Vietnam National University – Ho Chi Minh City International University







SCHOOL OF BIOMEDICAL ENGINEERING

Undergraduate Program Handout



(Since Oct. 2017)



(Since Dec. 2015)

September 2023





Student name:	
Student ID:	
Class of:	
Orientation:	
Thesis Advisor:	

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BM003IU - Pre-thesis. Credits 1(0,1):	43
BM004IU - Thesis Research. Credits 10(0,10):	43
BM005IU - Statistics for Health Sciences. Credits 3(2,1):	43
BM007IU - Introduction to Biomedical Engineering. Credits 4(3,1):	43
BM008IU - Bioethics. Credits 3(3,0):	43





BM009IU - BME Capstone Design Course. Credits 4(3,1):	43
BM010IU - Biosignal Processing. Credits 4(3,1):	44
BM011IU - Engineering Challenges in Medicine I. Credits 3(3,0):	44
BM012IU - Engineering Challenges in Medicine II. Credits 3(3,0):	44
BM013IU - Entrepreneurship in Biomedical Engineering. Credits 3(3,0):	44
BM017IU – Medical Design. Credits 1(0,1):	44
BM020IU - Internship. Credits 3(0,3):	44
BM030IU - Machine Design. Credits 3(3,0):	44
BM033IU, BM070IU - Information Technology in the Health Care System & Laboratory. (4(3,1):	
BM050IU – Practice 1: Reverse Engineering. Credits 1(0,1):	
BM052IU – Practice 2: Electronic Design. Credits 1(0,1):	
BM058IU - Biomedical Image Processing. Credits 4(3,1):	
BM060IU,BM061IU - Digital Systems, Digital Systems Lab. Credits 4(3,1):	
BM062IU - Micro-electronic Devices. Credits 3(3,0):	
BM063IU - Micro-electronic Devices Laboratory. Credits 1(0,1):	
BM064IU - Applied Informatics. Credits 4(3,1):	
BM067IU – Practice 2: Animal Cells and Microbiologies. Credits 1(0,1):	
BM071IU – Computer-aided Diagnosis. Credits 4(3,1):	
BM072IU - Computational Model in Medicine. Credits 4(3,1):	
BM073IU - Medical Imaging. Credits 4(3,1):	
BM074IU - Brain-Computer Interface. Credits 4(3,1):	46
BM075IU, BM076IU - Biomedical Photonics & Biomedical Photonics Laboratory. Credits	
BM077IU - Pharmaceutical Engineering 1. Credits 4(3,1):	46
BM078IU - Pharmaceutical Engineering 2. Credits 4(3,1):	47
BM079IU - Principle of Pharmacokinetics. Credits 4(3,1):	47
BM080IU - Nanotechnology for Drug Delivery Systems. Credits 4(3,1):	47
BM081IU - Drug Delivery Systems. Credits 4(3,1):	47
BM082IU - Biomaterials. Credits 4(3,1):	47
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BM084IU - Biocompatibility and Biodegradation of Biomaterials. Credits 4(3,1):	47
BM085IU - Characterization and Properties of Biomaterials. Credits 4(3,1):	47
BM086IU - Methods and Process in Fabrication of Scaffold. Credits 4(3,1):	47
BM089IU - Electronic Devices for Biomedical Design. Credits 4(3,1):	47
BM090IU - Biology for BME. Credits 4(3,1):	48
BM091IU - Human Anatomy and Physiology. Credits 3(3,0):	48
BM092IU - Cell/Tissue - Biomaterial interaction. Credits 4(3,1):	48
BM093IU - Tissue Engineering I. Credits 4(3,1):	48
BM094IU - Principle of Clinical Tests and Instrumentation. Credits 4(3,1):	48
BM095IU - Medical Instrumentation. Credits 4(3,1):	48
BM096IU - AI for Healthcare. Credits 3(3,0):	48





BM0981U - Chemistry Laboratory for BME. Credits 1(1,0):	49
BM099IU - Stem Cell Technology. Credits 4(3,1):	49
BM100IU - Principles of Neuroengineering. Credits 4(3,1):	49
BM101IU - Mechanical Design and Manufacturing Processes in Biomedical Engineering. Ca 2(2,0):	
BM102IU - Mechanical Design and Manufacturing Processes in Biomedical Engineering La Credits 2(0,2):	
CH011IU - Chemistry for Engineers. Credits 3(3,0):	49
CH012IU - Chemistry Laboratory. Credits 1(0,1):	49
CH014IU - Chemistry for BME. Credits 3(3,0):	49
BM053IU, BM054IU - Principles of EE I, Principles of EE I Laboratory. Credits 4(3,1):	50
EN007IU - Writing AE1. Credits 2(2,0):	50
EN008IU - Listening AE1. Credits 2(2,0):	50
EN011IU - Writing AE2. Credits 2(2,0):	50
EN012IU - Speaking AE2. Credits 2(2,0):	50
MA001IU - Calculus 1. Credits 4(4,0):	50
MA003IU - Calculus 2. Credits 4(4,0):	50
MA023IU - Calculus 3. Credits 4(4,0):	51
MA024IU - Differential Equations. Credits 3(3,0):	51
PE008IU - Critical Thinking. Credits 3(3,0):	51
PH013IU - Physics 1. Credits 2(2,0):	51
PH014IU - Physics 2. Credits 2(2,0):	51
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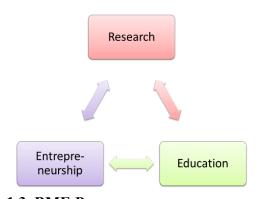
1.INTRODUCTION

1.1. What is Biomedical Engineering?

Biomedical Engineering is an emerging multidisciplinary field that involves the application of state-of-the-art technology to the creation of methodologies and devices for human welfare and for a better understanding of human biological processes. It includes the study of medical instrumentation, bioinformatics, biomechanics, regenerative medicine and biotechnology, and it requires expertise in applied and basic sciences as well as engineering.

1.2. History of the School of Biomedical Engineering

The Biomedical Engineering Department at International University (IU) of Vietnam National University in Ho Chi Minh City (VNU-HCM) was created in March 2009 by Professor Võ Văn Tới, Emeritus Professor at Tufts University, USA and a former Executive Director of the Vietnam Education Foundation (VEF), USA. He had been Department Chair until November 2018 when he was promoted to the University Vice-Provost to be in charge of the development of the Life and Health Science, Engineering and Technology for the University. In 2019, the BME Department became the School of BME. The current Dean is Associate Professor Nguyễn Thị Hiệp, graduated from SoonChunHyang University, Korea and the Vice-Dean is Associate Professor Vòng Bính Long, graduated from University of Tsukuba, Japan. School of BME has 2 Departments: Department of Medical Instrumentation (Chair is Associate Professor Phạm Thị Thu Hiền, graduated from National Cheng Kung University, Taiwan) and Department of Tissue Engineering and Regenerative Medicine (Chair is Dr. Hà Thị Thanh Hương, graduated from Stanford University, USA)



The vision of the BME School is to promote integrative **research**, **education** and **entrepreneurship** at the forefront of biomedical science and engineering.

The motto of our School is: *high quality, sustainability and usefulness*.

1.3. BME Programs

The School offers the following programs:

- 1. A 4.5-year Bachelor of Engineering (BE) degree. The first cohort entered in 2010 and up to this point in time more than 230 students have graduated.
- 2. Multiple undergraduate double degrees with other programs including Biotechnology, Chemistry, Data Science, Information Technology, Electronics and Telecommunication Engineering, and Control and Automation Engineering.
- 3. A 1.5-year Master of Engineering (ME) degree. The first cohort entered 2013 and up to this point in time, more than 20 students have graduated.
- 4. A combined 5.5-year Bachelor and Master (BS-MS) degree. The BS-MS program is currently having 25 enrolled students.
- 5. A 3-4 year Ph.D. degree. The Ph.D. program recruited total 11 students.





1.4. Program Educational Objectives

For the graduates of the Bachelor of Engineering in BME (BE-BME) program, the School aims towards three program educational objectives:

- Be successful in solving problems in a quantitative and systematic fashion, based on biomedical engineering knowledge and multidisciplinary perspectives;
- Continuously expand their knowledge, be creative and innovative in their contributions to the field of biomedical engineering;
- Perform in an ethical and professional manner; carry out this at the highest levels in public and private sectors.

1.5. Student Outcomes:

To realize the Program Educational Objectives, the School targets the following 07 outcomes for BME undergraduate students to achieve by their graduation. The student outcomes of the program follow the guidance recommended by ABET Accreditation Organization for a BE-BME program and demands of BME in Vietnam:

1.5.1. Industry knowledge:

- a. Outcome 1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. (1.1)
- b. Outcome 6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions. (1.2)

1.5.2. Professional skills and personal qualities:

- c. Outcome 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. (2.1)
- d. Outcome 7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies. (2.2)

1.5.3. Teamwork and communication skills:

- e. Outcome 3. an ability to communicate effectively with a range of audiences. (3.1)
- f. Outcome 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. (3.2)

1.5.4. Competency for professional practice:

g. Outcome 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 (4.1)

1.6. AUN Assessment:

In December 2015, the BE-BME program at IU was accredited by ASEAN University Network Quality Assurance (AUN-QA). This is the first and the only BME program in Vietnam that was accredited by AUN. Furthermore, this program obtained the highest score ever received by any programs in Vietnam that had been assessed by AUN and was placed second in AUN at that time.

AUN is a network of 30 top universities of 10 ASEAN countries. The AUN's strategic focus is built on those identified by ASEAN to facilitate regional cooperation.

1.7. ABET Accreditation

The BE-BME program has been accredited by ABET since October 2017, a recognized U.S.-based accreditor of college and university programs. ABET accreditation provides assurance that a college or university program meets the quality standards of the profession for which that program prepares graduates. Today, 4,005 programs at 793 colleges and universities in 32 countries have received ABET





accreditation. Students graduated from a program accredited by ABET will be well received by other universities as well as industries not only in the US but also in the world.

Because the BE-BME programs at IU obtained AUN-QA and ABET, BE-BME graduates have the privilege to be accepted to the BME Master's degree program with favorable conditions.

