	Prerequisite
1.	GEFC220105E	General Economics	2	Choose 1
2.	IQMA220205E	Introduction to Quality Management	2	
3.	INMA220305E	Introduction of Management	2	
4.	INLO220405E	Introduction to Logic	2	
5.	BPLA121808E	Business Plan	2	
6.	ENPS220591E	Engineering Psychology	2	Choose 1
7.	SYTH220491E	System Thinking	2	
8.	PLSK120290E	Planning Skills	2	
9.	WOPS120390E	Workplace Skills	2	
10.	REME320690E	Research Method	2	
11.	INSO321005E	Introduction to Sociology	2	
12.	LESK120190E	Learning skills	2	
	Total		**4**	

Professional Major: 9 Credits *(Choose 3 courses)*

No.	Course's ID	Course name	Credits	Prerequisite

1.	ALDS335764E	Algorithms and Data Structures	3	Choose 1
2.	AICD433164E	Analog IC Design	3	
3.	DLTA437664E	Deep Learning Theory and Applications	3	
4.	WMNW437464E	Wireless and Mobile Networking	3	Choose 1
5.	MBAD436364E	Mobile Application Development	3	
6.	VRSY338764E	Virtual Reality Systems	3	
7.	WSNW439564E	Wireless Sensor Networks	3	
8.	ESDS437064E	Embedded System Design	3	
9.	SOCD334264E	System-on-Chip (SoC) Design	3	
10.	CIPD334364E	CMOS Physical Design	3	
11.	TTDE334464E	Design-for-Testability (DFT) and Testing Techniques	3	
12.	MICD436464E	Mixed-Signal IC Design	3	Choose 1
13.	ICFT436964E	IC Fabrication and Technology	3	
14.	ICPK439464E	IC Packaging Technology	3	
15.	PDCI439664E	Pulse and Digital Circuits	3	
16.	LITO432464E	Linux-Based Programming Tools	3	
17.	VIDA439764E	VLSI Design Automation	3	
	Total		**9**	

Interdisciplinary: 6 Credits *(Students may select 6 interdisciplinary credits as substitutes for courses in the elective section of the major knowledge block.)*

No.	Course's ID	Course name	Credits	Prerequisite
1.	NWSP437364E	Network Security and Privacy	3	Choose 1
2.	HCIT437464E	Human-Computer Interaction Technologies	3	
3.	CVIP437564E	Computer Vision and Image Processing	3	
4.	CLCO436664E	Cloud Computing	3	
5.	DBWP437864E	Database and Web Programming	3	Choose 1
6.	BCAP437964E	Blockchain and Its Applications	3	

	Total	**6**	

C – MOOCs (Massive Open Online Courses):

To facilitate enhanced access to advanced training programs, students can independently choose proposed online courses from the following table to be considered equivalent to courses in the curriculum:

No.	Course code	Course name	Credits	Course eligible for MOOC equivalency (registration link provided)
1.	COOA335364E	Computer Organization and Architecture	3	https://www.coursera.org/learn/comparch
2.	EMSY435664E	Embedded Systems	3	https://www.coursera.org/learn/introduction-embedded-systems
3.	ITFA336064E	Internet of Things: Foundations and Applications	3	https://www.coursera.org/learn/iot
4.	CLCO436664E	Cloud Computing	3	https://www.coursera.org/learn/big-data-cloud-computing-cdn
5.	DLTA437664E	Deep Learning Theory and Applications	3	https://www.coursera.org/learn/neural-networks-deep-learning

8. Training plan

Courses not included in the official teaching plan will be offered by the Training Department in designated semesters, allowing students to plan their studies independently.

1st Semester

No.	Course's ID	Course name	Credits	Prerequisite	Term
1.	GELA 236939E	General Law	3		2
2.	INAT130130E	Introduction to CET	3	3 (2+1)	1
3.	MATH132401E	Calculus 1	3		1
4.	PHYS130902E	Physics 1	3		1
5.	CPRL130064E	C Programming language	3		2
6.	PHED110130	Giáo dục thể chất 1 (*Physical Education 1)*	1	Non-accumulation	1
7.	ACEN340535E	Academic English 1	4		1
8.	ACEN340635E	Academic English 2	4		1
Total			**23**		

2nd Semester:

