

แบบรายงานข้อมูลหลักสูตร

หลักสูตรระดับปริญญาตรี

1. ชื่อหลักสูตร	
(ภาษาไทย)	หลักสูตรวิศวกรรมศาสตรบัณฑิต สาขาวิชาวิศวกรรมชีวการแพทย์ (หลักสูตรนานาชาติ,หลักสูตรพหุวิทยาการ)
(ภาษาอังกฤษ)	Bachelor of Engineering Program in Biomedical Engineering (International Program, Multidisciplinary Program)
2. ชื่อปริญญา	
(ภาษาไทย)	วิศวกรรมศาสตรบัณฑิต สาขาวิชาวิศวกรรมชีวการแพทย์ (หลักสูตรนานาชาติ,หลักสูตรพหุวิทยาการ,
(ภาษาอังกฤษ)	Bachelor of Engineering Program in Biomedical Engineering (International Program, Multidisciplinary Program)
Abbreviated	วศ.บ. (วิศวกรรมชีวการแพทย์) B.Eng. (Biomedical Engineering)

ภาพรวมของหลักสูตร

ประเภทของหลักสูตร	ปริญญาตรีทางวิชาการ
จำนวนหน่วยกิต	The number of credits required for the program is at least 134 Credits.

ระยะเวลาการศึกษา / วงรอบหลักสูตร	four-years program
สถานภาพของหลักสูตร และกำหนดการเปิดสอน	New program เปิดภาคการศึกษาที่ 2560 ปีการศึกษา 1
การให้ปริญญา	- One degree of one major from Mahidol University
สถาบันผู้ประสาทปริญญา (ความร่วมมือกับสถาบันอื่น)	Mahidol University
องค์กรที่ให้การรับรองมาตรฐาน	-

ข้อมูลเฉพาะของหลักสูตร

เป้าหมาย / วัตถุประสงค์ Purpose / Goals / Objectives	- To provide the engineering knowledge necessary for solving biomedical problems and conducting experiments. - To provide the knowledge, competences and skills of Biomedical Engineering and can deal with problems in engineering or medicine and recognize the needs of society and the international community.
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ข้อมูลเฉพาะของหลักสูตร	
ลักษณะเฉพาะของหลักสูตร Distinctive Features	This program has been developed as a multi-disciplinary, project- and research-based program established on strong collaboration with schools of medicine and success and long history of graduate programs.
ระบบการศึกษา	Class room mode

เส้นทางความก้าวหน้าของผู้สำเร็จการศึกษา	
อาชีพสามารถประกอบได้	1) Medical Device Company: Product specialist, R&D engineer, etc. 2) Researcher in Biomedical Engineering or a related fields
การศึกษาต่อ	- Department of Biomedical Engineering and related engineering fields in leading university around the world. - Different fields according to department research tracks including Neuroengineering and Medical Imaging, Tissue Engineering and Drug Delivery System, Advanced Computing in Medicine, Rehabilitation Engineering and Artificial Organs, Robotics and Computer-Integrated Surgery, biosensors and Medical Instrumentation.
ปรัชญาการศึกษาในการบริหารหลักสูตร	
ปรัชญาการศึกษา	To produce graduates based on research-based and outcome-based education. Graduates will have skills and knowledge in the field of Biomedical Engineering that are fundamental to career-long professional competence and meet current and emerging Biomedical Engineering needs. Integration and application of knowledge to benefit in accordance with the needs of society and the country with ethics in the professions and a responsibility on society.

กลยุทธ์ / แนวปฏิบัติ ในการจัดการเรียนการสอน	The course aims to promote research-based education, creative problem solving, leadership, morality and ethics and multidisciplinary research to the international level. The program will provide resources such as faculty and workplace that serve research-based and outcome-based education. Teaching strategies includes Lecture, Group discussion, Self-study, case study, problem-based learning, Lab practice, internship, site visitation, Project-based
กลยุทธ์ / แนวปฏิบัติ ในการประเมินผลการเรียนรู้ของนักศึกษา	Written examination (MCQ, SA, MEQ, Eassay), Rubrics (product, project, group, team, research-based assessment; work assignment; continuous internal assessment), Oral presentation, Report.
<b>สมรรถนะที่เสริมสร้างให้นักศึกษาของหลักสูตร</b>	
Generic Competences	
<ul style="list-style-type: none"> <li>- Communication proficiency: Apply knowledge in the fields of profession in order to communicate to social in appropriate issues and present research works in publicity.</li> <li>- Critical thinking: Identify and formulate problems, make use of other data supporting decision making and make appropriate judgment.</li> <li>- Morality and ethics: Demonstrate awareness of morality and ethnics; especially in research involved with human or animal experiments</li> <li>- Creative problem solving: Ability to discuss different issues through divergent and convergent thinking then suggest inventive solutions in the class or to the lecturer</li> </ul>	
Subject-specific Competences	
<ul style="list-style-type: none"> <li>- Design &amp; Innovation: Apply principles of science and engineering in the engineering design process and have innovation in the developing and existing knowledge creatively.</li> <li>- Research proficiency: Ability to do use proper research methodology including literature search, evaluate and utilize information with ethic and systemic thinking, analyze and interpret data and draw conclusions.</li> <li>- Teamwork: Ability to participate in academic activity as a team which can establish goals, plan tasks, meet deadline, and analyze risk and uncertainly.</li> <li>- Independence: Ability to function independently and self-directed to explore knowledge and technology.</li> </ul>	