2. SCHOOL OF BME PERSONNEL AND LABORATORIES

Table 2.1. ADMINISTRATORS

Name	Position	Room
Ms. Nguyễn Thị Hiệp	Assoc. Prof., Ph.D., Dean of School	A1.412
Mr. Vòng Bính Long	Assoc. Prof. Ph.D., Vice Dean of School	A1.405
Ms. Phạm Thị Thu Hiền	Assoc. Prof., Ph.D., Chair of Dept. of Medical Instrumentation	A1.405
Ms. Hà Thị Thanh Hương	Ph.D., Chair of Dept. of Tissue Engineering and Regenerative Medicine	A1.405
Mr. Lê Ngọc Bích	Ph.D., Research and Graduate Affairs, Academic	A1.405
WII. Le Ngọc Bien	Advisor of K23	A1.403
Ms. Nguyễn Tấn Như	Ph.D., Student Activities Affairs	A1.408
Mr. Nguyễn Thành Quả	En Thành QuảPh.D., Head of Labratories, Dept. Of Medical Instrumentation	
Mr. Trần Lê Giang	Ph.D., Academic Assistant	LA1.404
Ms. Từ Thị Tuyết Nga	B.S., Administration Secretary	A1.405
Ms. Nguyễn Hoàng Thùy Khanh	B.A., General Secretary	A1.405
Ms. Võ Hồng Phúc	MS., Head of Laboratories, Dept. Of Tissue Engineering and Regenerative Medicine	LA1.404

Table 2.2. FACULTY

Name Title		Orientation	Room
Ms. Nguyễn Thị Hiệp	Assoc. Professor	Biomaterials Regenerative Medicine	A1.412
Ms. Phạm Thị Thu Hiền	Assoc. Professor	Medical Photonics	A1.405
Mr. Vòng Bính Long	Assoc. Professor	Pharmaceutical Engineering	A1.405
Mr. Huỳnh Chấn Khôn	Ph.D.	Tissue Engineering, Lab-on-a-chip	A1.405
Ms. Hà Thị Thanh Hương	Ph.D.	Neuro-Engineering	A1.405
Mr. Trương Phước Long	PhD.	Lab-on-a-chip	A1.405
Ms. Ngô Thị Lụa	Ph.D.	Signal and Image Processing	A1.405





Mr. Nguyễn Thành Quả	PhD.	Lab-on-a-chip	A1.405
Mr. Lê Ngọc Bích	PhD.	Medical Instrumentation	A1.405
Mr. Trần Lê Giang	Ph.D.	Medical Instrumentation	A1.405
Mr. Đoàn Ngọc Hoan	Ph.D.	Biomaterials	A1.405
Mr. Nguyễn Tấn Như	Ph.D.	AI and Digital Twin for Healthcare	A1.408

Table 2.3. STAFFS

Name	Position	Orientation	Room
Mr. Nguyễn Lê Ý	M.E., Lab Technician	Medical Instrumentation	LA1.108
Ms. Đặng Ngọc Thảo Nhi	M.E., Lab Technician	Regenerative Medicine	LA1.406
Ms. Nguyễn Thị Thanh Ngọc	M.S., Lab Technician	Regenerative Medicine	LA1.406
Mr. Trần Ngọc Việt	M.E., Lab Technician	Medical Instrumentation	LA1.408
Mrs. Võ Hồng Phúc	MS., Lab Technician	Regenerative Medicine	LA1.404
Ms. Lê Thị Thủy Tiên	B.E., Teaching Assistant	Medical Instrumentation	LA1.408
Mr. Lương Đại Tín	B.E., Teaching Assistant, Lab Technician	Regenerative Medicine	LA1.406
Ms. Phan Thị Thanh Tâm	B.S., Lab Technician	Regenerative Medicine	LA1.404
Ms.Nguyễn Thị Thúy Kiều	M.Sc.,Lab Technician	Regenerative Medicine	LA1.404
Ms. Huỳnh Thị Thanh Trúc	B.E., Lab Technician	Medical Instrumentation	LA1.404
Ms. Nguyễn Thị Thu Hà B.Sc., Lab Technician		Pharmaceutical Engineering	LA1.407
Ms. Lê Trần Mỹ An	B.E., Lab Technician	Regenerative Medicine	LA1.404
Ms. Nguyện Thị Phương Thảo B.E., Lab Technician		Regenerative Medicine	LA1.404





Table 2.4. MEDICAL INSTRUMENTATION LABORATORIES

Name	Person in charge	Location	
Medical Photonics	Phạm Thị Thu Hiền	LA1.108	
Lab-on-a-chip and Biosensors	Trương Phước Long	LA1.210	
R&D Medical Start-up	Trần Lê Giang	LA1.404	
Medical Instrumentation Design	Lê Ngọc Bích	LA1.408	
Clinical Engineering	Hà Thị Thanh Hương	LA1.513	

Table 2.5. TISSUE ENGINEERING AND REGENERATIVE MEDICINE LABORATORIES

Tissue Engineering and Regenerative Medicine	Nguyễn Thị Hiệp	LA1.406
Pharmaceutical Engineering	Vòng Bính Long	LA1.407
SEM and Cell culture	Nguyễn Thị Thúy Kiều	LA1.413
Service Equipment	Võ Hồng Phúc	LA1.410A
Biochemical Lab	Nguyễn Thị Thanh Ngọc	LA2.413
Animal Lab	Nguyễn Thị Thanh Ngọc	Aqua Lab
Microbiology Lab	Phan Thị Thanh Tâm	P109
Production Pilot	Đoàn Ngọc Hoan	P111





Table 2.6. Council of School

Name	Position		
Assoc. Prof., Ph.D., Nguyễn Thị Hiệp	Dean of School, Chair of Council		
Ph.D., Hà Thị Thanh Hương	Chair of Dept. of Tissue Engineering and Regenerative Medicine. Secretary of Council		
Assoc. Prof., Ph.D., Vòng Bính Long	Vice Dean of School. Member of Council		
Professor., Ph.D., Mr. Võ Văn Tới	University Vice-Provost. Member of Council		
Ph.D., Phạm Thị Thu Hiền	Chair of Dept. of Medical Instrumentation Member of Council		
Ph.D., Huỳnh Chấn Khôn	Lecturer. Member of Council		
Ph.D., Ngô Thị Lụa	Lecturer. Member of Council		
Ph.D., Trịnh Như Thùy	Lecturer. Member of Council		
Ph.D., Trương Phước Long	Lecturer. Member of Council		
Ph.D., Nguyễn Thành Quả	Lecturer. Member of Council		
Ph.D., Lê Ngọc Bích	Lecturer. Member of Council		
Ph.D., Trần Lê Giang	Lecturer. Member of Council		
Assoc. Prof., Ph.D., Lê Hoài Quốc	Chairman of Ho Chi Minh City Automation Association. Member of Council		
Ms. Nguyễn Thị Xuân Nhạn	President of AMPHARCO U.S.A Pharmaceutical Joint Stock Company. Member of Council		





3. STUDENT ACTIVITIES AND CLUBS

The School of Biomedical Engineering has a strong association between academic and student activities. There are plenty of opportunities to attend throughout the year, with students encouraged to get involved in unions and clubs below:

BME Youth Union

As an affiliated unit of the International University Youth Union, the purpose of the BME Youth Union is to be a place of solidarity, gathering young people, students, and union members who are working and studying at BME. BME Youth Union is aiming at supporting the School in ideological and moral education through movement activities, and extracurricular activities for students and union members. BME Youth Union is the core force in the development of potential members for the Vietnam Communist Party.

BME Student Union

As an affiliated unit of the International University Student Union, the BME Student Union is a close friend of biomedical engineering students during their university life. Every year, BME Student Union organizes a variety of student activities from culture - art, sports, volunteering, academic, and integration through 3 affiliated clubs.

BME Musketeers

This is a club belonging to the Student Union of the School of Biomedical Engineering. The club was established to connect the school with alumni, high schools, and companies in the biomedical industry. The regular activities of the club are the organization of academic seminars, student support counseling sessions, and the development of media content.

BME Innovation Club

This is a club belonging to the Student Union of the School of Biomedical Engineering. The purpose of the club is to create a playground to encourage students to develop new research projects that society needs in the biomedical field. The BME Innovation Contest is the main activity of the club, combined with technical seminars and especially entrepreneurship skills training sessions.

BME Sports Club

This is a club belonging to the Student Union of the School of Biomedical Engineering. The purpose of the club is to create a playground that encourages students to practice sports through practical activities and friendly competitions. Besides, every year the club also organizes competitions for students such as football, basketball, and checkers.





4. READ THIS PART BEFORE PERUSING THE REST OF THIS HANDOUT

Complete information of the BE-BME program is described in detail in the document "BME Academic Curriculum", disseminated on the School website bme.hcmiu.edu.vn under the menu Education-Undergraduate. This present handout summarizes important information about the BE-BME curriculum to help academic advisors and students to plan and keep track of the students' progress. It is also disseminated on the same website above. It is edited in a handy format and is very personal. Students must take it alongside at all time, especially when he/she meets and discusses with the academic advisor. This handout is divided into different sections:

- 1. **BME Undergraduate Course List:** To keep track of the breadth and depth of the program, the courses which have common goals are regrouped into clusters. Each course is listed with its code, the semester it is offered, the courses required before taking it (pre-requisite), its outcomes according to ABET, etc. By perusing this part, students will know the courses they will take during their 4.5 years of study and can plan ahead of time.
- 2. **Roadmap of BME Curriculum:** This chart highlights a typical sequential path of the courses of the program semester per semester. This information allows students to picture the relationship among the courses in the timing order. Note that the curriculum is credit-based, i.e., students can choose the courses to take for each semester; therefore they can build their own roadmap after consulting their academic advisors. The regular duration of the BE-BME program is 4.5 years. It is important to observe this duration. With special permission of IU administration, this time can be extended up to 6.5 years maximum.
- 3. **Program Orientation:** This part lists all orientation of the program and describes their goals, thus allowing students to determine the most interesting one for them.
- 4. **Learning:** This chart lists all courses a typical student will take based on the level of English determined at the Placement Test this student took when he/she was admitted to the University such as AE1, IE2, IE1, and IE0. This allows the students to plan specific courses they have to take semester by semester for the entire 4.5 years and adjust, if necessary.
- 5. **BME Undergraduate Program's Degree Checklist:** This table lists all the courses a student has taken. This is a very important document. Students must keep it updated and show to the academic advisor before they register for courses of the following semester so that the advisor can help students to select appropriate courses according to their progress.
- 6. **Requirements for graduation and academic awards:** This part helps students check their fulfillment to all requirements for graduation and conditions for awards.
- 7. **Advisor's Comments:** This part records the advisor's comments and recommendations to student's performance for each semester.
- 8. **Course Descriptions:** This part lists all courses of the program in an alphabetical order (based on their codes) and briefly describes their contents.

Note: The information in this handout can be changed. Therefore, please check with your academic advisor for more updated information.





5. BME UNDERGRADUATE COURSE LIST

Table 5.1: BME Program Checklist for the Class of 2023

			Subject			Credits		
No.	Subject ID	Vietnamese	English	Subject type	Total	Lecture	Lab	Laboratory (**)
I	Basic	l	l	<u> </u>	49	47	2	
I.I	Political and	Social Cluster			17	17	0	
1	PE015IU	Triết học Mác- Lênin	Philosophy of Marxism and Leninism	Bắt buộc	3	3	0	
2	PE016IU	Kinh tế chính trị Mác-Lênin	Political economics of Marxism and Leninism	Bắt buộc	2	2	0	
3	PE017IU	Chủ nghĩa Xã hội khoa học	Scientific socialism	Bắt buộc	2	2	0	
4	PE018IU	Lịch sử Đảng Cộng sản Việt Nam	History of Vietnamese Communist Party	Bắt buộc	2	2	0	
5	PE019IU	Tư tưởng Hồ Chí Minh	Ho Chi Minh's Thoughts	Bắt buộc	2	2	0	
6	PE008IU	Tư duy phân tích	Critical Thinking	Bắt buộc	3	3	0	
7	PE021IU	Pháp luật đại cương	General Law	Bắt buộc	3	3	0	
I.II		ce – Humanity –			0	0	0	
I.III	Academic E		· 		8	8	0	
8	EN007IU	Tiếng Anh học thuật 1 - Viết	Writing AE1.	Bắt buộc	2	2	0	
9	EN008IU	Tiếng Anh học thuật 1 – Nghe	Listening AE1	Bắt buộc	2	2	0	
10	EN011IU	Tiếng Anh học thuật 2 - Viết	Writing AE2	Bắt buộc	2	2	0	
11	EN012IU	Tiếng Anh học thuật 2 – Nói	Speaking AE2	Bắt buộc	2	2	0	
I.IV	Calculus – I	nformatic – Natu	ral Science Cluster		24	22	2	
12	MA001IU	Toán 1	Calculus 1	Bắt buộc	4	4	0	-
13	MA003IU	Toán 2	Calculus 2	Bắt buộc	4	4	0	-
14	MA023IU	Toán 3	Calculus 3	Bắt buộc	4	4	0	-
15	MA024IU	Phương trình vi phân	Differential Equations	Bắt buộc	4	3	1	-
16	PH013IU	Lý 1	Physics 1	Bắt buộc	2	2	0	-
17	PH014IU	Lý 2	Physics 2	Bắt buộc	2	2	0	-
18	CH011IU	Hóa học cho kỹ sư	Chemistry for Engineers	Bắt buộc	3	3	0	-