No.	Course's ID	Course name	Credits	Prerequisite	Term
1.	LLCT130105E	Philosophy of Marxism and Leninism	3		2
2.	MATH132501E	Calculus 2	3		1
3.	ELEC230262E	Electronic Circuits 1	3		2
4.	PHYS111202E	Physics - Laboratory 1	1		1
5.	PRPY238164E	Python Programming	3		1
6.	ELCI140144E	Electric Circuits	4		1
7.	PRPL218164E	Python Programming Lab	1		2
8.	GCHE130603E	General Chemistry for Engineers	3		1
9.	**Social Sciences and Humanities (1) (option)**		2		1
10.		Giáo dục thể chất 2 (tự chọn 1) *Physical Education 2 (Option 1)*	0(1)		
11.		Giáo dục Quốc phòng *National Defence Education*	0(4)		
Total			**23**		

3rd Semester:

No.	Course's ID	Course name	Credits	Prerequisite	Term
1.	LLCT120205E	Political Economics of Marxism and Leninism	2		**1**
2.	LLCT120405E	Scientific socialism	2		**2**
3.	MATH132601E	Calculus 3	3		2
4.	MATH132901E	Mathematical Statistics for Engineers	3		**1**
5.	PHYS131002E	Physics 2	3		1
6.	DSCC235864E	Discrete Structures	3		2
7.	ELEC330362E	Electronic Circuits 2	3		1
8.	SISY330164E	Signals and Systems	3		1
9.	DIGI330163E	Digital Systems	3		2
10.	Giáo dục thể chất 3 (tự chọn 2) *Physical Education 3(Option 2)*		0(1)	Non-accumulation	2
Total			**25**		

4th Semester:

No.	Course's ID	Course name	Credits	Prerequisite	Term
1.	LLCT120314E	Ho Chi Minh's ideology	2		1
2.	LLCT220514E	History of Vietnamese communist party	2		2
3.	AMCE245164E	Advanced Mathematics for Computer Engineering	4	MATH132401E	2
4.	DDCS336764E	Digital Systems and Integrated Circuit Design	3		1
5.	COOA335364E	Computer Organization and Architecture	3		2
6.	DACO430664E	Data Communication	3		1
7.	PHYS111302E	Physics – Laboratory 2	1		1
8.	ELPR320762E	Electronics Practice	2		1
9.	DACL411164E	Data Communication Lab	1		2
10.	PRDI310263E	Digital Systems Lab	1		1
11.	DDCL316764E	Digital Systems and Integrated Circuit Design Lab	1		2
Total			**23**		

5th Semester:

No.	Course's ID	Course name	Credits	Prerequisite	Term
1.	EMSY435664E	Embedded Systems	3		2
2.	DICD436264E	VLSI Circuits Design	3		1
3.	DSPR431264E	Digital Signal Processing	3		1
4.	ITFA336064E	Internet of Things: Foundations and Applications	3		2
5.	CNIN435464E	Computer Networking and Internet	3		1
6.	DSPL411264E	Digital Signal Processing Lab	1		2
7.	CNIL415464E	Computer Networking and Internet Lab	1		2
8.	COOL325364E	Computer Architecture and Organization Lab	2		1
9.	DICL426264E	VLSI Circuits Design Lab	2		2
Total			**21**		

6th Semester:

No.	Course's ID	Course name	Credits	Prerequisite	Term
1.	OPEP338564E	Object-Oriented Programming and Software Engineering	3		2
2.	MLAI338364E	Machine Learning and Artificial Intelligence	3		1
3.	RTOS345264E	Real Time Operating System	4(3+1)		1
4.	HSCD446164E	Hardware/Software Codesign	4(3+1)		2
5.	ITFL316064E	Internet of Things: Foundations and Applications Lab	1		2
6.	MLAL318364E	Machine Learning and Artificial Intelligence Lab	1		2
7.	EMSL425664E	Embedded Systems Lab	2		1
8.	SEPR415564E	Senior Project 1	1		1-2
Total			**19**		

7th Semester:

No.	Course's ID	Course name	Credits	Prerequisite	Term
1.	SEMI310026E	Enterprise Seminar	0(1)	Non-accumulation	**2**
2.	SEPR415964E	Senior Project 2	1		1-2
3.	INTE427464E	Internship Program	2		1-2
4.		Social Sciences and Humanities Elective 2	2		2
5.		Major/Interdisciplinary Elective 1	3		1
6.		Major/Interdisciplinary Elective 2	3		1
7.		Major/Interdisciplinary Elective 3	3		1
Total			**14**		

8th Semester:

