VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Biomedical Engineering

COURSE SYLLABUS

Feb, 2024

Table of Contents

Course Name: Research Methodology in Biomedical Engineering
Course Code: BM600

1. General information

Course designation	*The course covers basic principles for conducting research, different approaches to do research individually or in group, methods for selecting experimental tools, methods for problem solving and collection data, and experimental design. Students will also acquire skills for the presentations in public and editing of research proposals and publications and reviewing manuscripts.*
Semester(s) in which the course is taught	1
Person responsible for the course	Dr. Huynh Chan Khon
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, homework, class presentation
Workload (hours)	Total workload: 195 Theory: 25 Practice: 50 Project: 0 Self-study: 120
Credit points	4
ECTS	7.09
Required and recommended prerequisites for joining the course	None

Course objectives	● Theoretical knowledge of different aspects such as research methodology, methods to conduct an experiment, collect data, analyze the results, and write scientific publications. ● Practical skills such as planning projects, designing experiments, using existing statistics software to process data, writing, and giving critics on proposals and manuscripts. ● Experiences on individual/team learning and mentoring process.	
Course learning outcomes	Upon the successful completion of this course students will be able to:	
	Competency level	**Course learning outcome (CLO)**
	Knowledge	CLO 1: Proficiency in core Biomedical Engineering principles CLO 2: Advance knowledge in research methodology CLO 6: Basic knowledge in Bioethics in scientific research
	Skill	CLO 3: Capability in conducting and mentoring research in BME CLO 4: Proficiency in communication and pedagogical skills in inter and multidisciplinary environment
	Attitude	CLO 5: Capability of appreciation and critics of research works

Content	*The description of the contents should clearly indicate the weighting of the content and the level.*
	Weight: lecture session (3 hours)
	Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	Weight	Level
INTRODUCTION ● Definitions of research ● Characteristics of research ● Objectives of research ● Types of research ● Quantitative and Qualitative Methods	2	I, T, U
CURRICULUM VITAE ● What is the purpose of a CV? ● Preparing Your Curriculum Vitae ● Polishing your CV & sample CV ● Covering letters	2	I, T, U
REVIEW PAPER ● How to Read a Scientific Article? ● Distinguish main points ● Draw inferences ● Summary	2	I, T, U
CONCEPTUALISING A RESEARCH DESIGN ● Selection of a research topic ● Definition of a research problem ● Literature survey and reference collection (How to use ENDNOTE 7 software) ● Assessment of current status of the topic chosen ● Formulation of hypotheses ● Research design ● Actual investigation ● Data preparation ● Data analysis ● Data collection ● Interpretation of result ● Report	3	I, T, U
HOW TO WRITE A JOURNAL ARTICLE ● How to Prepare the Title ● How to List the Authors and Addresses ● How to Prepare the Abstract ● How to Write the Introduction ● How to Write the Materials and Methods Section ● How to Write the Results ● How to Write the Discussion	2	I, T, U

	HOW TO WRITE A RESEARCH PROPOSAL ● Golden Rules ● Title of Research Project ● Referees ● Co-applicants ● Budget ● All other Operating Grants ● Details of Research Proposal ● Summary	2	I, T, U
	TYPICAL MISTAKES ● Comparisons ● Definite / indefinite article ● Infinitive vs Gerund ● Negations ● Passive vs Active ● Pronouns ● Vocabulary	1	I, T, U
Examination forms	Research proposal writing, Homework.		
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.		
Reading list	[1] Vo Van Toi, Lecture notes of Research Methodology in BME, 2012. [2] Day, R.A., How to write and publish a scientific paper. 4th edition, Cambridge University Press, USA, 1995. [3] Vo Van Toi, Hand-outs, 2012 [4] Gorn, J.L., Style guide for writers of term papers, Master's thesis and doctoral dissertations. Monarch Press, USA, 1973.		

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-6) and ASIIN Intended Learning Outcomes (ILO) (1-6) is shown in the following table:

	ILOs																		
	ILO.1		ILO.2				ILO.3			ILO.4				ILO.5				ILO.6		
CLO	1.1	1.2	2.1	2.2	2.3	2.4	3.1	3.2	3.3	4.1	4.2	4.3	4.4	5.1	5.2	5.3	5.4	6.1	6.2	6.3
1.1	X,5				X, 5	X,5				X,5										
1.2							X,5	X,5	X,4		X,5		X,5		X,5		X,5			
3.1																		X,5	X,5	X,4.5

4

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1-2	Introduction	1, 4		Lecture, Discussion	
3-4	**Curriculum vitae**	4	HW1	Lecture, HW	
5-6	Review paper	5,6		Lecture, Discussion	
7-8-9	Conceptualising a **research design**	2, 3, 6	HW2	Lecture, HW	
10-11	How to **write a journal article**	1, 5	HW3	Lecture, HW	
11-12	How to write a research proposal	3,5,6	Design of research Research proposal	Lecture, Discussion	
13	Typical mistakes	2			
14	**Final Presentation**	1,2,3,4,5,6	Presentation of final report	Presentation	