ผลลัพธ์การเรียนรู้ของบัณฑิต	
PLOs	<ol style="list-style-type: none"> <li>1. Solve engineering problems specialty for biomedical engineering by applying principles of engineering, science, and mathematics.</li> <li>2. Apply both analysis and synthesis in the engineering design process, resulting in designs for biomedical engineering</li> <li>3. Conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.</li> <li>4. Communicate effectively with related audiences.</li> <li>5. Recognize ethical and professional responsibilities in biomedical engineering situations and make informed judgments, which must consider the impact of biomedical engineering globally.</li> <li>6. Recognize the ongoing need for additional knowledge in biomedical engineering and locate, evaluate, integrate, and apply this knowledge appropriately.</li> <li>7. Function effectively on teams that establish goals, plan tasks, meet deadline, and analyze risk and uncertainly.</li> <li>8. Function independently and self-directed to explore knowledge and technology for the benefits of mankind.</li> </ol>

## Alignment between PLOs & Higher Education TQF Level 2

ABET learning outcome	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
An ability to apply knowledge of mathematics, science, and engineering	X							
An ability to design and conduct experiments, as well as to analyze and interpret data		X	X					
An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability		X	X					
An ability to function on multidisciplinary teams							X	
An ability to identify, formulate, and solve engineering problems	X							
An understanding of professional and ethical responsibility					X			
An ability to communicate effectively				X				
The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context						X		
A recognition of the need for, and an ability to engage in life-long learning						X		
A knowledge of contemporary issues					X	X		
An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	X					X		X

ภาคผนวก

1. ข้อกำหนด: คุณสมบัติอาจารย์ผู้รับผิดชอบหลักสูตร

ที่ No.	ชื่อนามสกุล- Name	ตำแหน่ง ทางวิชาการ Academic Position	คุณวุฒิ Qualification	ผลงานวิจัยภายใน ปี 5
1.	Dr. Norased Nasongkla	Assoc. Prof.	Ph.D. (Polymer Science) Case Western Reserve University, USA: 2006 B.Sc. (Chemistry) Mahidol University: 2000	Manaspon C, Nasongkla N*, Chaimongkolnukul K, Nittayacharn P, Vejjasilpa K, Kengkoom K, Boongird A, Hongeng S, Injectable SN-38-loaded Polymeric Depots for Cancer Chemotherapy of Glioblastoma Multiforme, Pharmaceutical Research, 2016. DOI: 10.1007/s11095- 016-2011-4
2.	Dr. Chamras Promptmas	Asst. Prof.	Ph.D. (Biochemistry) Mahidol University: 1994 M.S. (Biochemistry) Chulalongkorn University: 1980 B.Sc. (Medical Technology) Mahidol University: 1976	Wat-aksorn K, Cheewasatheinchaiyaporn T, <b>Promptmas C.</b> Nucleic acid amplification free-QCM-DNA sensor using type III secretion system gene as probe for confirmation of <i>Burkholderia pseudomallei</i> . <i>World Journal of Microbiology and Biotechnology</i> (Submitted) (IF 2013=1.262, Q2 = Applied Microb)
3.	Dr. Soontorn Oraintara	Assoc. Prof.	Ph.D. (Electrical Engineering) Boston University, USA: 2000 M.S. (Electrical Engineering) University of Wisconsin- Madison, USA: 1996	Lakshmi Srinivasan, Yothin Rakvongthai, Soontorn <b>Oraintara:</b> Microarray Image Denoising Using Complex Gaussian Scale Mixtures Complex Wavelets. <i>IEEE J. Biomedical and Health Informatics</i> 2014;18(4):1423- 1430