No.	Course's ID	Course name	Credits	Prerequisite	Term
1.	CAPR408964E	Capstone Design Project	10		1-2
Total			**10**		

9. Course Descriptions

Academic English 1 **Credits: 4**

Prerequisite course(s): Communicative English 1
Corequisite course(s): Academic English 2
Previous course(s): N/A
Course Description:

This is the first course of the Academic English series designed for students majoring in the areas other than English to achieve the intermediate level of English language proficiency (equivalent to B2.1 level of CEFR) in Speaking and Listening skills. The series aims to enhance students' English competence to deal with complex matters of everyday life in other countries, to exchange specific information and personal ideas with young people and adults who speak English, and to achieve a wider understanding of thoughts from people of other cultures. This course particularly provides students with the opportunities to understand the main ideas of complex oral English on quite abstract topics, including basic technical discussions in their fields of specialization. Students are asked to orally interact with a degree of fluency that makes regular interactions with native English speakers quite possible with some strain. They are also prepared to orally produce clear, detailed texts on a limited range of subjects and explain a viewpoint on a topical issue giving the advantages and disadvantages of a few options. In addition, this course promotes students' development of presentation skills, teamwork ability, and learner autonomy by engaging them in various interactive activities.

Textbooks:

Kisslinger, E., & Baker, L. (2024). *Skillful 3 Listening and Speaking* (3rd ed.). Macmillan Education.

Academic English 2 **Credits: 4**

Prerequisite course(s): Communicative English 2
Corequisite course(s): Academic English 1
Previous course(s): N/A
Course Description:

This is the second course of the Academic English series designed for students majoring in the areas other than English to achieve the intermediate level of English language proficiency (equivalent to B2.1 level of CEFR) in Reading and Writing skills. The series aims to enhance students' English competence to deal with complex matters of everyday life in other countries, to exchange specific information and personal ideas with young people and adults who speak English, and to achieve a wider understanding of thoughts from people of other cultures. This course particularly provides students with the opportunities to understand the main ideas of complex English texts on quite abstract topics, including basic technical discussions in their fields of specialization. Students are asked to interact in written English with a degree of fluency that makes regular interactions with native English speakers quite possible with some strain. They are also prepared to produce clear, detailed written texts on a limited range of subjects and explain a viewpoint on a topical issue giving the advantages and disadvantages of a few options. In addition, this course promotes students' development of presentation skills, teamwork ability, and learner autonomy by engaging them in various interactive activities.

Textbooks:

Rogers, L., & Zemach, D. E. (2024). *Skillful 3 Reading and Writing* (3rd ed.). Macmillan Education.

Calculus 1

Study-time distribution: (3 credits – 3 lecture / 0 lab / 6 self-study)

Prerequisite: None

Previous course requirement: None

Course summary: A review of fundamental and advanced mathematics: sets of numbers (rational, real, complex); limits of sequences and functions, continuity; single-variable differential calculus (derivatives, differentials, Taylor–Maclaurin series, curve sketching, polar-coordinate curves); single-variable integral calculus (indefinite, definite and improper integrals); series (number series, function series, power series, Taylor–Maclaurin series, Fourier series and trigonometric expansions).

Calculus 2

Study-time distribution: (3 credits – 3 lecture / 0 lab / 6 self-study)

Prerequisite: None

Previous course requirement: Calculus 1

Course summary: Matrices and determinants (types, inverses, rank); systems of linear equations (Cramer's rule, Gaussian elimination, homogeneous systems); vector spaces (subspaces, linear independence/dependence, bases, dimension, Euclidean spaces); matrix diagonalisation & quadratic forms (eigenvalues, eigenvectors, eigenspaces, diagonalisation, canonical forms, quadric surfaces); multivariable differential calculus (partial derivatives, differentials, extrema, geometric applications in space).

Calculus 3

Study-time distribution: (3 credits – 3 lecture / 0 lab / 6 self-study)

Prerequisite: None

Previous course requirement: Calculus 1

Course summary: Multiple integrals (double and triple integrals, applications to plane area, surface area and volume); line integrals (first and second kinds, applications, Green's theorem, path-independence criteria); surface integrals (first and second kinds, Ostrogradsky/Gauss divergence theorem, vector fields, flux, divergence, Stokes' theorem, circulation and curl).