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6
Homework exercises (30%)	HW3 50%Pass	HW2, 50%Pass	HW2, 50%Pass	HW1, 50%Pass	HW3 50%Pass	HW2, 50%Pass
Design of research (20%)	50%Pass		50%Pass		50%Pass	
Research proposal (20%)	50%Pass	50%Pass	50%Pass	50%Pass	50%Pass	50%Pass
Presentation of final report (30%)	50%Pass	50%Pass	50%Pass	50%Pass	50%Pass	50%Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics (optional)

5.1. Grading checklist for Written Research Proposal and Presentation

| Student: …………………….. | HW/Assignment: ………………. |
| Date: ………………………… | Evaluator: ……………………… |

Criteria	Excellent (18–20)	Good (15–17)	Fair (12–14)	Poor (0–11)	Score	Comments
Literature Review	- Comprehensive coverage and in-depth analysis clearly pointed out specific knowledge gaps to be addressed. - Displays a deep understanding and awareness of the latest developments, research findings, and emerging trends in biomedical engineering. Integrates this knowledge effectively into the research proposal.	- Good coverage and analysis that may lack clear identification of knowledge gaps. - Shows good awareness of recent developments and research findings, with minor gaps or less integration into the proposal.	- Limited review with outdated or irrelevant sources. - Limited awareness or application of recent developments and trends; may lack depth or currency in understanding.	- Inadequate understanding of existing research or missing literature review. - A lack of awareness or consideration of the latest developments and trends in Biomedical Engineering.		

Research Problem and Significance	- A crucial problem highly related to healthcare, outlining its significant impact, with persuasive justification for investigation. - Abstracts and formulates complex problems arising from new or emerging areas within biomedical engineering with in-depth analysis of the problem's context and consequences. Demonstrates the ability to tackle intricate issues effectively.	- A problem related to healthcare, with clear justification for research. - Formulates complex problems with good clarity, but may lack detailed analysis of its significance.	- Addresses a problem related to healthcare, but lacks complexity, clarity or persuasive justification for investigation.	- A problem poorly defined or irrelevant to healthcare. - Struggles to abstract or formulate complex problems effectively.		

Research Objectives and Methodology	- Clear, particular, and relevant objectives. - Detailed, well-justified methodology that clearly described population, data collection methods, sample size justification, experiments, ethical considerations, and data analysis plan - Perfect alignment with the research question.	- Clear objectives with minor ambiguities. - Adequate methodology with minor gaps that may lack detail or justification for specific methodological choices. - Fair alignment with the research question.	- General objectives but with a lack of clarity. - Basic methodology with a considerable lack of detailed description.	- Unclear or irrelevant objectives. - Inadequate or poorly justified methodology		
Clarity and Organisation	- An excellent writing organisation with conciseness and free of grammatical errors. - Effective connection with the research question, methods, and significance in a clear, engaging, and professional manner.	- A good writing organisation with minor grammatical errors or some lengthiness. - Fairly effective connection with the research question and methods, but may lack clarity or engagement.	- A lack of organisation or clarity, with some grammatical errors. - Ineffective connection with the research question or methods.	- A poor writing organisation with ambiguity and many grammatical errors. - Difficulty in understanding the research question, methods, or significance.		

Presentation	- Slides are clear, well organised, and effectively support the presentation. - Demonstrates strong presentation skills, engages the audience - Handles Q&A confidently and professionally.	- Slides are reasonably clear and well organised. - Presentation skills are generally good but need improvement. - Handles Q&A effectively.	- Some issues with slide clarity or organisation - Presentation skills lack consistency or confidence during Q&A.	- Slides lack clarity or effective organisation. - Struggles with presentation skills and faces challenges during Q&A.		

5.2. Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW

Score	Description
10	Demonstrates complete understanding of the problem. All requirements of the task are included in response.
8	Demonstrates considerable understanding of the problem. All requirements of the task are included.
6	Demonstrates partial understanding of the problem. Most requirements of the task are included.
4	Demonstrates little understanding of the problem. Many requirements of the task are missing.
2	Demonstrates no understanding of the problem.
0	No response/task not attempted.

6. Date revised: February 22, 2024

Course Name: Progress in Biomedical Engineering
Course Code: BM601

1. General information

Course designation	*This course consists of two main parts: fundamental engineering technologies and methodologies, and their clinical applications. Bioethics will also be presented. Besides, a semester-long group project will be assigned. The project requires students to investigate new technologies and conceive, design and build a working device related to the Biomedical Engineering field.*
Semester(s) in which the course is taught	1
Person responsible for the course	Assoc.Prof. Vong Binh Long
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, homework assignment, class presentation
Workload (hours)	Total workload: 195 Theory: 25 Practice: 50 Project: 0 Self-study: 120
Credit points	4
ECTS	7.09
Required and recommended prerequisites for joining the course	None
Course objectives	The goal of the course is to offer a broad view of typical biomedical engineering aspects. Specific objectives consist of: ● Introducing research techniques and methods in biomedical engineering to help understand the principle of operation and to solve problems related to humans.. ● Giving students opportunities to relate other fields to biomedical engineering.