19	CH012IU	Thực hành hóa	Chemistry	Bắt	1	0	1	ВТ
I.V	Economics	học	Laboratory	buộc	0	0	0	
I.VI	Physical Tra	aining			$6(\theta)^*$	0	0	
20	PT001IU	Giáo dục thể chất 1	Physical Training 1	Bắt buộc	3(0)*	0	3	-
21	PT002IU	Giáo dục thể chất 2	Physical Training 2	Bắt buộc	3(0)*	0	3	-
I.VII	Military Tra	aining				Certificate		
II	Foundation	Courses	T		36	28	8	
22	BM007IU	Kỹ thuật Y sinh đại cương	Introduction to Biomedical Engineering	Bắt buộc	4	3	1	LA1.408
23	CH014IU	Hóa học cho Kỹ thuật Y Sinh	Chemistry for BME	Bắt buộc	3	3	0	-
24	BM098IU	Thực hành Hóa học cho Kỹ thuật Y Sinh	Chemistry for BME Laboratory	Bắt buộc	1	0	1	LA1.407
25	BM090IU	Sinh học cho Kỹ Thuật Y Sinh	Biology for BME	Bắt buộc	4	3	1	LA1.406
26	BM053IU	Nguyên lý điện trong kỹ thuật y sinh	Principles of Electricity in Biomedical Engineering	Bắt buộc	3	3	0	-
27	BM054IU	Thực hành Nguyên lý điện trong kỹ thuật y sinh	Principles of Electricity in Biomedical Engineering Lab	Bắt buộc	1	0	1	LA2.201
28	BM030IU	Thiết kế máy cơ khí	Machine Design	Bắt buộc	3	3	0	
29	BM064IU	Tin học ứng dụng	Applied Informatics	Bắt buộc	4	3	1	IT
30	BM096IU	Trí tuệ nhân tạo trong y tế	AI for Healthcare	Bắt buộc	3	3	0	LA1.513
31	BM101IU	Phương pháp thiết kế và chế tạo cơ khí trong kỹ thuật y sinh	Mechanical design and manufacturing processes in biomedical engineering	Bắt buộc	2	2	0	-
32	BM102IU	Thực hành thiết kế và chế tạo cơ khí trong kỹ thuật y sinh	Mechanical design and manufacturing processes in biomedical engineering Lab	Bắt buộc	2	0	2	LA1.404
33	BM005IU	Thống kê trong khoa học sức khỏe	Statistics for Health Science	Bắt buộc	3	2	1	-
34	BM091IU	Giải phẫu và sinh lý người	Human Anatomy and Physiology	Bắt buộc	3	3	0	-
III	Concentrati	on Cluster			45	36	9	





35	BM008IU	Y đức	Bioethics	Bắt buộc	3	3	0	
36	BM082IU	Vật liệu sinh học	Biomaterials	Bắt buộc	4	3	1	LA1.406
37	BM009IU	Thiết kế thượng đỉnh trong Kỹ thuật Y Sinh	BME Capstone Design	Bắt buộc	4	3	1	LA1.408
38	BM011IU	Thách thức kỹ thuật trong Y khoa 1	Engineering Challenges in Medicine I	Bắt buộc	3	3	0	-
39	BM013IU	Kinh thầu trong Kỹ thuật Y Sinh	Entrepreneurship in Biomedical Engineering	Bắt buộc	3	3	0	-
40	BM068IU	Đồ án 1	Project 1	Bắt buộc	1	0	1	-
41	BM003IU	Đồ án chuẩn bị Luận văn tốt nghiệp	Pre-Thesis	Bắt buộc	1	0	1	-
42	BMIU	Môn tự chọn chuyên ngành 1	Technical Electives 1 (**)	Tự chọn	4	3	1	-
43	BMIU	Môn tự chọn chuyên ngành 2	Technical Electives 2 (**)	Tự chọn	4	3	1	-
44	BMIU	Môn tự chọn chuyên ngành 3	Technical Electives 3 (**)	Tự chọn	4	3	1	-
45	BMIU	Môn tự chọn chuyên ngành 4	Technical Electives 4 (**)	Tự chọn	4	3	1	-
46	BMIU	Môn tự chọn chuyên ngành 5	Technical Electives 5 (**)	Tự chọn	4	3	1	-
47	BMIU	Môn tự chọn chuyên ngành 6	Technical Electives 6 (**)	Tự chọn	3	3	0	-
48	BMIU	Môn tự chọn chuyên ngành 7	Technical Electives 7 (**)	Tự chọn	3	3	0	-
IV	Free Electiv	e Cluster			3	3	0	
49	IU	Môn tự chọn	Free Electives (***)		3	3	0	
V	Internship	, Thesis			18	0	18	
50	BM050IU	Thực hành 1: Kỹ thuật đảo ngược	Practice 1: Reverse Engineering	Bắt buộc	1	0	1	-
51	BM067IU	Thực hành 2: Tế bào động vật và vi sinh vật	Practice 2: Animal Cells and Microbiologies	Bắt buộc	1	0	1	-
52	BM052IU	Thực hành 3: Thiết kế mạch điện	Practice 3: Electronic Design	Bắt buộc	1	0	1	-





53	BM017IU	Thiết kế y tế	Medical Design	Bắt buộc	1	0	1	-
54	BM069IU	Đồ án 2	Project 2	Bắt buộc	1	0	1	-
55	BM020IU	Thực tập	Internship	Bắt buộc	3	0	3	-
56	BM004IU	Luận văn tốt nghiệp	Thesis (#)	Bắt buộc	10	0	10	
	Tổng số (tín chỉ)				151	-	-	

*Note:

- -(*): Physical Training subject: It has 6 credits but these credits are not included in the total accumulated credits of the undergraduate program.
- -(**) Technical Electives courses show on the list below (**Table 5.2**), students take Technical Electives courses to depend on their major.
- -(***) Free Electives can be any subjects taken by International University. It must have to code subjects "xxxxxIU".
- -(#) You must have to a minimum of 127 accumulated credits and must qualify English output certificate.

The number of credits in math-basic science is 35, engineering is 90, other is 26 (as required by ABET, a minimum number of credits in math-basic science and engineering, respectively are 30 and 45).





Table 5.2: List of Technical Electives for Major Orientation

DEPARTMENT OF REGENERATIVE MEDICINE AND TISSUE ENGINEERING						
Technical Elective	Tissue Engineering and Regenerative Medicine	Pharmaceutical Engineering				
Technical Elective 1	Methods and Process in Fabrication of Scaffold (BM086IU)	Pharmaceutical Engineering 1 (BM077IU)				
Technical Elective 2	Stem Cell Technology (BM099IU)	Nanotechnology for Drug Delivery Systems (BM080IU)				
Technical Elective 3	Applications of Biomaterials in Regenerative Medicine (BM083IU)	Pharmaceutical Engineering 2 (BM078IU)				
Technical Electives 4	Cell/Tissue - Biomaterial Interaction (BM092IU)	Principle of Pharmacokinetics (BM079IU)				
Technical Elective 5,6 (Choose 2 subject in list • Principles of Clinical Test and Instrumentation (BM094IU) • Pharmaceutical Engineering 1 (BM077IU) • Nanotechnology for Drug Delivery Systems (BM080IU) • Pharmaceutical Engineering 2 (BM078IU) • Principle of Pharmacokinetics (BM079IU)		 Principles of Clinical Test and Instrumentation (BM094IU) Stem Cell Technology (BM099IU) Cell/Tissue - Biomaterial Interaction (BM092IU) Methods and Process in Fabrication of Scaffold (BM086IU) Applications of Biomaterials in Regenerative Medicine (BM083IU) Drug delivery system (BM081IU) 				
Technical Elective 7	Can choose any technical elective take	n by school of Biomedical Engineering				
	DEPARTMENT OF MEDICAL INS	STRUMENTATION				
Technical Elective	Medical Instrumentation	Biomedical Signal and Image Processing				
Technical Elective 1	Electronic Devices for Bion	medical Design (BM089IU)				
Technical Elective 2	Medical Instrumer	ntation (BM095IU)				
Technical Elective 3	Digital Systems (BM060IU) + Digital Systems Lab (BM061IU)	Biosignal Processing (BM010IU)				
Technical Elective 4, 5,6 (choose 3 subjects in list)	 Micro-electronic Devices (BM062IU) Medical Imaging (BM073IU) Biomedical Photonics (BM075IU) + Biomedical Photonics Lab (BM076IU) Information Technology in the Health Care System (BM033IU) + Information Technology in the Health Care System Lab (BM070IU) Principle of Clinical tests and Instrumentation (BM094IU) 	 Biomedical Image Processing (BM058IU) Computer Aided Diagnosis (BM071IU) Brain - Computer Interface (BM074IU) Principles of Neuroengineering (BM100IU) 				
Technical Elective 7	Technical Can choose any Technical Elective taken by School of Biomedical					

^{*}Each student following the Orientation of Regenerative Medicine, Pharmaceutical Engineering, Medical Devices, and Biomedical Image Signal Processing needs to accumulate all 7 Technical Electives subjects according to the instructions in the table above.