Probability & Applied Statistics

Study-time distribution: (3 credits – 3 lecture / 0 lab / 6 self-study)

Prerequisite: None

Previous course requirement: Calculus 2

Course summary: Basic probability theory (counting, permutations, combinations, Newton's binomial theorem, trials, events, probability, conditional probability); random variables (distributions, expectation, variance, mode, median); common distributions (binomial, Poisson, normal, Student t); sampling theory (population, random samples, sampling statistics and distributions); estimation theory (point and interval estimation); hypothesis testing (Type I & II errors, significance level, tests on mean, proportion, equality of two means or proportions, independence tests); correlation & regression (bivariate r.v., correlation coefficients, regression tables and curves).

Physics 1
Study-time distribution: (3 credits – 3 lecture / 0 lab / 6 self-study)
Prerequisite: None
Previous course requirement: None
Course summary: Mechanics (kinematics and dynamics of particles, conservation laws, rigid-body motion); thermodynamics (kinetic theory, First and Second Laws); electricity & magnetism (electrostatics, magnetostatics, time-varying electromagnetic fields).

Physics 2
Study-time distribution: (3 credits – 3 lecture / 0 lab / 6 self-study)
Prerequisite: None
Previous course requirement: None
Course summary: Einstein's relativity (special and general); wave optics (interference, diffraction), quantum optics (photoelectric effect, Compton scattering); quantum physics (de Broglie & Heisenberg hypotheses, Schrödinger equation, quantisation of physical quantities).Practical component: Experiments on error analysis, rotational inertia, gravitational acceleration, specific heat ratio of gases, RLC resonance, diode & transistor characteristics, electron charge-to-mass ratio (magnetron), laser diffraction & wavelength, thermal radiation (Stefan–Boltzmann law), and external photoelectric effect (Planck's constant).

Physics Laboratory 1
Study-time distribution: (1 credit – 0 lecture / 1 lab / 6 self-study)
Prerequisite: Calculus 1
Previous course requirement: Physics 1
Course summary: Nine experiments on particle and rigid-body mechanics and thermodynamics, reinforcing theoretical concepts and developing skills in observation, experimentation, measurement, data analysis and processing.

Physics Laboratory 2
Study-time distribution: (1 credit – 0 lecture / 1 lab / 6 self-study)
Prerequisite:
Previous course requirement: Physics Laboratory 1
Course summary: Nine experiments on electromagnetism and optics, further consolidating students' experimental technique and analytical skills.

General Chemistry
Study-time distribution: (3 credits – 3 lecture / 0 lab / 6 self-study)
Prerequisite:
Previous course requirement:
Course summary: Fundamental atomic and molecular structure; quantitative problem-solving in thermodynamics, chemical kinetics, equilibrium, solution properties and electrochemistry; foundation for reading technical literature and for later engineering studies.

Advanced Mathematics for Computer Engineering
Study-time distribution: (4 credits – 4 lecture / 0 lab / 8 self-study)
Prerequisite:
Previous course requirement: Calculus 1

Course summary: Transform theory, linear algebra, differential algebra and complex analysis relevant to computer engineering applications.

C Programming Language

Study-time distribution: (3 credits – 3 lecture / 0 lab / 6 self-study)

Prerequisite:

Previous course requirement:

Course summary: Overview of programming languages, basic data and control structures in C; design and implementation of control and management programs in C.

Introduction to CET

Study-time distribution: (3 credits – 2 lecture / 1 lab / 6 self-study)

Prerequisite:

Previous course requirement:

Course summary: Role, responsibilities and ethics of computer engineers; fundamentals of engineering design; soft skills (teamwork, communication, presentation); guidance for effective study and professional conduct.

Electric Circuits

Study-time distribution: (4 credits – 4 lecture / 0 lab / 8 self-study)

Prerequisite:

Previous course requirement: Calculus 1

Course summary: Kirchhoff's laws; circuit analysis methods (equivalent transformations, nodal and mesh analysis); theorems (Thevenin–Norton, maximum power transfer, superposition); phasor analysis of steady-state AC circuits; reactive circuits, op-amp circuits; three-phase balanced/unbalanced systems; two-port networks; time- and frequency-domain analysis (Bode plots); non-linear circuits.

Electronic Circuits 1

Study-time distribution: (3 credits – 3 lecture / 0 lab / 6 self-study)

Prerequisite:

Previous course requirement: Electric Circuits

Course summary: Semiconductor materials and devices (diodes, BJTs, four-layer devices, optoelectronic devices); analysis and design of basic circuits: diode applications (rectifiers, clippers, clampers, logic gates, multipliers, zener regulators), single-stage BJT amplifiers.