Course learning outcomes	Upon the successful completion of this course students will be able to:		
	Competency level	**Course learning outcome (CLO)**	
	Knowledge	CLO 1: Proficiency in core Biomedical Engineering principles	
	Skill	CLO 3: Capability in conducting and mentoring research in BME	
		CLO 4: Proficiency in communication and pedagogical skills in inter and multidisciplinary environment	

Content	*The description of the contents should clearly indicate the weighting of the content and the level.*		
	Weight: lecture session (3 hours)		
	Teaching levels: I (Introduce); T (Teach); U (Utilize)		

Topic	Weight	Level
Introduction to Biomedical Engineering	1	I, T, U
Microfluidic devices: From laboratory to market	1	I, T, U
A glimpse of the soft piezoelectric sensors	1	I, T, U
Mechatronic and Mechanic in Biomedical Engineering	1	I, T, U
Neuro-Engineering	1	I, T, U
Stem Cell Technology	1	I, T, U
Nanotechnology for Biomedical application	1	I, T, U
Pharmaceutical Engineering	1	I, T, U
Biomaterials and Their Applications in Medicine	1	I, T, U
Introduction to Lab on a chip	1	I, T, U

Examination forms	In-class exercises/quizzes, Homework exercises, Report and Presentation.

Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.
	Assignments/Examination: Students must have more than 60/100 points overall to pass this course.

Reading list	[1] Võ Văn Tới, *Hand-out*. 2012
	[2] Võ Văn Tới, *Lecture notes*, 2012.
	[3] Introduction to Biomedical Engineering, J. Enderle, S. Blanchard and J. Bronzino, Academic Press 2010.
	[4] Standard Handbook of Biomedical Engineering and Design, Myer Kutz, McGraw-Hill, 2003
	[5] Biomedical Instrumentation, Khandpur, McGraw-Hill, 2003

2. Learning Outcomes Matrix (optional)

The relationship between Intented Learning Outcomes (CLO) (1-6) and ASIIN Intended Learning Outcomes (ILO) (1-6) is shown in the following table:

	ILOs																				
	ILO.1		ILO.2				ILO.3			ILO.4				ILO.5				ILO6		
CLO	1.1	1.2	2.1	2.2	2.3	2.4	3.1	3.2	3.3	4.1	4.2	4.3	4.4	5.1	5.2	5.3	5.4	6.1	6.2	6.3
1.1	X,4		X,4	X, 5		X,5				X,5										
1.2							X,5	X,5			X, 4.5			X, 5		X, 5				
3.1																				X,5
3.2												X, 5					X, 4.5	X, 5	X,5	

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Introduction to Biomedical Engineering	1	HW1	Lecture, Discussion, HW	[1], [2], [3], [4], [5]
2	Microfluidic devices: From laboratory to market	4	HW2	Lecture, HW	[1], [2]
3	A glimpse of the soft piezoelectric sensors	1	Qz1	Lecture, Inclass-Quiz	[1], [2]
4	Mechatronic and Mechanic in Biomedical Engineering	4	HW3	Lecture, HW	[1], [2]
5	Neuro-Engineering	1, 3	HW4	Lecture, HW	[1], [2]
6	Stem Cell Technology	1, 3	HW5	Lecture, HW	[1], [2]

7	Nanotechnology for Biomedical application	1, 4	Qz2, HW6	Lecture, Group work, HW	[1], [2]
8	Pharmaceutical Engineering	1	HW7	Lecture, HW	[1], [2], [3], [4], [5]
9	Biomaterials and Their Applications in Medicine	1,4	HW8	Lecture, HW	[1], [2], [3], [4]
10	Introduction to Lab on a chip	1	HW9	Lecture, HW	

4. Assessment plan

Assessment Type	ILO1	ILO2	ILO3	ILO4	ILO5	ILO6
In-class exercises/quizzes (10%)	Qz1, Qz2 60%Pass			Qz2 60%Pass		
Homework exercises (50%)	HW1, HW4, HW5, HW6, HW7, HW8, HW9, 50%Pass		HW4, HW5, HW8, 50%Pass	HW2, HW3, HW6, 50%Pass		
Final report and Presentation (40%)	50%Pass		50%Pass	50%Pass		

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics (optional)

5.1. Grading checklist

Student: …………………………….. HW/Assignment: ……………….						
Date: …………………………… Evaluator: ………………………						
Criteria	Excellent (90–100)	Good (75–89)	Fair (60–74)	Weak (0<60)	Score	Comments

Understanding the progression and development of technologies in biomedical engineering	Correctly describe and fully understand the development of main technologies biomedical engineering with appropriate discussion, explanation or illustration	Correctly describe and fully understand the development of main technologies in biomedical engineering, but lack of appropriate discussion, explanation or illustration	Partly describe and partly understand the development of main technologies biomedical engineering	Do not seem to understand the development of main technologies biomedical engineering		
Ability to identify, formulate problems in biomedical engineering	Clearly identify and deeply describe main problems in biomedical engineering	Partly identify and well describe main problems in biomedical engineering	Slightly identify and partly describe main problems in biomedical engineering	Barely identify and describe main problems in biomedical engineering		
Gain new knowledge and propose new solutions to overcome challenges in biomedical engineering	Well understand the challenges in medicine and propose excellent solutions with scientific and logic discussions in biomedical engineering	Partly understand the challenges in medicine and propose good solutions with scientific and logic discussions in biomedical engineering	Partly understand the challenges in medicine and propose solutions without scientific and logic discussions in biomedical engineering	Do not seem to understand understand the challenges in medicine and can not propose solutions in biomedical engineering		

