THE MINISTRY OF EDUCATION AND TRAINING
HCMC UNIVERSITY OF TECHNOLOGY AND EDUCATION
FACULTY OF ELECTRICAL AND ELECTRONICS ENGINEERING

UNDERGRADUATE PROGRAM

ENGINEER OF

BIOMEDICAL ENGINEERING

(7520212)

HCM City - 2021

THE MINISTRY OF EDUCATION AND TRAINING
HO CHI MINH CITY UNIVERSITY OF TECHNOLOGY AND EDUCATION
Faculty of electrical and electronics engineering

UNDERGRADUATE PROGRAMME
(Full-time Curriculum)

Programme: Biomedical Engineering

Level: Undergraduate

Major: Biomedical Electronics Engineering

Programme duration: 4 years

(Decision No……date… on……..)

1. Enrollment, Grading System, Curriculum and Graduation Requirements

- *Enrollment***:** High-school Graduates
- *Grading system*: 10
- *Curriculum and Graduation Requirements*: Based on regulations of Decision No 43/2007/BGDDT

2. The Goals, Objectives, and Expected Learning Outcomes

Goals

The programme is designed to prepare graduates to assume engineering and technology positions in the biomedical electronics field. Graduates of Biomedical Engineering (BME) programme have an ability to demonstrate expertise and career advancement in the biomedical electronics field through the application of fundamental knowledge, skills, and engineering technology tools. In addition, they have the ability to contribute significantly to the achievement of their organization's goals as an effective member and an ability to take part in life-long learning by being engaged with biomedical institutions, educational organizations, hospitals and professional societies.

Programme Objectives

PO-01	Apply, formulate and solve scientific, technical and technological problems in biomedical engineering field with social benefit
PO-02	Identify, develop, conduct experiments for analysis, and apply new knowledge with professional responsibility and ethics in biomedical engineering field
PO-03	Recognize and apply effectively when working in teams, and communicate effectively to people and even in English
PO-04	Operate, apply, analyze, evaluate, design and manage health and medical systems in term of considering economic, social and human factors

Expected Learning Outcomes

ELO-01	Ability to apply, formulate and solve principles, theorems, concepts of engineering, science and mathematics in the field of biomedical engineering
ELO-02	Ability to develop, conduct, and operate appropriate experiments and devices on boards, machines, and data obtained to interpret and produce results

ELO-03	Ability to recognize professional and ethical responsibilities associated with biomedical engineering issues that affect the social, environmental, economic, and global contexts
ELO-04	Ability to recognize and apply knowledge in appropriate and long-term learning strategies
ELO-05	Ability to effectively apply knowledge to teamwork and provide entrepreneurship and leadership to achieve objectives
ELO-06	Ability to explain, demonstrate, and communicate technical issues to people in the BME field and even in English
ELO-07	Ability to analyze and interpret data obtained from the experiments to apply appropriate circuits and systems
ELO-08	Ability to effectively evaluate issues, systems and applications in biomedical field that can impact on social, economic, environmental and global contexts to have conclusions
ELO-09	Ability to create biomedical engineering systems using new knowledge and skills

3. **Blocks of knowledge in the whole programme:**150 credits (without Physical Education and National Defense Education knowledge)
4. **Knowledge, skills, attitude, career opportunities**

4.1. Knowledge and skills

- ✓ Ability to apply theory and philosophical thinking in practice and in the professional scientific field; (ELO-1)
- ✓ Ability to design and build independently, creatively, detect and solve problems requiring specialized knowledge and skills; (ELO-1, ELO-7)
- ✓ Ability to apply new technologies in different fields: medical electronics, medical mechatronics, telemedicine, medical information to serve in the medical field; (ELO-7, ELO-8)
- ✓ Ability to contribute in consulting, designing and building medical equipment systems for medical and healthcare centers, consider and calculate the impact of society, economy and people; (ELO-5)
- ✓ Ability to apply knowledge for operating principles, programming, and use of some medical devices; (ELO-1, ELO-2)
- ✓ Ability to use and program using C +, Matlab, Python languages in designing smodel and system; (ELO-1, ELO-2)
- ✓ Ability to apply and build App for use on mobile phones/microcontroller hardware for medical device applications; (ELO-5, ELO-6, ELO-7, ELO-8)
- ✓ Ability to analyze and design medical equipment hardware models using IoTs and AI; (ELO-7, ELO-8, ELO-9).
- ✓ Ability to apply and build wireless connection systems for data transmission and equipment control; (ELO-1, ELO-7, ELO-8)
- ✓ Ability to work, research and develop within a team and between groups; (ELO-5)
- ✓ Ability to operate problems such as performing, testing, diagnosing, determining the cause, repairing, replacing components or products related to medical electronics; (ELO-8, ELO-9)