Electronic Circuits 2

Study-time distribution: (3 credits – 3 lecture / 0 lab / 6 self-study)

Prerequisite:

Previous course requirement: Electric Circuits

Course summary: Multistage amplifiers, op-amp circuits, feedback, power amplifiers, oscillators, power supplies and filters.

Digital Systems

Study-time distribution: (3 credits – 3 lecture / 0 lab / 6 self-study)

Prerequisite:

Previous course requirement: Electric Circuits

Course summary: Number systems, logic gates, Boolean algebra; TTL and CMOS logic families; A/D and D/A conversion; memory devices; digital oscillators; analysis and design of combinational and sequential circuits and digital systems.

Signals and Systems
Study-time distribution: (3 credits – 3 lecture / 0 lab / 6 self-study)
Prerequisite:
Previous course requirement: Calculus 1
Course summary: Continuous-time signals and systems; time-domain analysis; Laplace transform and convolution; Fourier series and transform; modulation systems and filters.
Data Communications Engineering
Study-time distribution: (3 credits – 3 lecture / 0 lab / 6 self-study)
Prerequisite:
Previous course requirement: Signals and Systems
Course summary: Unified view of computer and data communications: channel multiplexing/demultiplexing, error correction, flow control, and data transfer services within and between networks.
Discrete Structures
Study-time distribution: (3 credits – 3 lecture / 0 lab / 6 self-study)
Prerequisite:
Previous course requirement:
Course summary: Discrete mathematics for computer engineering: functions, relations, sets, propositional and predicate logic, simple logic circuits, proof techniques, cryptography, discrete probability, graphs and trees, finite-state machines, Turing machines and formal languages.
Computer Architecture & Organization
Study-time distribution: (3 credits – 3 lecture / 0 lab / 6 self-study)
Prerequisite:
Previous course requirement: Discrete Structures, Digital System, C programming language
Course summary: Fundamental architecture and microarchitecture concepts; processor generations; memory hierarchy; I/O organisation (slots, ports); peripheral interfacing; assembly programming; fault diagnosis; basic microprocessor system design.
Embedded Systems
Study-time distribution: (3 credits – 3 lecture / 0 lab / 6 self-study)
Prerequisite:
Previous course requirement: C programming language & Computer Architecture
Course summary: Design, interfacing, configuration and programming of embedded systems, using the Arduino platform as a practical vehicle.
Python Programming
Study-time distribution: (3 credits – 3 lecture / 0 lab / 6 self-study)
Prerequisite:
Previous course requirement: C programming language
Course summary: Introduction to Python: libraries, data types, statements, expressions, conditionals, loops, functions, classes and practical applications.
Digital System & IC Design
Study-time distribution: (3 credits – 3 lecture / 0 lab / 6 self-study)
Prerequisite:
Previous course requirement: Digital System

Course summary: ASIC and FPGA design using Verilog: combinational and sequential circuits, resource–timing trade-offs, optimisation techniques, finite-state machine modelling.

Digital Signal Processing

Study-time distribution: (3 credits – 3 lecture / 0 lab / 6 self-study)

Prerequisite:

Previous course requirement: Signals and Systems

Course summary: Sampling and reconstruction; time-domain analysis of discrete-time signals and systems; Z-transform; frequency-domain analysis (DTFS, DTFT, DFT, FFT); FIR and IIR digital filter design.

Computer Networks & Internet

Study-time distribution: (3 credits – 3 lecture / 0 lab / 6 self-study)

Prerequisite: Data Communications

Previous course requirement:

Course summary: Network technologies, TCP/IP protocols, networking devices; design and configuration of computer and internetworks; professional attitude toward continual learning.

Real-Time Operating Systems

Study-time distribution: (4 credits – 3 lecture / 1 lab / 8 self-study)

Prerequisite: Computer Architecture & Organization

Previous course requirement:

Course summary: OS foundations (processes, synchronisation, deadlocks, memory management); RTOS concepts for embedded systems (hardware interfacing, interrupts, real-time scheduling, task management, timers, data sharing); survey of RTX51, uCLinux and embedded Linux; students build a simple RTOS.

HW/SW Co-Design

Study-time distribution: (4 credits – 3 lecture / 1 lab / 8 self-study)

Prerequisite:

Previous course requirement:

Course summary: Integrated hardware and software design for embedded real-time systems; data-flow and control-flow models; performance evaluation; datapaths with FSMs; analysis of soft cores and SoC architectures.