	The writing report has clear, logical and understandable structures. no spelling and grammar errors, and uses the correct scientific words	The writing report has clear, but not logical and understandable structures. A few spelling and grammar errors, and few mistake in use scientific words	The writing report has a structure, but is not clear. Some spelling and grammar errors, and does not use the correct scientific words	The writing report has no structure at all. Many spelling and grammar errors		
Report writing						

5.2. Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW

Score	Description
10	Demonstrates complete understanding of the problem. All requirements of task are included in response
8	Demonstrates considerable understanding of the problem. All requirements of the task are included.
6	Demonstrates partial understanding of the problem. Most requirements of the task are included.
4	Demonstrates little understanding of the problem. Many requirements of the task are missing.
2	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

6. Date revised: February 22, 2024

Course Name: Engineering Challenges in Medicine
Course Code: BM602

1. General information

Course designation	*Course work designed for students interested in advanced work in Biomedical Engineering. A team of instructors, from Engineering and professional schools (Medicine, Dental and Veterinary Medicine) and experienced in interdisciplinary investigations, will teach these courses. The course contains modules that cover the central nervous system, muscles/bone, lungs, and heart. The course emphasizes vital biological signals, their measurement, and the required instrumentation with examples drawn from current joint research efforts between the engineering faculty and the professional schools. It involves a semester long project.*
Semester(s) in which the course is taught	2
Person responsible for the course	Dr. Ngo Thi Lua
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, class project presentation
Workload (hours)	Total workload: 195 Theory: 25 Practice: 50 Project: 0 Self-study: 120
Credit points	4
ECTS	7.09
Required and recommended prerequisites for joining the course	None

Course objectives	• Theoretical knowledge of different aspects such as research methodology, methods to conduct an experiment, collect data, analyze the results, and write scientific publications. • Practical skills such as planning project, designing experiments, using existing statistics software to process data, writing, and giving critics on proposals and manuscripts. • Experiences on individual/team learning and mentoring process.
Course learning outcomes (CLO)	Upon the successful completion of this course students will be able to: **CLO 1:** An ability to identify, formulate, and solve complex engineering problems by applying engineering, scientific, and mathematical principles. **CLO 2:** An ability to develop and conduct appropriate testing, analyze, and interpret data, and use technical judgment to draw conclusions. **CLO 3:** An ability to effectively communicate with a wide range of audiences. **CLO 4:** An ability to work effectively in a team that all members lead jointly, creating an environment of cooperation and equality, establishing goals, planning implementation, and achieving the set.

Content	*The description of the contents should clearly indicate the weighting of the content and the level.*
	Weight: lecture session (3 hours)
	Teaching levels: I (Introduce); T (Teach); U (Utilize)

Topic	Weight	Level
Neurology/Nose Physiology - Action potentials - Synaptic physiology - Sensory physiology - Autonomic nervous system - Brain physiology - Physiology of the nose	10	I, T, U
Skeletal/Bone Physiology - Bone growth/resorption - Bone repair - Development and growth - Ligaments/tendons/cartilage - Skeletal muscle contraction and movement	6	I, T, U
Respiratory Physiology - Pulmonary circulation - Pulmonary mechanics - Gas exchange and transport - Ventilation/perfusion - Respiratory control	6	I, T, U
Cardiovascular Physiology - EKG - Cardiac muscle - Hemodynamics and cardiac cycle - Peripheral circulation regulation - Coronary circulation - Cardiac performance	10	I, T, U
Renal Physiology - Glomerular filtration - Quantitation of renal transport processes - Electrolyte transport processes - Renal tubular function - Acid/base balance - Blood pressure, volume regulation and dehydration.	6	I, T, U
Endocrine Physiology - Hypothalamus and pituitary - Thyroid	3	I, T, U

	- Adrenal steroids - Calcium homeostasis - Insulin and glucagon - Metabolism and exercise		
	Physiology of the Eye	3	I, T, U
	Dental Physiology	3	I, T, U
Examination forms	Multiple-choice questions, short-answer questions		
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed based on their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.		
Reading list	[1] Human Physiology: from cells to systems. Lauralee Sherwood. Instructor's edition. Fifth edition.		