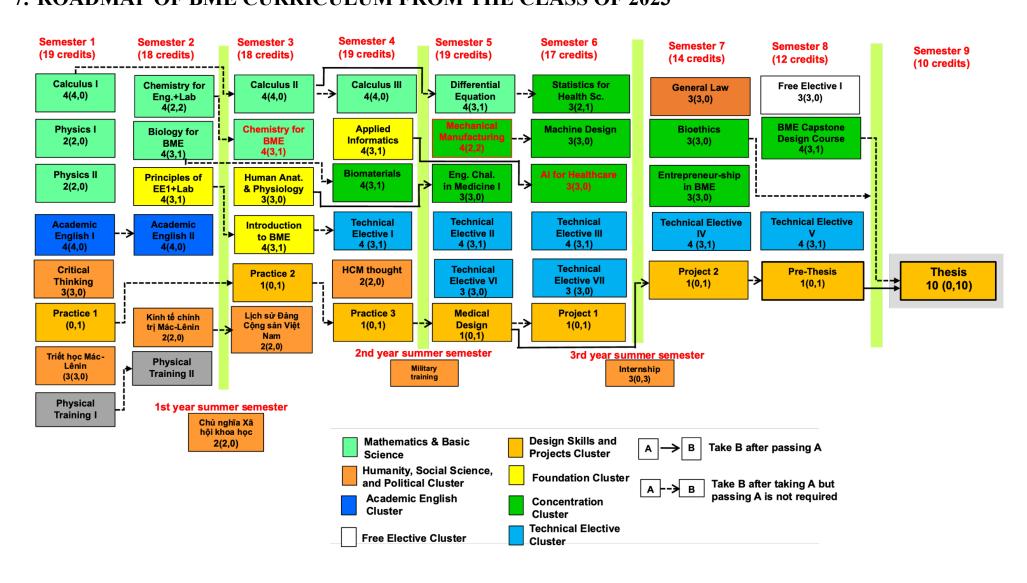


6. YOUR NOTES



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7. ROADMAP OF BME CURRICULUM FROM THE CLASS OF 2023







8. PROGRAM ORIENTATION

The BME program consists of 4 main orientation and

- Medical Instrumentation focusing on the telemedicine, and the design of homecare
 devices for outpatients and advanced medical equipment providing rapid, automated and
 reliable diagnostics for healthcare professionals to satisfy the great and urgent needs of
 the country, and to bring synergy between traditional engineering technologies, the life
 sciences and medicine.
- **2.** Biomedical Signal and Image Processing focusing on the applications of medical devices and developments of new research methodologies and algorithms to investigate human biological processes and provide an early detection of diseases.
- **3.** *Pharmaceutical Engineering* focusing on the investigations of the mechanism of drug delivery using nanotechnology to enhance the efficacy of the treatment and the imaging diagnostics as well as the development of new drug delivery formulations and devices.
- **4.** *Tissue Engineering and Regenerative in Medicine* focusing on the development of new biological and bioinductive materials, and the use of stem cells to repair or replace damaged tissues and organs and to use in biological implants.

and 02 developing orientation:

- **5.** Entrepreneurship in Biomedical Engineering focusing on the developments of clinical engineering and practice of effective methods to bring into the market medical devices newly developed in academic laboratories, to build a medical device industry appropriate for Vietnam and developing countries, and to manage healthcare settings.
- **6.** *Lab-on-a-chip and Biosensors* focusing on the design and fabrication of lab-on-a-chip devices and organ-on-a-chip systems in combination with biosensors that are applicable in point-of-care, automatic diagnostics and human-disease models on a chip.

Notes:

- a. During the first 2 years all students take the same courses; from the 3rd year students choose their own orientation and take related technical elective courses (**Table 4**).
- b. For a student, to know which orientation is appropriate for you, discuss with your academic advisor, other faculty members and senior students. Visit different labs in the School of Biomedical Engineering on your own to see what people are doing.
- c. In the BME curriculum, Project 1 and Project 2 courses are designed for students to explore the nature of those orientation. These courses are project-based and individual, and taught by instructors of different orientation. Therefore, after taking these courses a student may be able to identify the appropriate orientation and the instructor for the prethesis and thesis. These courses can be taken simultaneously in the same semester. However, the topic in each course must be different.
- d. For each orientation, students can take up to 9 courses: 7 technical electives and 1 free elective course. These courses will prepare students to do the pre-thesis and thesis works in this orientation. Hence, it is advisable for a student to identify his/her thesis advisor at an early stage. This advisor will then help students identify appropriate courses to be taken.





9. LEARNING SCHEDULES

When a student is first admitted to a program at IU, he/she is required to indicate his/her level of English proficiency. Students can show proof of an English proficiency exam taken no later than 2 years or take an English placement test administered by IU (Note: this requirement is not applied to students who graduated from high school whose educational program is in English). Depending on the obtained scores a student is placed into one of 5 groups:

- AE1 group: Students take Academic English 1 course and courses of the BE-BME program in their 1st semester.
- IE0, IE1, IE2 group: Students take Intensive English course and begins with the corresponding course (IE0/ IE1/ IE2).

The following tables show the typical roadmaps for students of each group.

Table 9.1: Learning schedule for BME program –AE1 group

Course code	Course name	Credits				
1 st Semester						
MA001IU	Calculus 1	4				
PH013IU	Physics 1	2				
PH014IU	Physics 2	2				
EN007IU	Writing AE1.	2				
EN008IU	Listening AE1	2				
BM050IU	Practice 1: Reverse Engineering	1				
PE015IU	Philosophy of Marxism and Leninism	3				
PE008IU	Critical Thinking	3				
PT001IU	Physical Training 1	3(0)				
Credits		19(22)*				
Accumulated credit	s	19				
	2 nd Semester					
CH011IU	Chemistry for Engineers	3				
CH012IU	Chemistry Laboratory	1				
BM090IU	Biology for BME	4				
EE051IU	Principles of EE1	3				
EE052IU	Principles of EE1 Laboratory	1				
EN011IU	Writing AE2	2				
EN012IU	Speaking AE2	2				





PE016IU	Political economics of Marxism and Leninism	2
PT002IU	Physical Training 2	3(0)1
Credits		18(21)*
Accumulated cred	its	37
	Summer semester	
PE017IU	Scientific socialism	2
Credits		2
Accumulated cred	its	39
	3 rd Semester	
MA003IU	Calculus 2	4
CH014IU	Chemistry for BME	3
BM098IU	Chemistry for BME Laboratory	1
BM091IU	Human Anatomy and Physiology	3
BM007IU	Introduction to Biomedical Engineering	4
BM067IU	Practice 2: Animal Cells and Microbiologies	1
PE018IU	History of Vietnamese Communist Party	2
Credits		18
Accumulated cred	its	57
	4 th Semester	
MA023IU	Calculus 3	4
BM064IU	Applied Informatics	4
BM082IU	Biomaterials	4
BMIU	Technical Electives 1	4
PE019IU	Ho Chi Minh's Thoughts	2
BM052IU	Practice 3: Electronic Design	1
Credits	19	
Accumulated cred	76	
	Summer semester	
	Military Training	0





BM102IU	Mechanical design and manufacturing processes in biomedical engineering Lab	2				
Credits	Credits					
Accumulated credit	s	78				
	5 th Semester					
MA024IU	Differential Equations	4				
BM101IU	Mechanical design and manufacturing processes in biomedical engineering	2				
BM011IU	Engineering Challenges in Medicine I	3				
BM017IU	Medical Design	1				
BMIU	Technical Electives 2	4				
BMIU	Technical Electives 6	3				
Credits		17				
Accumulated credit	s	95				
	6 th Semester					
BM005IU	Statistics for Health Science	3				
BM030IU	Machine Design	3				
BM096IU	AI for Healthcare	3				
BM068IU	Project 1	1				
BMIU	Technical Electives 3	4				
BMIU	Technical Electives 7	3				
Credits		17				
Accumulated credit	s	112				
	Summer semester					
BM020IU	Internship	3				
Credits	3					
Accumulated credit	115					
	7 th Semester					
BM008IU	Bioethics	3				
BM013IU	Entrepreneurship in Biomedical Engineering	3				
BMIU	Technical Electives 4	4				





BM069IU	Project 2	1
Credits		11
Accumulated credit	rs ·	126
	8 th Semester	
IU	Free elective	3
BM009IU	BME Capstone Design	4
BM003IU	Pre-Thesis	1
BMIU	Technical Electives 5	4
Credits		12
Accumulated credit	es s	138
	Summer semester	
PE021IU	General Law	3
Credits		3
Accumulated credit	es s	141
	9 th Semester	
BM004IU	Thesis	10
Credits		10
Accumulated credit	151	
Total Credits	151	

Note: * The IE0/1/2 courses and physical training are not take into account of accumulated credits

Table 9.2: Learning schedule for BME program –IE2 group

Course code	Course name	Credits			
1st Semester					
ENTP02	IE2	0(13)			
MA001IU	Calculus 1	4			
PT001IU	Physical Training 1	0(3)			
BM050IU	Practice 1: Reverse Engineering	1			
Credits	5(21)*				
Accumulated cred	5				
2 nd Semester					





DHOISHI	1	_
PH013IU	Physics 1	2
PH014IU	Physics 2	2
EN007IU	Writing AE1.	2
EN008IU	Listening AE1	2
PE015IU	Philosophy of Marxism and Leninism	3
PE008IU	Critical Thinking	3
PE016IU	Kinh tế chính trị Mác-Lênin	2
PT002IU	Physical Training 2	3(0)1
Credits		16
Accumulated cre	dits	21
	Summer semester	
PE017IU	Scientific socialism	2
Credits		2
Accumulated cre	dits	23
	3 rd Semester	
CH011IU	Chemistry for Engineers	3
CH012IU	Chemistry Laboratory	1
BM090IU	Biology for BME	4
EE051IU	Principles of EE1	3
EE052IU	Principles of EE1 Laboratory	1
EN011IU	Writing AE2	2
EN012IU	Speaking AE2	2
BM067IU	Practice 2: Animal Cells and Microbiologies	1
PE018IU	History of Vietnamese Communist Party	2
Credits	19	
Accumulated cre	42	
	4 th Semester	
MA003IU	Calculus 2	4
CH014IU	Chemistry for BME	3
BM098IU	Chemistry for BME Laboratory	1
		· · · · · · · · · · · · · · · · · · ·





BM091IU	Human Anatomy and Physiology	3
BM007IU	Introduction to Biomedical Engineering	4
PE019IU	Ho Chi Minh's Thoughts	2
BM052IU	Practice 3: Electronic Design	1
Credits		18
Accumulated cred	its	60
	Summer semester	
	Military Training	0
BM102IU	Mechanical design and manufacturing	2
B1/11 (21)	processes in biomedical engineering Lab Credits	
	Creaus	2
	Accumulated credits	62
	5 th Semester	
MA023IU	Calculus 3	4
BM064IU	Applied Informatics	4
BM082IU	Biomaterials	4
BMIU	Technical Electives 1	4
BM017IU	Medical Design	1
BM101IU	Mechanical design and manufacturing processes in biomedical engineering	2
Credits		19
Accumulated cre	edits	81
	6 th Semester	
MA024IU	Differential Equations	4
BM011IU	Engineering Challenges in Medicine I	3
BMIU	Technical Electives 2	4
BMIU	Technical Electives 6	3
BM068IU	Project 1	1
BM005IU	Statistics for Health Science	3
Credits	18	
Accumulated cre	99	





Summer semester		
BM020IU	Internship	3
Credits		3
Accumulated credits		102
	7 th Semester	
BM030IU	Machine Design	3
BM096IU	AI for Healthcare	3
BMIU	Technical Electives 3	4
BMIU	Technical Electives 7	3
BM069IU	Project 2	1
BM008IU	Bioethics	3
Credits		17
Accumulated cre	dits	119
	8 th Semester	
BMIU	Technical Electives 4	4
BM013IU	Entrepreneurship in Biomedical Engineering	3
IU	Free elective	3
BM009IU	BME Capstone Design	4
BM003IU	Pre-Thesis	1
BMIU	Technical Electives 5	4
Credits		19
Accumulated cre	dits	138
	Summer semester	
PE021IU	General Law	3
Credits		3
Accumulated credits		141
	9th Semester	
BM004IU	Thesis	10
Credits		10





Accumulated credits	151
Total Credits	151

Note: * The IE0/1/2 courses and physical training are not take into account of accumulated credits

Table 9.3: Learning schedule for BME program –IE1 group			
Course code	Course name	Credits	
1 st Semester			
ENTP01	IE1	0(17)	
ENTP02	IE2	0(13)	
Credits		0(30)*	
Accumulated credit	ts	0	
	2 nd Semester		
MA001IU	Calculus 1	4	
PH013IU	Physics 1	2	
PH014IU	Physics 2	2	
EN007IU	Writing AE1.	2	
EN008IU	Listening AE1	2	
BM050IU	Practice 1: Reverse Engineering	1	
PE008IU	Critical Thinking	3	
PT001IU	Physical Training 1	3(0)	
Credits		16	
Accumulated credit	ts	16	
	Summer semester		
PE015IU	Philosophy of Marxism and Leninism	3	
PE016IU	Kinh tế chính trị Mác-Lênin	2	
Credits		5	
Accumulated credits		21	
	3 rd semester		
BM090IU	Biology for BME	4	
CH011IU	Chemistry for Engineers	3	
CH012IU	Chemistry Laboratory	1	
	•		