- ✓ Ability to calculate, design, build, and manage a finished system or product as optimally as possible; (ELO-4, ELO-8, ELO-9)
- ✓ Ability to create scientific working methods, have skills in thinking, analyzing and solving problems arising in reality; (ELO-4)

4.2. Attitude

- ✓ Having civic responsibility; The right professional attitude and ethics; Discipline and industrial manners; Ability to work, research in groups, good work ethic; (ELO-3)
- ✓ Having sufficient professional knowledge, social knowledge, law knowledge to gradually build a solid professional bravery; (ELO-3, ELO-7)
- ✓ Having responsibility for the profession, with a supportive connection at work with people, leadership at work. (ELO-5)

4.3. Communication and English level

- ✓ Communicating normally in English; (ELO-6)
- ✓ Reading and understanding technical documents in English in the biomedical engineering field. (ELO-6)

4.4. Learning and improving knownledge

- ✓ Having enough knowledge to study independently to continue research and learning at a higher level such as master or doctorate.

5. Blocks of knowledge

Name	Credits		
	Total	**Compulsion**	**Elective**
General knowledge	**62**	**58**	**04**
Political Education and General Laws	13	13	0
Humanities and Social Science	04	0	04
English	12	12	0
Mathematics and Natural Sciences	27	23	0
Informatics	03	03	0
Introduction to BME	03	03	0
Professional knowledge	**88**	**79**	**09**
Biomedical and Electronics Core	30	27	3
Biomedical and Electronics Advanced Core	9	9	0
Biomedical Electronics Specialization	17	11	6
Laboratories and Practices	21	21	0
Internship and Graduation Thesis	11	11	0
Total	**150**	**137**	**13**

5.1. Background knownledge

Students have knowledge of fundamental, electronic, digital systems, microprocessor engineering and systems as background for designing medical systems applied to humans.

5.2. Specialised knownledge

Students have theoretical and practical knowledge to be able to design medical electronic systems, familiarize with small models and modules related to medical equipment. Therefore, students can design practical models related to medical systems or operate and program on real medical machines at Labs. Moreover, students have the opportunity to exchange, visit and practice on medical equipment at companies or hospitals to learn, operate, repair and improve practical skills. In addition, students learn the rules and regulations, how to work, manage equipment, interact with customers, partners, patients and customers.

5.3. Graduation

After being fully equipped with theoretical and practical knowledge for 7 semesters, students do a big project called graduation thesis. In particular, the idea of this thesis will be a product based on the actual needs of the company, hospital or social needs. Therefore, the product must be designed with correct techniques and standards to be able to be applied in practice based on the process of understanding, analyzing, calculating and applying almost theoretical, practical and practical knowledge and skills learned to complete the product and report with evaluation and reasoning.

1. 6. Other information

6.1 Department information

- ✓ Assoc. Prof. Nguyen Thanh Hai, email address: nthai@hcmute.edu.vn, Cellphone: +84 906738806

6.2 Online information

- ✓ HCMUTE website: http://tuyensinh.hcmute.edu.vn/#/home
- ✓ FEEE website: http://feee.hcmute.edu.vn/
- ✓ Department website: http://feee.hcmute.edu.vn/Default.aspx?PageId=7e97839c-2e80-4699-8960-111e072dda67
- ✓ Department facebook: https://www.facebook.com/groups/ktysspkt
- ✓ Youtube channel: https://www.youtube.com/watch?v=1xN0B0XNmsE