Digital IC Design (ASIC)

Study-time distribution: (3 credits – 3 lecture / 0 lab / 6 self-study)

Prerequisite:

Previous course requirement: Computer Architecture & Organization

Course summary: Design of combinational and sequential logic gates toward large-scale integrated digital systems; analysis of parasitic RLC effects on timing and power, optimisation, standard-cell to system-level layout and fabrication principles.

Machine Learning & Artificial Intelligence

Study-time distribution: (3 credits – 3 lecture / 0 lab / 6 self-study)

Prerequisite: Embedded Systems

Previous course requirement: Python Programming

Course summary: Programming ML and AI applications; optimisation of deep-learning models; development using Python and open-source libraries.

Fundamentals & Applications of IoT

Study-time distribution: (3 credits – 3 lecture / 0 lab / 6 self-study)

Prerequisite: Embedded Systems

Previous course requirement: Data Communications

Course summary: IoT concepts; hardware and software platforms; M2M protocols (Zigbee, Bluetooth, IEEE 802.15.x & 802.11); data processing mechanisms.

Object-Oriented Programming & Software Engineering

Study-time distribution: (3 credits – 3 lecture / 0 lab / 6 self-study)

Prerequisite: Embedded Systems

Previous course requirement: Data Communications

Course summary: Object-oriented concepts using C#; class construction; OO software design, development and testing methodologies.

Design Project 1

Study-time distribution: (1 credit – 0 lecture / 1 studio / 4 self-study)

Prerequisite:

Previous course requirement:

Course summary: Principles and practice of product design: specifications, alternative evaluation, technical reporting and presentation; includes IP, standards, engineering economics, reliability, safety and ethics.

Enterprise Seminar

Study-time distribution: (2 credits – 1 lecture / 0 lab / 2 self-study)

Prerequisite:

Previous course requirement:

Course summary: Nature of entrepreneurship; role of innovation and technology; managing uncertainty and risk in start-ups; suitable for those considering a business venture or policy work.

Electronics Lab

Study-time distribution: 2 (0 / 2 / 4)

Prerequisite: none

Previous course requirement: Basic Electronics

Course summary: Learners practice using measurement instruments in electronics; identifying basic electronic components such as R, L, C, diode, BJT, FET, OP-AMP; verifying the theoretical and real-world operation of fundamental application circuits built from those devices, then analyzing their behavior; and finally applying and analyzing basic electronic circuits in practical situations.

Digital System Lab

Study-time distribution: 1 (0 / 1 / 2)

Prerequisite: Digital System

Previous course requirement: Digital System

Course summary: Guides students in hands-on work with digital-electronic circuits such as logic gates, flip-flops, counters, registers, combinational and sequential designs, memory, ADC, DAC, and related real-world application circuits.

Python Programming Lab
Study-time distribution: 1 (0 / 1 / 2)
Prerequisite:
Previous course requirement: Data Communications
Course summary: Equips learners with a solid grasp of Python through computer-based labs covering basic libraries, variables, and compound data types. Students then practice defining/using functions and classes and apply them to build graphical interfaces with Tkinter.

Data Communications Lab
Study-time distribution: 1 (0 / 1 / 2)
Prerequisite:
Previous course requirement: Data Communications
Course summary: Provides practical knowledge of data-communications techniques, connecting digital-network devices and computers, and surveying data-transfer protocols.

Computer Architecture & Organization Lab
Study-time distribution: 1 (0 / 1 / 2)
Prerequisite:
Previous course requirement: Computer Architecture & Organization
Course summary: Gives learners skills to analyze and troubleshoot computers; design and build computer systems; program in assembly; and write low-level code for hardware control.

Embedded Systems Lab
Study-time distribution: 2 (0 / 2 / 4)
Prerequisite:
Previous course requirement: Embedded Systems
Course summary: Provides knowledge of embedded-system architecture and the principles of embedded and real-time operating systems.

Digital System & IC Design Lab
Study-time distribution: 1 (0 / 1 / 2)
Prerequisite:
Previous course requirement:
Course summary: Guides students to design digital ICs in Verilog using FPGA devices and IC-design software.