EE051IU	Principles of EE I	3
EE052IU	Principles of EE I Laboratory	1
BM067IU	Practice 2: Animal Cells and Microbiologies	1
PT002IU	Physical Training 2	0(3)*
PE017IU	Chủ nghĩa Xã hội khoa học	2
EN011U	Writing AE2	2
EN012IU	Speaking AE2	2
Credits		19
Accumulated credits		40
	4 th Semester	
MA003IU	Calculus 2	4
BM091IU	Human Anatomy and Physiology	3
CH014IU	Chemistry for BME	3
BM098IU	Chemistry for BME Lab	1
BM007IU	Introduction to BME	4
BM052IU	Practice 3: Electronic Design	1
PE018IU	Lịch sử Đảng Cộng sản Việt Nam	2
Credits		18
Accumulated credits		58
	Summer semester	
	Military Training	0
BM102IU	Mechanical design and manufacturing processes in biomedical engineering Lab	2
Credits		2
Accumulated credits		60
	5 th Semester	
MA023IU	Calculus 3	4
PE019IU	Ho Chi Minh's Thoughts	2
BM064IU	Applied Informatics + Lab	4
BM082IU	Biomaterials	4





BM101IU	Mechanical design and manufacturing processes in biomedical engineering	2
BM017IU	Medical Design	1
IU	Technical Electives 1	4
Credits		21
Accumulated credi	ts	81
	6 th Semester	
MA024IU	Differential Equations	4
BM011IU	Engineering Challenges in Medicine I	3
BM005IU	Statistics for Health Science	3
IU	Technical Electives 3	4
BM068IU	Project 1	1
IU	Technical Electives 2	4
Credits	·	19
Accumulated credi	ts	100
	Summer semester	
BM020IU	Internship	3
Credits		3
Accumulated credits		103
	7 th Semester	
IU	Technical Electives 4	4
IU	Technical Electives 5	4
BM030IU	Machine Design	3
BM096IU	AI for healthcare	3
BM008IU	Bioethics	3
BM069IU	Project 2	1
Credits		18
Accumulated credits		121
	8th Semester	
BM013IU	Entrepreneurship in Biomedical Engineering	3





BM009IU	BME Capstone Design + Lab	4
IU	Technical Electives 7	3
IU	Free Elective 1	3
IU	Technical Electives 6	3
BM003IU	Pre-thesis	1
Credits		17
Accumulated credi	ts	138
	Summer semester	
PE021IU	General Law	3
Credits		3
Accumulated credits		141
	9 th Semester	
BM004IU	Thesis	10
Credits		10
Accumulated credits		151
Total Credits		151

Note: * The IE0/1/2 courses and physical training are not take into account of accumulated credits

Table 9.4: Learning schedule for BME program –IE0 group

Table 7.11. Dearling senedule for Divid program 120 group			
Course code	Course name	Credits	
1 st Semester			
ENTP00	IE0	0(17)	
ENTP01	IE1	0(17)	
Credits	Credits 0(34)*		
Accumulated credits 0			
	2 nd Semester		
ENTP02	IE2	0(13)	
MA001IU	Calculus 1	4	
PT001IU	Physical Training 1	0(3)	
BM050IU	Practice 1: Reverse Engineering	1	





Credits		5(21)*
Accumulated credi	its	5
	Summer semester	
PE015IU	Triết học Mác-Lênin	3
PE016IU	Kinh tế chính trị Mác-Lênin	2
Credits		5
Accumulated credi	its	10
	3 rd Semester	
PH013IU	Physics 1	2
PH014IU	Physics 2	2
EN007IU	Writing AE1.	2
EN008IU	Listening AE1	2
PE008IU	Critical Thinking	3
PT002IU	Physical Training 2	3(0)1
MA003IU	Calculus 2	4
PE017IU	Chủ nghĩa Xã hội khoa học	2
BM067IU	Practice 2: Animal Cells and Microbiologies	1
PE018IU	Lịch sử Đảng Cộng sản Việt Nam	2
Credits		20
Accumulated credi	its	30
	4 th Semester	
BM090IU	Biology for BME	4
EE051IU	Principles of EE I	3
EE052IU	Principles of EE I Laboratory	1
CH011IU	Chemistry for Engineers	3
CH012IU	Chemistry Laboratory	1
EN011U	Writing AE2	2
EN012IU	Speaking AE2	2
MA023IU	Calculus 3	4
BM052IU	Practice 3: Electronic Design	1





Credits		21
Accumulated credits		51
	Military Training	0
BM102IU	Mechanical design and manufacturing processes in biomedical engineering Lab	2
Credits		2
Accumulated credi	ts	53
	5 th Semester	
BM091IU	Human Anatomy and Physiology	3
BM064IU	Applied Informatics + Lab	4
BM007IU	Introduction to BME	4
CH014IU	Chemistry for BME	3
BM098IU	Chemistry for BME Lab	1
BM017IU	Medical Design	1
PE019IU	Ho Chi Minh's Thoughts	2
BM101IU	Mechanical design and manufacturing processes in biomedical engineering	2
Credits		20
Accumulated credits		73
	6 th Semester	
IU	Technical Electives 1	4
MA024IU	Differential Equations	4
BM082IU	Biomaterials	4
IU	Technical Electives 3	4
BM069IU	Project 2	1
BM005IU	Statistics for Health Science	3
BM068IU	Project 1	1
Credits		21
Accumulated credits		94
	Summer semester	





BM020IU	Internship	3
Credits		3
Accumulated credits		97
	7 th Semester	
BM008IU	Bioethics	3
BM011IU	Engineering Challenges in Medicine I	3
BM030IU	Machine Design	3
BM096IU	AI for healthcare	3
IU	Technical Electives 2	4
BM003IU	Pre-thesis	1
IU	Technical Electives 6	3
Credits		20
Accumulated credi	its	117
	8 th Semester	
BM009IU	BME Capstone Design + Lab	4
BM013IU	Entrepreneurship in Biomedical Engineering	3
IU	Technical Electives 4	4
IU	Technical Electives 5	4
IU	Technical Electives 7	3
Credits		18
Accumulated credi	its	135
	Summer semester	
PE021IU	General Law	3
Credits		3
Accumulated credits		138
	9 th Semester	
IU	Free Elective 1	3
BM004IU	Thesis	10
Credits		13





Accumulated credits	151
Total credits	151

Note: * The IE0/1/2 courses and physical training are not take into account of accumulated credits





10. BME UNDERGRADUATE PROGRAM'S DEGREE CHECKLIST

Student name:	Student ID:
Academic Advisor:	Class of:
Orientation:	Thesis Advisor:

NI -	Cala	Code Course's name	Credits			T.	6.1
No.	Code	Course's name	Total	Lect.	Lab	Term	Grade
I	Basix		46	44	2		
I.I	Political ar	nd social Cluster	14	14	0		
1	PE015IU	Philosophy of Marxism and Leninism (Triết học Mác- Lênin)	3	3	0		
2	PE016IU	Political economics of Marxism and Leninism (Kinh tế chính trị Mác- Lênin)	2	2	0		
3	PE017IU	Scientific socialism (Chủ nghĩa Xã hội khoa học)	2	2	0		
4	PE018IU	History of Vietnamese Communist Party (Lịch sử Đảng Cộng sản Việt Nam)	2	2	0		
5	PE019IU	Ho Chi Minh's Thoughts (Tư tưởng Hồ Chí Minh)	2	2	0		
6	PE021IU	General Law (Pháp luật đại cương)	2	2	0		
7	PE008IU	Critical Thinking	3	3	0		
I.II	Academic	English Cluster	8	8	0		
8	EN007IU	Writing AE1	2	2	0		
9	EN008IU	Listening AE1	2	2	0		
10	EN011IU	Writing AE2	2	2	0		
11	EN012IU	Speaking AE2	2	2	0		
I.III	Calculus - Informatic - Natural Science Cluster		24	22	2		
12	MA001IU	Calculus 1	4	4	0		
13	MA003IU	Calculus 2	4	4	0		
14	MA023IU	Calculus 3	4	4	0		





15		T	T			1	T	
17	15	MA024IU	Differential Equations	4	3	1		
18	16	PH013IU	Physics 1	2	2	0		
19 CH012IU Chemistry Laboratory 1 0 1	17	PH014IU	Physics 2	2	2	0		
Prioriples of Electricity in Biomedical Engineering BM054U Biomedical Engineering Laboratory BM064IU Applied Informatics 4 3 1	18	CH011IU	Chemistry for Engineers	3	3	0		
20 PT001IU Physical Training 1 3(0) 0 3 3 3 3 3 4 4 3 5 5 5 5 5 5 5 5 5	19	CH012IU	Chemistry Laboratory	1	0	1		
21 PT002IU Physical Training 2 3(0) 0 3	I.IV	Physical T	raining	$6(0)^1$	0	0		
I.V Military Training Certificate II Foundation courses 36 28 8	20	PT001IU	Physical Training 1	3(0)1	0	3		
Foundation courses 36 28 8	21	PT002IU	Physical Training 2	$3(0)^1$	0	3		
22 BM007IU Introduction to Biomedical Engineering 4 3 1	I.V	Military Tr	aining	Ce	ertificat	'e		
22 BM007IU Engineering	II	Foundation	n courses	36	28	8		
23 CH014IU Chemistry for BME 3 3 0	22	BM007IU		4	3	1		
Laboratory 1	23	CH014IU		3	3	0		
26 BM053IU Principles of Electricity in Biomedical Engineering 3 3 0	24	BM098IU		1	0	1		
BM053IU Biomedical Engineering 3 3 0	25	BM090IU	Biology for BME	4	3	1		
27 BM054U Biomedical Engineering Laboratory 1 0 1 28 BM030IU Machine Design 3 3 0 29 BM064IU Applied Informatics 4 3 1 30 BM096IU AI for Healthcare 3 3 0 31 BM101IU Mechanical design and manufacturing processes in biomedical engineering 2 2 0 32 BM102IU Mechanical design and manufacturing processes in biomedical engineering Lab 2 0 2 33 BM005IU Statistics for Health Science 3 2 1 34 BM091IU Human Anatomy and Physiology 3 3 0 III Concentration Cluster 17 15 2 35 BM008IU Bioethics 3 3 0 36 BM082IU Biomaterials 4 3 1	26	BM053IU		3	3	0		
28 BM030IU Machine Design 3 3 0 29 BM064IU Applied Informatics 4 3 1 30 BM096IU AI for Healthcare 3 3 0 31 BM101IU Mechanical design and manufacturing processes in biomedical engineering 2 2 0 32 BM102IU Mechanical design and manufacturing processes in biomedical engineering Lab 2 0 2 33 BM005IU Statistics for Health Science 3 2 1 34 BM091IU Human Anatomy and Physiology 3 3 0 III Concentration Cluster 17 15 2 35 BM008IU Bioethics 3 3 0 36 BM082IU Biomaterials 4 3 1	27	BM054U	Biomedical Engineering	1	0	1		
30 BM096IU AI for Healthcare 3 3 0	28	BM030IU	•	3	3	0		
BM101IU Mechanical design and manufacturing processes in biomedical engineering Mechanical design and manufacturing processes in biomedical engineering Lab BM102IU Mechanical design and manufacturing processes in biomedical engineering Lab Statistics for Health Science 3 2 1 Human Anatomy and Physiology 3 3 0 III Concentration Cluster 17 15 2 SBM008IU Bioethics 3 3 0 0 BM082IU Biomaterials 4 3 1	29	BM064IU	Applied Informatics	4	3	1		
31 BM101IU manufacturing processes in biomedical engineering 2 2 0 32 BM102IU Mechanical design and manufacturing processes in biomedical engineering Lab 2 0 2 33 BM005IU Statistics for Health Science 3 2 1 34 BM091IU Human Anatomy and Physiology 3 3 0 III Concentration Cluster 17 15 2 35 BM008IU Bioethics 3 3 0 36 BM082IU Biomaterials 4 3 1	30	BM096IU	AI for Healthcare	3	3	0		
32 BM102IU manufacturing processes in biomedical engineering Lab 2 0 2 33 BM005IU Statistics for Health Science 3 2 1 34 BM091IU Human Anatomy and Physiology 3 3 0 III Concentration Cluster 17 15 2 35 BM008IU Bioethics 3 3 0 36 BM082IU Biomaterials 4 3 1	31	BM101IU	manufacturing processes in	2	2	0		
34 BM091IU Human Anatomy and Physiology 3 3 0 III Concentration Cluster 17 15 2 35 BM008IU Bioethics 3 3 0 36 BM082IU Biomaterials 4 3 1	32	BM102IU	manufacturing processes in	2	0	2		
34 BM09110 Physiology 3 3 0 III Concentration Cluster 17 15 2 35 BM008IU Bioethics 3 3 0 36 BM082IU Biomaterials 4 3 1	33	BM005IU	Statistics for Health Science	3	2	1		
35 BM008IU Bioethics 3 3 0 36 BM082IU Biomaterials 4 3 1	34	BM091IU		3	3	0		
36 BM082IU Biomaterials 4 3 1	III	Concentration Cluster		17	15	2		
	35	BM008IU	Bioethics	3	3	0		
37 BM009IU BME Capstone Design 4 3 1	36	BM082IU	Biomaterials	4	3	1		
	37	BM009IU	BME Capstone Design	4	3	1		