7. **Programme curriculum**

8. **Blocks of knowledge**

Name	Credits		
	Total	**Compulsion**	**Elective**
General knowledge	**62**	**58**	**04**
Political Education and General Laws	13	13	0
Humanities and Social Science	04	0	04
English	12	12	0
Mathematics and Natural Sciences	27	23	0
Informatics	03	03	0
Introduction to BME	03	03	0
Professional knowledge	**88**	**79**	**09**
Biomedical and Electronics Core	30	27	3
Biomedical and Electronics Advanced Core	9	9	0
Biomedical Electronics Specialization	17	11	6
Laboratories and Practices	21	21	0
Internship and Graduation Thesis	11	11	0

9. **Programme Contents**

1	**General knowledge: 62 Credits**			
No.	**Course Prefix and Number**	**Course Title**	**Cr.**	**Note**
A1	**Political Education and General Laws**		**12**	
1	LLCT130105	Principles of Marxist-Leninism	3	
2	LLCT120205	Political Economics of Marxism and Leninism	2	
3	LLCT120405	Science socialism	2	
4	LLCT120314	Ho Chi Minh’s Ideology	2	
5	LLCT220514	History of Vietnamese communist party	2	
6	GELA220405	General Laws	2	
A2	**Informatics**		**3**	
1	CPRL130064	Program-C Language	3	
A3	**Introduction to BME**		**3**	
1	INBE130165	Introduction to BME	3	
A4	**Foreign Language**		**12**	
1	ENGL130137	English 1	3	
2	ENGL230237	English 2	3	
3	ENGL330337	English 3	3	

4	ENGL430437	English 4	3	
A5	**Humanities and Social Science (Select 02 of free elective courses)**		**4**	
1	GEEC220105	General Economics	2	
2	QMAN331606	Quality Management	2	
3	INMA220305	Introduction to Management	2	
4	INLO220405	Introduction to Logic	2	
5	IVNC320905	Vietnamese Culture	2	
6	INSO321005	Introduction to Sociology	2	
7	ENPS220591	Engineer Psychology	2	
8	SYTH220491	Systematic thinking	2	
9	LESK120190	Learning Skills	2	
10	PLSK120290	Planning Skill	2	
11	WOPS120390	Workplace Skills	2	
12	SRME530126	Scientific Research Methodology	2	
A6	**Mathematics and Natural Sciences**		**23**	
1	MATH130101	Calculus 1	3	
2	MATH130201	Calculus 2	3	
3	MATH130301	Calculus 3	3	
4	AMEE341944	Applied Mathematics for Electrical Engineers	4	
5	MATH131901	Mathematical statistics for engineers	3	
6	PHYS130102	Physics 1	3	
7	PHYS130202	Physics 2	2+1	
8	GCHE130603	General Chemistry	3	
A7	**Physical Education**		**5**	
1	PHED110513	Physical Education 1	1	
2	PHED110613	Physical Education 2	1	
3	PHED130715	Physical Education 3	3	
A8	**National Defense Education**		**165**	

B	**Professional knowledge: 88 credits**			
No.	**Course Prefix and Number**	**Course Title**	**Cr.**	**Note**
B1	**Biomedical and Electronics Core**		**27**	
1	ELCI140144	Electric Circuits	4	
2	BAEL340662	Basic Electronics	4	
3	DIGI330163	Digital Systems	3	

4	MICR330363	Microprocessor	3	
5	HUAN330265	Human and animal physiology and anatomy	3	
6	BISI340665	Biosignal processing	4	
7	HSBE330865	Biomedical Engineering Safety	3	
B2	**Elective Biomedical and Electronics Core (Select 01 course)**		**3**	
1	ELFI230344	Electromagnetic Field	3	
2	ITFA336064	Internet of Things: Foundations and Applications	3	
3	AIFA436864	Fundamentals and applications of AI	3	
4	APCA331363	Android programming in control applications	3	
5	SISY330164	Signals and Systems	3	
B3	**Biomedical and Electronics Advanced Core**		**9**	
1	MEDE330465	Biomedical Electronic Circuit Design	3	
2	DEMD330565	Biomedical Instrumentation	3	
3	TESO330765	Biomedical Sensor Technology	3	
4	BIME332265	Computer-Aided Design	3	
B4	**Biomedical and Electronics Specialisation**		**11**	
1	IMSY332065	Healthcare Information system	3	
2	BIIM330965	Bio-medical Image Processing	3	
3	MESY335565	Embedded Systems in Biomedical Engineering	3	
4	BUCO121465	Topics with Enterprises	2	
5	LEBU320026	Leadership and Entrepreneurship in Engineering		
B5	**Elective Biomedical and Electronics Advanced Core (Select 02 courses)**		**6**	
1	APME332365	Data Acquisition and Control Using Computer	3	
2	WITE332465	Wireless Technologies	3	
3	SPSU332565	Special Topic in Biomedical Engineering	3	
4	ECME332665	Engineering Challenges in Medicine	3	
5	MALE331063	Machine Learning	3	
6	BIMA332765	Biomaterials	3	
7	BITE332865	Biomedical Imaging Technology	3	
8	BIAP332965	Application of ultrasound and magnetism in biomedicine	3	