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLOs) (1-6) and ASIIN Intended Learning Outcomes (ILOs) (1-6) is shown in the following table:

	ILOs																		
	1		2				3			4				5				6		
CLOs	1.1	1.2	2.1	2.2	2.3	2.4	3.1	3.2	3.3	4.1	4.2	4.3	4.4	5.1	5.2	5.3	5.4	6.1	6.2	6.3
1	x,4		x,4	x,5		x,5				x,5										
2							x,5	x,5			x,4.5			x,5		x,5				
3																				x,5
4											x,5						x,4.5	x,5	x,5	

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Tissue Engineering and regenerative medicine		Quiz1	Lecture, Discussion, Inclass-Quiz	[1]
2	Challenges in Stem cell applications in Biomedical field		HW1	Lecture, HW	[1]
3	Biosensor engineering challenges		HW2	Lecture, Group work, HW	[1]

5	Challenges of nanomedicine development in research and clinical setting		HW3	Lecture, Group work, HW	[1]
6	Pharmaceutical Engineering		HW4	Lecture, HW	[1]
7-8	Challenges in Neuroengineering		Quiz2	Lecture, Group work, Inclass-Quiz	[1]
9	Midterm				
10	Biomedical application of Lab on a chip		HW5	Lecture, Group work, HW	[1]
11	Biophotonics and medical imaging		Quiz3	Lecture, Group work, Inclass-Quiz	[1]
12	Al for Healthcare and Challenge		Quiz4	Lecture, Discussion, Inclass-Quiz	[1]
13	Signal and image processing and Challenge		Quiz5	Lecture, Inclass-Quiz	[1]
14				Review-Test	
15	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
In-class exercises/quizzes (10%)	Qz1 60%Pass	Qz4 60%Pass		Qz5 60%Pass
Homework exercises (20%)	HW2 50%Pass		HW1, HW3, HW4 50%Pass	
Midterm exam (30%)		Qz3 50%Pass	Qz1, Qz2 50%Pass	
Final exam (40%)	Part I 50%Pass		Part II.1,2 50%Pass	Part II.3 50%Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics (optional)

Criteria	Excellent (90-100)	Good (75-89)	Fair (60-74)	Weak (<60)
Understanding the progression and development of technologies in biomedical engineering	Correctly describe and fully understand the development of main technologies biomedical engineering with appropriate discussion, explanation, or illustration	Correctly describe and fully understand the development of main technologies in biomedical engineering, but lack of appropriate discussion, explanation, or illustration	Partly describe and partly understand the development of main technologies biomedical engineering	Do not seem to understand the development of main technologies biomedical engineering
Ability to identify, formulate problems in biomedical engineering	Clearly identify and deeply describe main problems in biomedical engineering	Partly identify and well describe main problems in biomedical engineering	Slightly identify and partly describe main problems in biomedical engineering	Barely identify and describe main problems in biomedical engineering
Gain new knowledge and propose new solutions to overcome challenges in biomedical engineering	Well understand the challenges in medicine and propose excellent solutions with scientific and logic discussions in biomedical engineering	Partly understand the challenges in medicine and propose good solutions with scientific and logic discussions in biomedical engineering	Partly understand the challenges in medicine and propose solutions without scientific and logic discussions in biomedical engineering	Do not seem to understand understand the challenges in medicine and cannot propose solutions in biomedical engineering
Report writing	The writing report has a clear, logical, and understandable structures. no spelling and grammar errors, and uses the correct scienticfic words	The writing report has a clear, but not logical and understandable structures. A few spelling and grammar errors, and few mistake in use scientific words.	The writing report has a structure, but is not clear. Some spelling and grammar errors, and does not use the correct scienticfic words	The writing report has no structure at all. Many spelling and grammar errors

5.1. Grading checklist

Grading checklist for Written Reports			
Student: ………………………….. HW/Assignment: ……………….			
Date: …………………………… Evaluator: ………………………			
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	Milestone		Benchmark
	4	3	2	1
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone		Benchmark
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

6. Date revised: March 20, 2024

Course Name: Special Topics in BME
Course Code: BM648

1. General information

Course designation	*The course is carried out by module model. In this course, each student must attend in at least three laboratories, which are under the management of School of Biomedical Engineering, International University, to participate in the research activities in these laboratories. The experimental contents are decided in the dependence of the current research in these facilities. Students will have to report the progression to the head of laboratories while attending the course. Before the end of the course, students must present the result of the experiment/research to the heads from other laboratories as well as the student's advisor.*
Semester(s) in which the course is taught	1, 2
Person responsible for the course	
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, class project presentation
Workload (hours)	Total workload: 660 Theory: 0 Practice: 300 Project: 0 Self-study: 360
Credit points	12
ECTS	24.00
Required and recommended prerequisites for joining the course	None

	Course objectives	The objective of this course is an opportunity for candidates to demonstrate their ability to address a specific issue in the field of BME. The results of the research proposal will contribute to enhancing the understanding of human biological processes or provide a scientific foundation for the development of a new medical device. The findings of the research proposal must be published in the form of a scientific paper at a specialized scientific conference or as a patent.