38	BM011IU	Engineering Challenges in Medicine I	3	3	0	
39	BM013IU	Entrepreneurship in Biomedical Engineering	3	3	0	
IV	Design and	l Research cluster	7	0	7	
40	BM050IU	Practice 1: Reverse Engineering	1	0	1	
41	BM067IU	Practice 2: Animal Cells and Microbiologies	1	0	1	
42	BM052IU	Practice 3: Electronic Design	1	0	1	
43	BM017IU	Medical Design	1	0	1	
44	BM068IU	Project 1	1	0	1	
45	BM069IU	Project 2	1	0	1	
46	BM003IU	Pre-Thesis	1	0	1	
V	Technical Elective Cluster (Need to		26	21	5	
	obtain at le	east 26 credits)	20	21	3	
47		Technical Electives 1:	4	3	1	
48		Technical Electives 2:	4	3	1	
49		Technical Electives 3:	4	3	1	
50		Technical Electives 4:	4	3	1	





51		Technical Electives 5:	4	3	1	
52		Technical Electives 6:	3	3	0	
53		Technical Electives 7:	3	3	0	
VI Free Elective Cluster		6	6	0		
54		Free Elective:	3	3	0	
VII	Internship,	Thesis	13	0	13	
55	BM020IU	Internship	3	0	3	
56	BM004IU	Thesis	10	0	10	
		TỔNG CỘNG	151	-	-	





11. REQUIREMENTS FOR GRADUATION

11.1 GRADUATION CHECKLIST

No.	Conditions	Note		
1	Had accumulated at least 151 credits of courses including a thesis			
2	Earned a total GPA \geq 50/100 points and no course had a grade $<$ 50/100			
3	The total time of study for the BE-BME program is ≤ 6 years			
4	Passed English proficiency with scores of TOEFL iBT ≥ 61; or IELTS ≥ 5.5; or TOEIC 600 (Listening + Reading) 270 (Speaking + Writing); or Cambridge Exam (First FCE); or BEC Business Vantage; or BULATS 60			
5	Fulfilled Military training requirement			
6	Participated in all 3 civil activities: + Entrance political session + Midterm political session + Exit political session			

11.2 DEGREE AWARDS

Upon graduation, depending on the accumulated GPA, a student may receive the following awards:

- 1. Gold medal: Excellent grade. Note: Only one student/year obtains this award
- 2. Silver medal: Very Good grade. Note: Only one student/year obtains this award
- 3. Women Technical Award: for female students with GPA \geq 80. There is no limitation of the number of recipients.

Grade level	Grade Point Average (GPA)					
	On 100 points	Letter grades	On 4 points			
Excellent	90 ≤ GPA ≤ 100	A^+	4.0			
Very Good	80 ≤ GPA < 90	A	3.5			
Good	70 ≤ GPA < 80	\mathbf{B}^{+}	3.0			
Average Good	$60 \le \text{GPA} < 70$	В	2.5			
Ordinary	$50 \le \text{GPA} < 60$	С	2			

<u>Notes</u>: To earn the grade level "Excellent" or "Very Good", a student must not only obtain the required GPA as indicated above but also must satisfy the following conditions; otherwise he/she will be downgraded to one level lower:

- a) The total time until graduation is not higher than the regular requirement (4 years).
- b) If a student retakes the same courses more than once, the total credits of these courses must not be higher than 5% (i.e., 7 credits) of the total of the regular requirements (i.e., 151 credits).
- c) During the study time, the student must not receive an academic punition of Warning or higher from IU.





12. ADVISOR'S COMMENTS:

Year	Semester	Comments
1 st	1 (Fall)	
1	2 (Spring)	
2 nd	1 (Fall)	
_	2 (Spring)	
3 rd	1 (Fall)	
3	2 (Spring)	
4 th	1 (Fall)	
7	2 (Spring)	
5 th	1 (Fall)	
3	2 (Spring)	
6 th	1 (Fall)	
0	2 (Spring)	
7 th	1 (Fall)	





13. COURSE DESCRIPTIONS

BM003IU - Pre-thesis. Credits 1(0,1):

From previous experience and knowledge, under the potential thesis advisor supervision, the student will focus on a specific research topic to pave the way and establish a plan for the thesis.

BM004IU - Thesis Research. Credits 10(0,10):

Students will carry on to the success of the works planned in the pre-thesis course. The final results will be presented in front of a formal examiner panel.

BM005IU - Statistics for Health Sciences. Credits 3(2,1):

This course focuses on intermediate statistical methods which are often used in bioengineering and biomedicine. The course emphasizes the appropriateness, practical application and interpretation of a variety of analytic methods. Working with SPSS (Statistical package for the social sciences) supports students to deal with practical problems in statistical analysis.

BM007IU - Introduction to Biomedical Engineering. Credits 4(3,1):

This course consists of three main parts: (1) fundamental engineering technologies and methodologies, (2) their clinical applications and (3) topics related to the department orientation. In the first part students learn different engineering techniques and methods including mathematical modeling and simulation of a dynamic system, design methodology, geometric optics, kinematics, and statistics. In the second part students learn how these techniques or methods are applied in the medical field. Case studies focus on specific organs such as the eye, ear, and lung. In each study three aspects are covered: physiological, clinical, and instrumentation aspects. These two parts emphasize on the activities of the Medical Instrumentation orientation. In the third part other activities of the Department will be briefly introduced including Signal and Image Processing, Pharmaceutical Engineering and Regenerative Medicine. Besides, a semester-long project is assigned. The project requires students to conceive, design and build a working device related to the Biomedical Engineering field. This course is accompanied by lab works which introduce students by hands-on ways to topics related to different research orientation of the Department.

BM008IU - Bioethics. Credits 3(3,0):

Many difficult ethical questions have arisen from the explosive growth of biomedical research and the health-care industry since World War II. For example, when does life begin to matter morally? When and how should doctors be allowed to help patients end their lives? Should embryos be cloned for research and/or reproduction? What sorts of living things are appropriate to use as research subjects? How should we distribute scarce and expensive medical resources? This course will show students how problems in bioethics can be approached from a variety of perspectives, with the aim of understanding how we have got, where we are, and how we should decide where to go next.

BM009IU - BME Capstone Design Course. Credits 4(3,1):

The course has three components: class lectures, laboratories, and projects. The lectures are built upon all previous BME coursework. They emphasize on the design principles of medical instrumentation and biomedical signal analysis. Topics include the origin of bioelectric potentials; the characteristics of various biological signals, transducers, instrumentation amplifiers, analogue and digital devices; and computer interfaces. Labs include the design, construction and testing of electrical circuits and computer interfaces to measure diverse biological signals. The semester-long group project consists of designing an instrument requested from hospitals or the BME Department labs. Students work in a team of different orientation.





BM010IU - Biosignal Processing. Credits 4(3,1):

The course provides students with the fundamental knowledge to process and analyze biosignals. The knowledge of Fourier transform, signal sampling, analog to digital conversion, and stochastic signal processing are covered in the class. The course also provides insight to different characteristics of typical biological signals including Electrocardiogram (ECG), Electroencephalogram (EEG), Electromyogram (EMG).

BM011IU - Engineering Challenges in Medicine I. Credits 3(3,0):

Engineering Challenges in Medicine (ECM) exposes students to technical issues encountered by physicians in hospitals that prevent them to advance in medical diagnosis and treatment. In this course, physician instructors will demonstrate pathophysiology, advantages and disadvantages of current medical management of common diseases, and ask students to propose their own solutions to overcome these challenges. ECM I covers basic principles of diagnostic imaging, electrocardiography and common diseases of the musculoskeletal, neurological, and cardiovascular systems.

BM012IU - Engineering Challenges in Medicine II. Credits 3(3,0):

Engineering Challenges in Medicine (ECM) exposes students to technical issues encountered by physicians in hospitals that prevent them to advance in medical diagnosis and treatment. In this course, physician instructors will demonstrate pathophysiology, advantages and disadvantages of current medical management of common diseases, and ask students to propose their own solutions to overcome these challenges. ECM II covers the value of a diagnostic test, interpretation of basic laboratory tests and common diseases of the respiratory, renal, digestive, endocrinal systems, and cancers.

BM013IU - Entrepreneurship in Biomedical Engineering. Credits 3(3,0):

This course introduces various stages of the entrepreneurial process and provides knowledge of start-up development. Students will expose to this process by working on some key steps in establishing a start-up for a biomedical product or service. The main goal of the course is to prepare students with an entrepreneurial mindset so that they realize the importance of developing a biomedical product or service that meets the customer demand and can be commercialized.

BM017IU – Medical Design. Credits 1(0,1):

Students will explore important software used by engineers to build, analyze, and test the engineering design of a medical instrument. In the first half of the course, students will learn LABVIEW together with medical sensors supported by National Instruments (NI) to develop a prototype of medical devices. In the second half of the course, students will learn SOLIDWORK as a computer-aided design (CAD) tool to help engineers construct a 3-D model of medical devices.

BM020IU - Internship. Credits 3(0,3):

Students will work in either companies, hospitals or research institutions in the country or abroad to acquire practical experiences in the real world.

BM030IU - Machine Design. Credits 3(3,0):

Introduction to the principles of design and analysis of machines and machine components. Design for functionality, motion, force, strength and reliability. The laboratory experience provides open-ended projects to reinforce the design process.