B6	**Elective Biomedical and Electronics Advanced Core from relative programmes (Select 02 courses)**			
1	INSK331663	Industrial skills	3	
2	PLCS330846	Programmable Logic Controller	3	
3	INRO331129	Industrial Robot	3	
4	SCDA430946	SCADA Systems	3	
5	ROTE430946	Robotics Engineering	3	
6	HCIN431979	Human-Computer Interaction	3	
7	APEN331329	Applied Programming in Engineering	3	
B5	**Massive Open Online Courses (MOOCs): Select courses for replacing the courses taught at classroom**			
1	LLCT220514	History of Vietnamese communist party		
2	GELA220405	General Laws		
3	LLCT130105	Principles of Marxist-Leninism		
4	INSO321005	Introduction to Sociology		
5	PRSK320705	Representation Skills		
6	MATH130101	Calculus 1		
7	MATH130201	Calculus 2		
8	MATH130301	Calculus 3		
9	CPRL130064	Program-C Language		
10	ELCI140144	Electric Circuits		
11	BAEL340662	Basic Electronics		
12	DIGI330163	Digital Systems		
13	SISY330164	Signals and Systems		
14	MATH132901	Applied Probability-Statistic		
B8	**Laboratories and Practices**		**21**	
1	ELPR320762	Basic Electronics Lab	2	
2	PRDI310263	Digital Systems Lab	1	
3	PRMI320463	Microprocessor Lab	2	
4	PRCD312663	Digital Electronic Circuit Design Lab	1	
5	MEPR321565	Biomedical Instrumentation Lab	2	
6	MEPR316165	Biomedical Embedded Systems Engineering Lab	1	

7	BIPR311665	Biosignal Signal Processing Lab	1	
8	TSEP321765	Biomedical Electronic Circuit Lab	2	
9	BIMP311865	Biomedical Image Processing Lab	1	
10	TSEP311965	Biomedical Sensors Technology Lab	1	
11	BSPR411965	Healthcare Information Systems Lab	1	
12	ELPR311065	Digital Electronics Project	1	
13	MIPR311165	Microprocessor Project	1	
14	CAPR411265	Capstone Project	1	
15	THEM426265	Thesis Topics	3	
B9	**Internship and Thesis**		**11**	
1	GRPR442065	Internship	4	
2	GRAD462165	Graduation Thesis	7	