Digital Signal Processing Lab
Study-time distribution: 1 (0 / 1 / 2)
Prerequisite:
Previous course requirement: Digital Signal Processing
Course summary: Trains students to use MATLAB for simulating continuous- and discrete-time signals, enabling analysis/design in time and frequency domains. Students also evaluate discrete systems on Texas Instruments DSP kits (C6713 DSK, C6416 DSK, C6437 EVM).

VLSI Integrated-Circuit Design Lab
Study-time distribution: 2 (0 / 2 / 4)
Prerequisite:
Previous course requirement: VLSI IC Design

Course summary: Guides students in VLSI IC design practice with Cadence design tools.

Machine Learning & Artificial Intelligence Lab

Study-time distribution: 1 (0 / 1 / 2)

Prerequisite: Machine Learning & AI

Course summary: Covers programming ML/AI applications, optimizing deep-learning models, and building ML/AI apps in Python with open-source libraries.

IoT Fundamentals & Applications Lab

Study-time distribution: 1 (0 / 1 / 2)

Prerequisite: TT IoT Fundamentals & Applications

Course summary: Guides students in designing and developing IoT systems across relevant application domains.

Computer Networks & Internet Lab

Study-time distribution: 1 (0 / 1 / 2)

Prerequisite: Computer Networks & Internet

Course summary: Provides knowledge of computer networks and basic network services; skills for LAN/inter-network design and administration; network-device programming; and troubleshooting.

Internship

Study-time distribution: 2 (0 / 2 / 4)

Previous course requirement: Project 1, Project 2

Course summary: Students intern at domestic or overseas electronics companies, practicing real-world duties of future electronics-telecom engineers under host supervision.

Algorithms & Data Structures

Study-time distribution: 3 (3 / 0 / 6)

Prerequisite**:** C Programming Language

Previous course requirement:

Course summary**:** Equips learners with fundamental data-structure types—records, lists, arrays, trees—and the algorithms used to operate on those structures.

Analog IC Design

Study-time distribution: 3 (3 / 0 / 6)

Prerequisite**:** Basic Electronics

Previous course requirement:

Course summary**:** Enables students to design analog-IC blocks such as amplifiers, current mirrors, differential amplifiers, voltage references, charge pumps, DRAM, SRAM, and flash memories while meeting area, power-efficiency, gain, stability, and bandwidth constraints; compares alternative circuit techniques to select the optimal solution.

Wireless & Mobile Networks

Study-time distribution: 3 (3 / 0 / 6)
Prerequisite**:** Data Communications
Previous course requirement:
Course summary**:**

Mobile-App Development

Study-time distribution: 3 (3 / 0 / 6)
Prerequisite**:** C Programming Language
Previous course requirement:
Course summary**:** Introduces Android-platform programming. By course end, students can build deployable applications and hone teamwork skills through group projects.

Wireless Sensor Networks

Study-time distribution: 3 (3 / 0 / 6)
Prerequisite**:**
Previous course requirement:
Course summary**:** Covers WSN concepts, concentrating on applications; network architectures; MAC, routing, and transport protocols; and management issues for health care, transportation, industrial automation, and smart grids.

Virtual-Reality Systems

Study-time distribution: 3 (3 / 0 / 6)
Prerequisite**:** C Programming Language
Previous course requirement:
Course summary**:** Surveys VR history, system concepts, hardware and software components, and the key challenges facing VR systems.

Embedded-System Design

Study-time distribution: 3 (3 / 0 / 6)
Prerequisite:
Previous course requirement:
Course summary**:** Explores hardware–software co-design for embedded systems; implements and debugs complex software applications; introduces real-time-operating-system foundations for time-critical control.

System-on-Chip (SoC) Design

Study-time distribution: 3 (3 / 0 / 6)
Prerequisite**:**
Previous course requirement:

Course summary**:** Covers top-down SoC design and verification with SystemVerilog—bus architecture, IP integration, reusable design, system-level synthesis, hierarchical coding, interfaces, test-bench structures, and industrial tool usage—reinforced through design projects.

CMOS Physical-IC Design

Study-time distribution: 3 (3 / 0 / 6)
Prerequisite**:**
Previous course requirement:
Course summary**:** Examines CAD-automation issues in VLSI physical design: clustering, partitioning, floor-planning, placement, routing, and compaction.

DFT & Testing Techniques

Study-time distribution: 3 (3 / 0 / 6)
Prerequisite:
Previous course requirement:
Course summary**:** Introduces test methods for VLSI and digital systems; provides CAD-tool access for HDL modeling, fault simulation/analysis, and test-insertion for diverse digital circuits and systems.