BM033IU, BM070IU - Information Technology in the Health Care System & Laboratory. Credits 4(3,1):

This course will teach students how to analyze and apply various management programs and technology systems currently available to health care professionals. Lectures and tutorials will offer experiential learning opportunities. The tutorials will introduce the knowledge and





software toolsets that will be used by the students to design an original health care delivery system application. Knowledge will include those used by professionals to design information healthcare systems, automated decision support systems and healthcare standards.

BM050IU – Practice 1: Reverse Engineering. Credits 1(0,1):

This is the course of general knowledge in medicine and medical instrumentation. Students will learn how to take vital signs, do CPR and some common first aids as well as explore some common medical devices in our department's labs such as ECG, Ultrasound, X ray machine... They learn how to use mechanical tools to open these medical devices, disassemble and reassemble them, explore their working principles and block diagrams. As one of the first courses for BME students, it also covers the soft skills required for presentation, literature searching and report writing.

BM052IU – Practice 2: Electronic Design. Credits 1(0,1):

Students will study essential skills for medical device design. In the first half of the semester, students will study how to design an electrical schematic and PCB using Orcad. They also have a chance to make their own PCB using tools in our department's labs. Upon finishing the third semester, students can design the electrical part of a medical device.

BM058IU - Biomedical Image Processing. Credits 4(3,1):

The goal of this course is to introduce techniques to enhance biomedical images to help physicians in diagnosis and treatment. This subject also introduces the principle of tomography techniques such as X-ray, CT, MRI and PET/CT. Moreover, it provides students essential knowledge of digital image processing including image acquisition, image formation, linear system, low-level image processing, image enhancement in frequency domain, pattern recognition, etc. A series of exercises and labs also provide students practical experience in working with biomedical image data.

BM060IU,BM061IU - Digital Systems, Digital Systems Lab. Credits 4(3,1):

This course provides the student to understand about digital systems in order to design digital circuits or systems. This course represents the following parts: Binary arithmetic, Boolean algebra, K-maps, Combinational Logic Circuit, Flip-Flops, Digital Arithmetic, Counters and Registers, Memory Devices, AD-DA Conversions and PLD.

BM062IU - Micro-electronic Devices. Credits 3(3,0):

The course is an introduction to microcontrollers including basic architecture, programming and applications of MCS-51 family and other MCS platforms.

BM063IU - Micro-electronic Devices Laboratory. Credits 1(0,1):

The course the lab session to apply the knowledge learnt in the Micro-electronic Devices class with the focus on basic architecture, programming and applications of MCS-51 family and other MCS platforms.

BM064IU - Applied Informatics. Credits 4(3,1):

This course focuses on how to apply programming languages to solve engineering problems targeting towards biomedical fields. C-programming language provides students basic programming skills to develop and implement medical devices. MATLAB-programming language supports effective tools for mathematical calculations and graphical visualization of dataset.

BM067IU – Practice 2: Animal Cells and Microbiologies. Credits 1(0,1):

Students will study existing medical devices such as CT scanner, NIRS, Alice 5, Field Analyser, BIOPAC and others at BME LABs. They learn all blocks of a device and their operation. At the end of the semester, they will represent a poster and give an oral presentation on one of these medical devices.

BM068IU - Project 1. Credits 1(0,1):





Students will explore a specific topic in the medical fields. Students will learn how to do research through various skills of doing experiments, searching and identifying scientific journals as references related to the experiments from e-library, analyzing data, weekly report meeting with advisor, writing scientific report, and etc. At the end of the course, students will submit a final report.

BM069IU - Project 2. Credits 1(0,1):

Students will do biomedical engineering projects. They will have a chance to apply what they have learned in previous semesters in designing, performing experiments, collecting and analyzing experimental data. In addition, students will improve their presenting, writing skills in a scientific manner.

BM071IU - Computer-aided Diagnosis. Credits 4(3,1):

This course is an introduction to diagnostic imaging and an overview of how computerized analysis of medical images has been employed to assist physicians in detecting or classifying lesions and screening for differential diagnosis. Topics include typical pathological abnormal patterns of various diagnostic imaging modalities with an emphasis on ECG, Ultrasound, and CT scan. Lab activities focus on interpreting ECG, CT scan and performing an Ultrasound exam.

BM072IU - Computational Model in Medicine. Credits 4(3,1):

The computer modeling and simulation of the heart and the circulation, gas exchange in the lungs, control of cell volume, the renal counter-current multiplier mechanism, and muscle mechanics, mechanisms of neural control, genetics, epidemics and dispersal.

BM073IU - Medical Imaging. Credits 4(3,1):

Physical and computational principles of different medical imaging modalities (including computed tomography, nuclear, magnetic resonance, ultrasound, and optical imaging) are discussed with the focus on image formulation and reconstruction. Hardware designs and clinical applications are also mentioned.

BM074IU - Brain-Computer Interface. Credits 4(3,1):

In this course, students will learn about the basic function and structure of the brain, the function of each part of the brain. In addition, students will be practiced on devices to learn how to interface between Brain-Computer. Collecting signals and analyzing them are also mentioned.

BM075IU, BM076IU - Biomedical Photonics & Biomedical Photonics Laboratory. Credits 4(3,1):

This course introduces some of the basic concepts of applying light in biomedical applications. This course is especially tailored for engineers who have no prior knowledge in biomedical sciences. The course first introduces some basic concepts in biomedical sciences so that students can be familiar with the techniques and the terminologies used in the field. Subsequently, the course would consider biological tissues as an optical material with some unique properties different from other conventional material, such as semiconductors, when light interacts with it. Several important research topics including microscopy, optical detection techniques, and optical disease detection techniques will be discussed. Engineering students who take this course would allow them to quickly get into the field of biomedical engineering that highly interdisciplinary knowledge and skills are required.

BM077IU - Pharmaceutical Engineering 1. Credits 4(3,1):

This course emphasizes the primary engineering aspects of the pharmaceutical processes through methodologies, both applied and fundamental of dosage form design, to analyze and scale up manufacturing pharmaceutical processes involving liquid and dispersed-phase systems including solution, suspensions, transdermal systems, etc.





BM078IU - Pharmaceutical Engineering 2. Credits 4(3,1):

This course emphasizes the primary engineering aspects of the pharmaceutical processes through methodologies, both applied and fundamental of dosage form design, to analyze and scale up manufacturing pharmaceutical processes involving solids processing, such as solids characterization, blending, milling, granulation, tableting, coating, and others.

BM079IU - Principle of Pharmacokinetics. Credits 4(3,1):

The course is intended to provide the students with basic principles of pharmacokinetics including drug transport, various routes of drug administration, and drug absorption, distribution, metabolism, and elimination. Mathematical pharmacokinetic models are also presented.

BM080IU - Nanotechnology for Drug Delivery Systems. Credits 4(3,1):

Since nanoparticulate drug delivery systems present very small size, they are promising in targeted therapy of diseased tissue, organ and hence, leading to the increased drug concentration at those places through biological barriers to increase the effectiveness of the treatment. The course depicts nanoparticles and technologies applied to targeted drug delivery to diseased cells.

BM081IU - Drug Delivery Systems. Credits 4(3,1):

In this class, the students will be introduced the concept of drug delivery systems providing pharmaceutical agents at target sites, technology, regulatory considerations and applications of each system. The course is also intended to provide the students with the design of controlled release drug delivery systems.

BM082IU - Biomaterials. Credits 4(3,1):

An engineer of tissue engineering major should understand biomaterials, and its surface modification for specific applications. Also, an engineer must understand how to choose materials and how to design a scaffold for a specific implantation zone.

BM083IU - Applications of Biomaterials in Regenerative Medicine. Credits 4(3,1):

This course is the basis for the student in biomedical engineering. It equips students with the basic knowledge about the types of tissues in the human body. This course will introduce some kinds of tissue in the human body, including: heart, liver, lungs, stomach, eyes, bones, blood vessels, etc.

BM084IU - Biocompatibility and Biodegradation of Biomaterials. Credits 4(3,1):

Students will learn and understand the biocompatible and biodegradable measure of biomaterials. Students will learn and practice in the laboratory about interaction of cells and biomaterials (using MTT, SEM, confocal, etc.) and interaction of implanted biomaterials in animals (using H&E, MT staining).

BM085IU - Characterization and Properties of Biomaterials. Credits 4(3,1):

This is a course for students majoring in biological materials. It equips students with the knowledge of how to determine the required properties and characteristics of biomaterials. Case studies and specific applications will be investigated. According to the specific damages to be repaired, the biomaterials must be fabricated to match the required properties and characteristics.

BM086IU - Methods and Process in Fabrication of Scaffold. Credits 4(3,1):

This course will introduce students to some common methods to fabricate the biomaterials that are used worldwide. During the course, students will create their own new materials according to their purposes.

BM089IU - Electronic Devices for Biomedical Design. Credits 4(3,1):

Fundamentals of semiconductor devices and microelectronic circuits, characteristics of p-n, Zener diodes, and analog diode circuits. Principles of MOSFET and BJT operation, biasing, transistor analysis at midband frequencies.





BM090IU - Biology for BME. Credits 4(3,1):

This course covers basic concepts and universal principles of biological molecules, cells, genetics, and biotechnology. The laboratory activities are designed to further investigate and illuminate each topic area in BME research settings.

BM091IU - Human Anatomy and Physiology. Credits 3(3,0):

This subject explains the physical and chemical factors that are responsible for the origin, development, and progression of life. This subject explains the specific characteristics and mechanisms of the human body that make it a living being. This subject explains the functions of tissues, organs and systems with the regulation and control mechanisms of the body.

BM092IU - Cell/Tissue - Biomaterial interaction. Credits 4(3,1):

A crucial concept to understand about the tissue-biomaterial interface is that a lot of things happen there. The environment inside the body is chemically, electrically, and mechanically active, and the interface between an implanted biomaterial and the body is the location of a variety of dynamic biochemical processes and reactions. This course will introduce students to the molecular level events that happen at the tissue-implant interface, explore selected biological and physiological consequences of these events, methods to characterize interaction between cell/tissue and materials and specifically, design novel biomaterials that truly integrate with the body's natural tissues.

BM093IU - Tissue Engineering I. Credits 4(3,1):

Tissue engineering encompasses several disciplinary fields of knowledge to enable the regeneration of malfunctioning tissues or even whole organs. There are three main components in tissue engineering: scaffolds, cells, and signals. This course is the first part of the 2-semester course on Tissue engineering which introduces students to the basic knowledge of those three main components of tissue engineering. The following course (Tissue engineering II) will focus on the clinical applications.

BM094IU - Principle of Clinical Tests and Instrumentation. Credits 4(3,1):

The laboratory plays a crucial role in healthcare because it provides physicians and other health professionals with information to: (1) detect disease or predisposition to disease; (2) confirm or reject a diagnosis; (3) establish prognosis; (4) guide patient management; and (5) monitor efficacy of therapy. Therefore, a fundamental understanding of the principles of laboratory tests and instrumentation used in clinical laboratories is essential. This course will provide students an overview of medical laboratories, principles of a wide range of analytical tests and instrumentations ranging from hematology to molecular pathology.