Course learning outcomes (CLO)	Upon the successful completion of this course students will be able to:

Competency level	Course learning outcome (CLO)
Knowledge	**CLO 1:** The ability to identify, construct, and solve complex technical problems by applying principles of engineering, science, and mathematics. **CLO 2:** The capability to develop and conduct suitable experiments, analyze, and interpret data, and utilize technical reasoning to draw conclusions.
Skill	**CLO 3: T**he ability to apply designing technology to create solutions for not only real-world and detailed requirements but also address healthcare issues, safety, welfare, and global factors including culture, society, the environment, and economics.
Attitude	

Content	Add later
Examination forms	Multiple-choice questions, short-answer questions
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed based on their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.
Reading list	Add later

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLOs) (1-6) and ASIIN Intended Learning Outcomes (ILOs) (1-6) is shown in the following table:

CLOs	ILOs

	1		2				3			4				5				6		
CLOs	1.1	1.2	2.1	2.2	2.3	2.4	3.1	3.2	3.3	4.1	4.2	4.3	4.4	5.1	5.2	5.3	5.4	6.1	6.2	6.3
1	x,4		x,4	x,5		x,5				x,5										

						x,5	x,5			x,4.5			x,5		x,5				
2																			
3																			x,5

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Laboratory class 1 (compulsory)		Report	Head of laboratory advice Self-study and research	Laboratory activities Textbook
2	Laboratory class 2 (compulsory)		Report	Head of laboratory advice Self-study and research	Laboratory activities Textbook
3	Laboratory class 3 (compulsory)		Report	Head of laboratory advice Self-study and research	Laboratory activities Textbook
4	Laboratory class 4 (optional)		Report	Head of laboratory advice Self-study and research	Laboratory activities Textbook
5	Laboratory class 5 (optional)		Report	Head of laboratory advice Self-study and research	Laboratory activities Textbook
6	Final report and presentation		Final Report, Presentation		

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
Presentation and report (100%)	50%Pass	50%Pass	50%Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics (optional)

Criteria	Excellent (90-100)	Good (75-89)	Fair (60-74)	Weak (<60)
Understanding the progression and development of technologies in biomedical engineering	Correctly describe and fully understand the development of main technologies biomedical engineering with	Correctly describe and fully understand the development of main technologies in biomedical engineering, but lack	Partly describe and partly understand the development of main technologies	Do not seem to understand the development of main technologies

	appropriate discussion, explanation, or illustration	of appropriate discussion, explanation, or illustration	biomedical engineering	biomedical engineering
Ability to identify, formulate problems in biomedical engineering	Clearly identify and deeply describe main problems in biomedical engineering	Partly identify and well describe main problems in biomedical engineering	Slightly identify and partly describe main problems in biomedical engineering	Barely identify and describe main problems in biomedical engineering
Gain new knowledge and propose new solutions to overcome challenges in biomedical engineering	Well understand the challenges in medicine and propose excellent solutions with scientific and logic discussions in biomedical engineering	Partly understand the challenges in medicine and propose good solutions with scientific and logic discussions in biomedical engineering	Partly understand the challenges in medicine and propose solutions without scientific and logic discussions in biomedical engineering	Do not seem to understand understand the challenges in medicine and cannot propose solutions in biomedical engineering
Report writing	The writing report has a clear, logical, and understandable structures. no spelling and grammar errors, and uses the correct scienticfic words	The writing report has a clear, but not logical and understandable structures. A few spelling and grammar errors, and few mistake in use scientific words.	The writing report has a structure, but is not clear. Some spelling and grammar errors, and does not use the correct scienticfic words	The writing report has no structure at all. Many spelling and grammar errors

5.1.Grading checklist

Grading checklist for Written Reports			
Student: ………………………….. HW/Assignment: ………………. Date: …………………………… Evaluator: ………………………			
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		

Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	Milestone		Benchmark
	4	3	2	1
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others'	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some

			assumptions than one's own (or vice versa).	contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone		Benchmark
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.

Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

6. Date revised: March 20, 2024

Course Name: Research Proposal
Course Code: BM649

1. General information

Course designation	*The course provides the assessment of student's research orientation and conducting plan before thesis defense. Advisors and students must discuss the aim of the research. Literature review with related publications must be carried out by the students for further understanding the topics, learning theoretical basis as well as the possibilities of the research. The advisors are allowed to discuss with students in the research progress and provide efficient subjects which can support the proposed topics. All the research which does the experiment on human or animals must follow the declaration of Helsinki and obtain the Research Ethics Committee's agreement before performing the topic.*
Semester(s) in which the course is taught	1, 2
Person responsible for the course	
Language	English
Relation to curriculum	Compulsory
Teaching methods	Project
Workload (hours)	Total workload: 675 Theory: 0 Practice: 0 Project: 405 Self-study: 270
Credit points	9
ECTS	24.55
Required and recommended prerequisites for joining the course	None

Course objectives	The objective of this course is an opportunity for candidates to demonstrate their ability to address a specific issue in the field of BME. The results of the research proposal will contribute to enhancing the understanding of human biological processes or provide a scientific foundation for the development of a new medical device. The findings of the research proposal must be published in the form of a scientific paper at a specialized scientific conference or as a patent.
Course learning outcomes (CLO)	Upon the successful completion of this course students will be able to:

Competency level	Course learning outcome (CLO)
Knowledge	**CLO 1.1:** The ability to identify, construct, and solve complex technical problems by applying principles of engineering, science, and mathematics. **CLO 1.2:** The capability to develop and conduct suitable experiments, analyze, and interpret data, and utilize technical reasoning to draw conclusions. **CLO 2.1:** The ability to recognize responsibility and uphold ethical principles in a technological context, while providing a critical assessment of advanced technical solutions within the global network environment. **CLO 2.2:** The ability to gain new knowledge and apply it in reliable learning strategies.
Skill	**CLO 3.1:** The ability of communication to tremendous audiences**.** **CLO 3.2:** The ability to work effectively in a group with strong interpersonal connections, cooperation through leadership, and a fair environment created by all members. From this perspective, they can promote new research plans and achieve the expected results. **CLO 4:** The ability to apply designing technology to create solutions for not only real-world and detailed requirements but also address healthcare issues, safety, welfare, and global factors including culture, society, the environment, and economics.
Attitude	

Content	
Examination forms	Presentation, Report.
Study and examination requirements	Students must have more than 50/100 points overall to pass this course.

Reading list	Textbooks and Lecture Notes of related courses, scientific articles in research databases such as ScienceDirect, NCBI, Springer, etc.

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLOs) (1-6) and ASIIN Intended Learning Outcomes (ILOs) (1-6) is shown in the following table:

	ILOs																			
	1		2				3			4				5				6		
CLOs	1.1	1.2	2.1	2.2	2.3	2.4	3.1	3.2	3.3	4.1	4.2	4.3	4.4	5.1	5.2	5.3	5.4	6.1	6.2	6.3
1.1	x,5	x,5		x,5	x,5	x,5				x,5	x,5		x,5							
1.2								x,5			x,5	x,5	x,5				x,5			
2.1							x,5	x,5			x,5						x,5			
2.2			x,5	x,5			x,5		x,5						x,5		x,5			
3.1																		x,5		x,5
3.2				x,5							x,5		x,5						x,5	x,5
4											x,5		x,5		x,5	x,5			x,5	x,5

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Identify the thesis problem: problem statement, objectives of study, scope, and limitations		Report	Lecture advices Self-study and research	
2	Conduct current system process and literature review		Report	Lecture advices Self-study and research	Scientific databases
3	Identify research gap and proposed the solution system		Report	Lecture advices Self-study and research	
4	Propose research plan and Proposal defense		Report	Lecture advices Self-study and research	
5	Continue investigating the topics		Report	Lecture advices Laboratory Self-study and research	
	Final report and defense		Final Report		

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Project (100%)	50%Pass	50%Pass	50%Pass	50%Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics (optional)

Criteria	Excellent (90-100)	Good (75-89)	Fair (60-74)	Weak (<60)
Understanding the progression and development of technologies in biomedical engineering	Correctly describe and fully understand the development of main technologies biomedical engineering with appropriate discussion, explanation, or illustration	Correctly describe and fully understand the development of main technologies in biomedical engineering, but lack of appropriate discussion, explanation, or illustration	Partly describe and partly understand the development of main technologies biomedical engineering	Do not seem to understand the development of main technologies biomedical engineering
Ability to identify, formulate problems in biomedical engineering	Clearly identify and deeply describe main problems in biomedical engineering	Partly identify and well describe main problems in biomedical engineering	Slightly identify and partly describe main problems in biomedical engineering	Barely identify and describe main problems in biomedical engineering
Gain new knowledge and propose new solutions to overcome challenges in biomedical engineering	Well understand the challenges in medicine and propose excellent solutions with scientific and logic discussions in biomedical engineering	Partly understand the challenges in medicine and propose good solutions with scientific and logic discussions in biomedical engineering	Partly understand the challenges in medicine and propose solutions without scientific and logic discussions in biomedical engineering	Do not seem to understand understand the challenges in medicine and cannot propose solutions in biomedical engineering
Report writing	The writing report has a clear, logical, and understandable structures. no spelling and grammar errors, and uses the correct scienticfic words	The writing report has a clear, but not logical and understandable structures. A few spelling and grammar errors, and few mistake in use scientific words.	The writing report has a structure, but is not clear. Some spelling and grammar errors, and does not use the correct scienticfic words	The writing report has no structure at all. Many spelling and grammar errors.

5.1. Grading checklist

Grading checklist for Written Reports			
Student: ………………………….. Topic: …………………………..			
Date: …………………………… Evaluator: ………………………			
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	Milestone		Benchmark
	4	**3**	**2**	**1**
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone		Benchmark
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