Mixed-Signal IC Design

Study-time distribution: 3 (3 / 0 / 6)
Prerequisite:
Previous course requirement:
Course summary**:** Covers fundamentals and design issues of mixed-signal ICs—switched-capacitor techniques, ADC/DAC architectures, and system-/circuit-level modeling with Verilog-A.

IC Technology & Fabrication

Study-time distribution: 3 (3 / 0 / 6)
Prerequisite:
Previous course requirement:
Course summary**:** Provides basic knowledge of device and IC fabrication: clean-room concepts, cleaning, diffusion, lithography, wet & dry etching, CVD, sputtering, and process integration.

IC Packaging Technology

Study-time distribution: 3 (3 / 0 / 6)
Prerequisite:
Previous course requirement:
Course summary**:** Introduces IC-packaging principles, technologies, and evolution; addresses design considerations, fabrication processes, assembly techniques, EMIR, and comprehensive physical verification.

Pulse & Digital Circuits

Study-time distribution: 3 (3 / 0 / 6)
Prerequisite:
Previous course requirement:
Course summary**:** Covers pulse waveforms, linear-circuit response, switching-circuit analysis, pulse generation/shaping, flip-flops, one-shots, registers, counters, and characteristics of logic families (TTL, NMOS, ECL, CMOS, LVT).

Linux Programming Tools

Study-time distribution: 3 (3 / 0 / 6)
Prerequisite:
Previous course requirement:
Course summary**:** Provides working knowledge of Unix/Linux, scripting languages, and diverse Linux tools to help students become efficient OS users.

VLSI Design Automation

Study-time distribution: 3 (3 / 0 / 6)
Prerequisite:
Previous course requirement:
Course summary**:** Focuses on CAD-automation issues in VLSI design: logic synthesis, partitioning, floor-planning, placement, global & detailed routing, clock and power routing, and emerging trends.

10. Facilities for Learning

10.1 Workshops, Laboratories & Major Experimental Systems

- Electronics Laboratory
- Digital-Technique Laboratory
- Microprocessor Laboratory
- Digital-IC-Design Laboratory
- Telecommunications Laboratory
- IC-Design Laboratory
- Signal-Processing Laboratory
- Embedded-Systems Laboratory

10.2 Library & Web Resources

- Library of Ho Chi Minh City University of Technology and Education
- Internet-based resources

11. Program Implementation Guidelines

The training program is implemented in accordance with the current regulations for full-time university-level credit-based training, as stipulated by the Ministry of Education and Training and Ho Chi Minh City University of Technology and Education.

The specified hours are calculated as follows:

- 1 credit = 15 hours of theoretical lectures or in-class discussions
- 1 credit = 30 - 45 hours of laboratory work or practical exercises
- 1 credit = 30 hours of self-study
- 1 credit = 45 - 90 hours of on-site internship
- 1 credit = 45 - 60 hours for project work or graduation thesis

The total hours for a course must be a multiple of 15.

Political Theory Knowledge: Implemented according to the regulations of the Ministry of Education and Training.

Foreign Language Knowledge: The foreign language output standard is determined by the university's Science and Training Council at the beginning of each admission cohort. Throughout their studies, the university will monitor the students' foreign language proficiency development each academic year to decide the number of credits for courses that students are allowed to register for in a semester. Students can self-study or register for the foreign language proficiency development program according to the university's plan.

Physical Education Knowledge: Implemented according to the regulations of the Ministry of Education and Training. For Physical Education 2 and 3, students can select from the course catalog when registering for modules.

National Defense Education Knowledge: Implemented according to the regulations of the Ministry of Education and Training. Students accumulate credits and are granted a certificate after completing the requirements of the module.

Elective Social Sciences and Humanities Knowledge: Students select 2 courses, equivalent to 4 credits, from the course catalog when registering for modules.

Elective Foundational Major Knowledge: Students select 2 courses, equivalent to 6 credits, from the course catalog when registering for modules.

Elective Specialized Major Knowledge: Students select 2 courses, equivalent to 6 credits, from the course catalog when registering for modules.

The remaining knowledge blocks are arranged into 8 semesters as presented in section 8.

VICE PRESIDENT	DEAN OF FACULTY OF INTERNATIONAL EDUCATION
Dr. Quach Thanh Hai	**Assoc. Prof. Dr. Truong Dinh Nhon**