			B.Eng. (Telecommunications Engineering) King Mongkut's Institute of Technology Ladkrabang: 1995	
4.	Dr. Phornphop Naiyanetr	Lect.	Dr.scient.med (Biomedical Engineering) Medical University of Vienna, Austria: 2010 M.Eng. (Biomedical Engineering) Mahidol University: 2001 B.Eng. (Electrical Engineering) Mahidol University: 1997	K. Lerdwuttiaugoon and P. Naiyanetr, “Wireless Electrocardiogram Monitoring using Mobile Network Communication” , 7th Biomedical Engineering International Conference (BMEiCON- (2014, November 28-26, 2014, Fukuoka, Japan. (Proceeding published in IEEE Xplore Digital Library)
5.	Dr. Panrasee Ritthipravat	Assoc. Prof.	D.Eng (Mechanical Engineering) King Mongkut's University of Technology Thonburi: 2005 M.Eng (Manufacturing Systems Engineering) King Mongkut's University of Technology Thonburi: 1999 B.Eng (Mechanical Engineering) King Mongkut's University of Technology Thonburi: 1996	Chanapai W., Ritthipravat P., “3D Reconstruction From Multiple Imaging Planes: A Case Study of Bone Tumor MR Images”, in Proc. IEEE ISSPIT 2015, 7-10 Dec 2015, UEA

2. Alignment between PLOs & Higher Education TQF Level 2

Thailand Qualifications Framework for Higher Education (TQF)		Program Learning Outcomes (PLOs)							
		1	2	3	4	5	6	7	8
Morality and ethics	1. Understand and appreciate the culture of Thailand. Recognize the value of sacrifice and moral integrity.					√			
	2. Have discipline, punctuality, responsibility to themselves and society, respectation to the rules and regulations of the organization and society.							√	
	3. Have leadership and followership, Ability to work as a group and to resolve conflicts by priority. Having respect and listening to the opinions of others including respect for the human worth and dignity.							√	
	4. Be able to analyze and assess the impact of the use of engineering knowledge to individuals, social organizations and environment.								√
	5. Have technical and professional ethics. And responsibility as a professional. To understand the social context of the engineering profession in each branch. From past to present.					√			
Knowledge development	1. Have knowledge and understanding of basic mathematics, science, engineering and economics. Able to apply to the engineering fields, others related and create innovative technologies.	√							
	2. Have knowledge and understanding of the key principles both theoretical and practical in the content of Biomedical Engineering.	√							

Thailand Qualifications Framework for Higher Education (TQF)		Program Learning Outcomes (PLOs)							
		1	2	3	4	5	6	7	8
Knowledge development	3. Able to Integrate of knowledge in Biomedical Engineering with knowledge in other related fields.						√		
	4. Analysis and solving problems with the right approach including the application of tools, such as computer programs, etc.		√						
	5. Able to use profession knowledge and skills in order to apply to realistic problems.	√					√		
Cognitive Skills	1. Have good judgment.		√						
	2. Be able to to collect, study, analyze, and summarize the issues and needs.		√	√					
	3. Be able to think critically, analyze and solve engineering problems systematically. As well as make use of other data supporting decision making efficiently.		√	√					
	4. Have the imagination and flexibility in the deployment of relevant knowledge appropriately. Have innovation in the development or extension of existing knowledge creatively.			√			√		
	5. Capability to search for more knowledge on their own. It is necessary for lifelong learning and cope with changes of knowledge and new technologies.			√					√

Thailand Qualifications Framework for Higher Education (TQF)		Program Learning Outcomes (PLOs)							
		1	2	3	4	5	6	7	8
Interpersonal Skills and Responsibility	1. Communicate with a diverse groups of people effectively. Be able to communicate both Thai and English efficiently as well as apply knowledge in the fields of profession in order to communicate to social in appropriate issues.				√				√
	2. Take the initiative to represent constructive solutions to solve both personal and public issues. Besides express appropriate standing point for oneself and own group as well as support and facilitate problem solving to any situation.				√				
	3. Plan and take responsibility of their own learning. It must consistent with ongoing professional.			√					
	4. Recognize the roles, duties and possess responsibilities to work as assigned both individual and group work. Be able to adapt and work with others, both as leaders and as followers efficiently. Behave properly based on their responsibilities.					√		√	
	5. Have a moral sense of responsibility for safety in the workplace, and Save the environment to the society.					√			

Thailand Qualifications Framework for Higher Education (TQF)		Program Learning Outcomes (PLOs)							
		1	2	3	4	5	6	7	8
Numerical Analysis skills, Communication and Information Technology Skills	1. Have the skills to use the computer for work-related professions as well.	√							
	2. Have the skills to analyze the data, information, mathematical or statistical application in order to solve problems creatively.			√					
	3. Be able to use the application of information technology and communications and advance them appropriately and effectively.				√				
	4. Have communication skills in both speaking and writing. Able to convey meaning by using symbols.				√				
	5. Be able utilize calculation and engineering tools in related professional ways.	√							