BM095IU - Medical Instrumentation. Credits 4(3,1):

This course covers the basic and advanced principles, concepts, and operations of medical sensors and devices. The origin and nature of measurable physiological signals are studied, including chemical, electrochemical, optical, and electromagnetic signals. The principles and devices to make the measurements, including design of electronic instrumentation, will be rigorously presented. This will be followed by realistic design and experimentation with amplifiers for biopotential measurements. There are laboratories session to give students hands on experience with electronic components, sensors, and biopotential measurements. The final part of this course will cover emerging frontiers of cellular and molecular instrumentation

BM096IU - AI for Healthcare. Credits 3(3,0):

This course provides an introduction to how we apply artificial intelligence in healthcare. Several typical problems of applied artificial intelligence in healthcare are introduced, such as diagnosis/segmentation/abnormality detection in CT, OCT, fundus, endoscope images, detecting diseases by signals, e.g., EEG, blood pressure, heart rate. The course offers artificial intelligence methods that are frequently utilized in healthcare systems, including k-nearest





neighbor, support vector machine (SVM), neural network, convolutional neural network, recurrent neural network, generative adversarial network. There are lab activities in which students work on programing to build practical schemes

BM098IU - Chemistry Laboratory for BME. Credits 1(1,0)::

The course covers the basic principles of analytical chemistry, introduces modern analytical chemistry and instrumental techniques with emphasis on techniques relevant to analysis in biomedical engineering. Applications of each technique will be discussed.

BM099IU - Stem Cell Technology. Credits 4(3,1):

Stem cells, tissue engineering and regenerative medicine are fast moving fields with vastly transformative implications for the future of health care and capital markets. Stem cells, which located in many tissues and organs in human body, are presented as miracle cells that can do anything. When administered to a patient with some serious diseases they will rebuild the damaged tissues and make the patient recover and live longevity. Understanding of stem cell characteristics, intrinsic regulations, and functions helps generating novel therapies for many acute and chronic diseases as well as developing the new strategies for tissue engineering. This course will focus on the science of stem cells to explore the characteristics, functions, pathologies, and applications of stem cells in tissue engineering and regenerative medicine.

BM100IU - Principles of Neuroengineering. Credits 4(3,1):

Covers how to innovate technologies for brain analysis and engineering, for accelerating the basic understanding of the brain, and leading to new therapeutic insight and inventions. Focuses on using physical, chemical and biological principles to understand technology design criteria governing ability to observe and alter brain structure and function. Topics include optogenetics, noninvasive brain imaging and stimulation, nanotechnologies, stem cells and tissue engineering, and advanced molecular and structural imaging technologies. Design projects by students.

BM101IU - Mechanical Design and Manufacturing Processes in Biomedical Engineering. Credits 2(2,0):

Introduction to fundamental knowledge of mechanical design and manufacturing processes in biomedical engineering.

BM102IU - Mechanical Design and Manufacturing Processes in Biomedical Engineering Lab. Credits 2(0,2):

Learn skills of mechanical design and manufacturing processes in biomedical engineering

CH011IU - Chemistry for Engineers. Credits 3(3,0):

This one-semester course is designed for engineering students those who are pursuing a non-chemistry engineering degree such as information technology, bio-technology, civil, biomedical, electronic and telecommunication engineering. The course will introduce the basic principles of chemistry and connect those principles to issues in engineering professions.

CH012IU - Chemistry Laboratory. Credits 1(0,1):

Chemistry Laboratory is an accompanied part for the Chemistry for Engineers, which is designed for engineering students those who are pursuing a non-chemistry engineering degree such as information technology, bio-technology, civil, biomedical, electronic and telecommunication engineering.

CH014IU - Chemistry for BME. Credits 3(3,0):

This course is designed for non-chemistry majors, as it is intended for students pursuing a degree in biomedical engineering. The course covers the basic principles of analytical chemistry, introduces modern analytical chemistry and instrumental techniques with emphasis on techniques relevant to analysis in biomedical engineering. Applications of each technique will be discussed.





BM053IU, BM054IU - Principles of EE I, Principles of EE I Laboratory. Credits 4(3,1):

In the lectures students study common circuit elements such as resistors, capacitors, inductors, and operational amplifiers, and different circuit analysis methods in DC and AC steady state. In the labs, students practice with Bread-board, Power supply, Signal generator, Multi-meter, Oscilloscope, Multi-sim and Electrical elements.

EN007IU - Writing AE1. Credits 2(2,0):

This course provides students with comprehensive instructions and practice in essay writing, including transforming ideas into different functions of writing such as process description, cause-effect, comparison-contrast, argumentative, and paraphrase-summary essays. Throughout the whole course, students are required to read university-level texts to develop the ability to read critically and to respond accurately, coherently and academically in writing. Through providing them with crucial writing skills such as brainstorming, proofreading, documentation and editing, this course prepares the students for research paper writing in the next level of AE2 writing.

EN008IU - Listening AE1. Credits 2(2,0):

The course is designed to prepare students for effective listening and note-taking skills, so that they can pursue the courses in their majors without considerable difficulty. The course is therefore lecture-based in that the teaching and learning procedure is built up on lectures on a variety of topics such as business, science, and humanities.

EN011IU - Writing AE2. Credits 2(2,0):

This course introduces basic concepts in research paper writing, especially the role of generalizations, definitions, classifications, and the structure of a research paper to students who attend English- medium college or university. It also provides them with methods of developing and presenting an argument, a comparison or a contrast. Students are required to work on the tasks selected to maximize their exposure to written communication and are expected to become competent writers in the particular genre: the research paper. As writing is part of an integrated skill of reading and writing where reading serves as input to trigger writing, this course is designed to familiarize non-native students with academic literature in their major study by having them read and critically respond to texts of a variety of topics ranging from natural sciences such as biology to social sciences and humanities like education, linguistics and psychology.

EN012IU - Speaking AE2. Credits 2(2,0):

Giving presentations today becomes a vital skill for students to succeed not only in university but also at work in the future. However, this may be seen as a nerve-racking task, especially when presented in a foreign language. Speaking AE2 provides the students with the knowledge and skills needed to deliver effective presentations. To do this, the course covers many aspects of giving presentation: preparing and planning, using the appropriate language, applying effective visual aids, building up confidence, performing body language, dealing with questions and responding, etc.

MA001IU - Calculus 1. Credits 4(4,0):

Functions; Limits; Continuity; Derivatives, Differentiation, Derivatives of Basic Elementary Functions, Differentiation Rules; Applications of Differentiation: l'Hôpital's Rule, Optimization, Newton's Method; Anti-derivatives; Indefinite Integrals, Definite Integrals, Fundamental Theorem of Calculus; Techniques of Integration; Improper Integrals; Applications of Integration.

MA003IU - Calculus 2. Credits 4(4,0):

Sequence and Series; Convergence Tests; Power Series; Taylor and Maclaurin Series; Cartesian Coordinates; Lines, Planes and Surfaces; Derivatives and Integrals of Vector Functions, Arc





Length and Curvature, Parametric Surfaces; Functions of Several Variables; Limits, Continuity, Partial Derivatives, Tangent Planes; Gradient Vectors; Extreme; Lagrange Multipliers; Multiple Integrals: Double Integrals, Triple Integrals, Techniques of Integration; Vector Fields, Line Integrals, Surface Integrals.

MA023IU - Calculus 3. Credits 4(4,0):

Complex numbers, complex series, complex functions, complex derivatives; Laplace transform, z-transform, Fourier series, Fourier transform, the inverse transform, transforms of derivatives and integrals, first-order differential equations, second-order differential equations, difference equations, applications to electrical circuits and signal processing.

MA024IU - Differential Equations. Credits 3(3,0):

First-order differential equations, second-order linear differential equations, undetermined coefficients, variation of parameters, applications, higher-order linear differential equations, systems of first-order linear equations, elementary partial differential equations and the method of separation of variables.

PE008IU - Critical Thinking. Credits 3(3,0):

Critical Thinking studies a process which is indispensable to all educated persons-the process by which we develop and support our beliefs and evaluate the strength of arguments made by others in real-life situations. It includes practice in inductive and deductive reasoning, presentation of arguments in oral and written form, and analysis of the use of language to influence thought. The course also applies the reasoning process to other fields such as business, science, law, social science, ethics, and the arts.

PH013IU - Physics 1. Credits 2(2,0):

An introduction to mechanics including planar forces, free body diagrams, planar equilibrium of rigid bodies, friction, distributed forces, internal forces, shear force and bending moment diagrams, simple stress and strain and associated material properties, kinematics and kinetic of particles, work and energy, motion of rigid bodies in a plane.

PH014IU - Physics 2. Credits 2(2,0):

This course provides students with basic knowledge of fluid mechanics; macroscopic description of gases; heat and the first law of thermodynamics; heat engines and the second law of thermodynamics; microscopic description of gases and the kinetic theory of gases.





14. BACHELOR AND MASTER PROGRAM

The Bachelor-Master (BS-MS) program is an integrated Bachelor – Master degree program allowing students to complete undergraduate and graduate courses within a shorter time frame of 5 years compared to the traditional Bachelor and Master's programs with 4-year undergraduate and 1.5-2 year graduate modules. Besides, the integrated Bachelor – Master's degree program encourages and guides students to pursue scientific research path from university level. After accomplishing the BS-MS program, students will obtain two degrees including a Bachelor of Engineering degree and a Master's degree from International University. When students complete courses in the Master's curriculum, these courses will be used to consider exemption from courses in the undergraduate university curriculum.

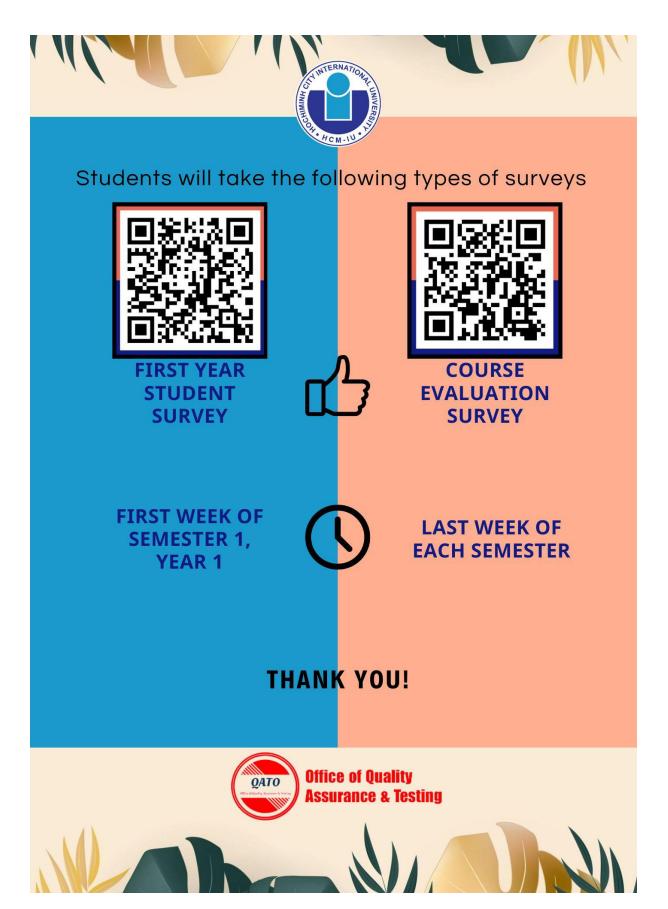
Advantages of the BS-MS program:

- Pursue a Master's degree in less time in comparison with the traditional Master's program.
- Reduce tuition costs for the total program.
- Students enrolled in the BS-MS program will be involved in research activities at the early stages.

Eligible candidates: Students in junior or senior year with a GPA \geq 7.0 (in the scale of 10).









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