C Teaching plan

The general courses arranged by GAPAO each semester				
No.	**Course Prefix and Number**	**Course Title**	**Cr.**	**Pre-requisite**
1	ENGL130137	English 1	3	
2	ENGL230237	English 2	3	
3	ENGL330337	English 3	3	
4	ENGL430437	English 4	3	
5	LLCT120205	Principles of Marxist-Leninism	2	
6	LLCT120405	Science socialism	2	
7	LLCT220514	History of Vietnamese communist party	2	
8	LLCT120314	Ho Chi Minh's Ideology	2	
9	GELA220405	General Laws	2	
10	PHED110513	Physical Education 1	1	
11	PHED130715	Physical Education 3	3	
	Total		**22**	
1st Semester				
No.	**Course Prefix and Number**	**Course Title**	**Cr.**	**Pre-requisite**
1	LLCT130105	Principles of Marxist-Leninism	3	
2	CPRL130064	Program-C Language	3	
3	MATH130101	Calculus 1	3	
4	INBE130165	Introduction to BME	3	
5	PHED110513	Physical Education 2	1	
	Total		**12**	
2nd Semester				
No.	**Course Prefix and Number**	**Course Title**	**Cr.**	**Pre-requisite**
1	MATH130201	Calculus 2	3	MATH130101
2	PHYS130102	Physics 1	3	
3	AMEE341944	Applied Mathematics for Electrical Engineers	4	MATH130201
4	MATH130401	Applied Probability –Statistics	3	
5	ELCI140144	Electric Circuits	4	MATH130101
	Total		**21**	
3rd Semester				
No.	**Course Prefix and Number**	**Course Title**	**Cr.**	**Pre-requisite**
1	PHYS130202	Physics 2	3	PHYS130102
2	MATH130301	Calculus 3	3	MATH130201
3	GCHE130603	General Chemistry	3	
4	DIGI330163	Digital Systems	3	BAEL340662
5	BAEL340662	Basic Electronics	4	
6	HUAN330265	Human and animal physiology and anatomy	3	
7	PHYS111202	Physics Lab-1	1	
	Total		**18**	
4th Semester				

No.	Course Prefix and Number	Course Title	Cr.	Pre-requisite
1	BISI340665	Bio-signal processing	4	SISY330164
2	MICR330363	Microprocessor	3	DIGI330163
3	MEDE330465	Biomedical Electronic Circuit Design	3	BAEL340662
4	PRDI310263	Digital Systems Lab	1	DIGI330163
5	TESO330765	Biomedical sensor technology	3	
6	ELPR320762	Basic Electronics Lab	2	BAEL340662
7	PHYS111302	Physics Lab-2	1	
8		**Elective Biomedical and Electronics Core (Select 01 course)**	3	
	Total		**21**	
5th Semester				
No.	**Course Prefix and Number**	**Course Title**	**Cr.**	**Pre-requisite**
1	BIIM330965	Biomedical image processing	3	BISI340665
2	BIPR311665	Bio-signal signal processing Lab	1	BISI340665
3	DEMD330565	Biomedical Instrumentation	3	
4	PRMI320463	Microprocessor Lab	2	MICR330363
5	PRCD312663	Digital Electronic Circuit Design Lab	1	DIGI330163
7	TSEP321765	Biomedical Electronic Circuit Lab	2	MEDE330565
8	ELPR311065	Digital- Electronics Project	1	BAEL340662 DIGI330163
9	MESY335565	Embedded Systems in Biomedical Engineering	3	MICR330363
10	TSEP311965	Biomedical Sensors Instrumentation Lab	1	MESY335565
11		Humanities-Social Sciences (Select 02 of free elective courses)	4	
	Total		**20**	
6th Semester				
No.	**Course Prefix and Number**	**Course Title**	**Cr.**	**Pre-requisite**
1	MIPR311165	Microprocessor Project	1	PRMI320463
2	HSBE330865	Health and Safety in Biomedical Engineering	3	
3	BIMP311865	Biomedical Image Processing Lab	1	BISI340665
4	BIME331965	Computer Aided Design		
5	MEPR321565	Biomedical Instrumentation Lab	2	DEMD330565
6	MEPR316165	Biomedical Embedded Systems Engineering Lab	1	**MESY335565**
7	IMSY332065	Healthcare information system	3	INBE130165
8		Specialised knowledge (Select 02 of free elective courses)	6	
	Total		**17**	
7th Semester				
No.	**Course Prefix and Number**	**Course Title**	**Cr.**	**Pre-requisite**
1	CAPR411265	Capstone Project	1	
2	BSPR411965	Healthcare Information Systems Lab	1	IMSY332065
3	GRPR442065	Internship	4	MIPR311165
4	BUCO121465	Topics with Enterprises	2	
5	LEBU320026	Leadership and Entrepreneurship in Engineering	2	

6	THEM426265	Thesis Topics	3	
	Total		**17**	
8th Semester				
No.	**Course Prefix and Number**	**Course Title**	**Cr.**	**Pre-requisite**
1	GRAD462165	Graduation Thesis	7	
	Total		**7**	