6. Date revised: March 20, 2024

Course Name: Thesis for Research-based Program 2
Course Code: BM652

1. General information

Course designation	*During the three semesters of thesis implementation, students are encouraged to engage in discussions with external experts in this field, critique the research of other students, participate in lectures, and critique scientific papers. All the research which does the experiment on human or animals must follow the declaration of Helsinki and obtain the Research Ethics Committee's agreement before performing the topic.*
	At the beginning of the first semester, students are required to attend the Research Seminar reported by lecturers at the School of Biomedical Engineering or external experts to understand their research directions and scientific activities. Students choose their advisors and select a research topic. The research topics must align with the students' backgrounds to develop into a master's thesis. If the student's advisor is not a regular member of the university, the student must select an additional regular lecturer from the School of Biomedical Engineering to co-advice. Advisors and students discuss the research, as well as, if necessary, additional courses to explore the proposed topic. These courses may be outside the Biomedical Engineering field. Students also need to self-study to supplement the necessary knowledge for their research topic.
	At the beginning of the second semester, students are required to submit and defend their thesis in front of a thesis evaluation board according to the regulations of the International University and Vietnam National University – Ho Chi Minh City. By the end of the second semester, students report progress to the board.
	During the third semester, students are required to attend department seminars to present their work according to schedule and answer questions from experts and other students. By the end of the third semester, candidates will defend their theses in front of the board.
	Students may extend the time to complete their thesis within the allowed period but must comply with the International University's regulations.
Semester(s) in which the course is taught	1, 2
Person responsible for the course	
Language	English

Relation to curriculum	Compulsory
Teaching methods	Project
Workload (hours)	Total workload: 1125 Theory: 0 Practice: 0 Project: 675 Self-study: 450
Credit points	15
ECTS	40.91
Required and recommended prerequisites for joining the course	None
Course objectives	The objective of the thesis is to provide candidates with an opportunity to demonstrate their ability to systematically and comprehensively address a scientific problem in the field of BME. The results of the thesis will contribute to enhancing understanding of human biological processes or provide a scientific foundation for the development of a new medical device. The findings of the thesis must be published in the form of a scientific paper in a peer-reviewed specialized scientific journal or as a patent.

Course learning outcomes (CLO)	Upon the successful completion of this course students will be able to:	
	Competency level	**Course learning outcome (CLO)**
	Knowledge	**CLO 1.1:** The ability to identify, construct, and solve complex technical problems by applying principles of engineering, science, and mathematics.
		CLO 1.2: The capability to develop and conduct suitable experiments, analyze, and interpret data, and utilize technical reasoning to draw conclusions.
		CLO 2.1: The ability to recognize responsibility and uphold ethical principles in a technological context, while providing a critical assessment of advanced technical solutions within the global network environment.
		CLO 2.2: The ability to gain new knowledge and apply it in reliable learning strategies.
	Skill	**CLO 3.1:** The ability of communication to tremendous audiences**.**
		CLO 3.2: The ability to work effectively in a group with strong interpersonal connections, cooperation through leadership, and a fair environment created by all members. From this perspective, they can promote new research plans and achieve the expected results.
		CLO 4: The ability to apply designing technology to create solutions for not only real-world and detailed requirements but also address healthcare issues, safety, welfare, and global factors including culture, society, the environment, and economics.
	Attitude	
Content		
Examination forms	Presentation, Report.	
Study and examination requirements	Students must have more than 50/100 points overall to pass this course.	
Reading list	Textbooks and Lecture Notes of related courses, scientific articles in research databases such as ScienceDirect, NCBI, Springer, etc.	

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLOs) (1-6) and ASIIN Intended Learning Outcomes (ILOs) (1-6) is shown in the following table:

CLOs	1.1	1.2	2.1	2.2	2.3	2.4	3.1	3.2	3.3	4.1	4.2	4.3	4.4	5.1	5.2	5.3	5.4	6.1	6.2	6.3
1.1	x,5	x,5		x,5	x,5	x,5				x,5	x,5		x,5							
1.2								x,5			x,5	x,5	x,5				x,5			
2.1							x,5	x,5			x,5						x,5			
2.2			x,5	x,5			x,5		x,5						x,5		x,5			
3.1																		x,5		x,5
3.2				x,5							x,5		x,5						x,5	x,5
4											x,5		x,5	x,5	x,5				x,5	x,5

(Column groups: ILOs 1 = 1.1, 1.2; ILO 2 = 2.1, 2.2, 2.3, 2.4; ILO 3 = 3.1, 3.2, 3.3; ILO 4 = 4.1, 4.2, 4.3, 4.4; ILO 5 = 5.1, 5.2, 5.3, 5.4; ILO 6 = 6.1, 6.2, 6.3)

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Identify the thesis problem: problem statement, objectives of study, scope, and limitations		Report	Lecture advices Self-study and research	
2	Conduct current system process and literature review		Report	Lecture advices Self-study and research	Scientific databases
3	Identify research gap and proposed the solution system		Report	Lecture advices Self-study and research	
4	Propose research plan and Proposal defense		Report	Lecture advices Self-study and research	
5	Continue investigating the topics		Report	Lecture advices Laboratory Self-study and research	
	Final report and defense		Final Report		

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Thesis report and defense	50% Pass	50% Pass	50% Pass	50% Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics (optional)

Criteria	Excellent (90-100)	Good (75-89)	Fair (60-74)	Weak (<60)
Understanding the progression and development of technologies in biomedical engineering	Correctly describe and fully understand the development of main technologies biomedical engineering with appropriate discussion, explanation, or illustration	Correctly describe and fully understand the development of main technologies in biomedical engineering, but lack of appropriate discussion, explanation, or illustration	Partly describe and partly understand the development of main technologies biomedical engineering	Do not seem to understand the development of main technologies biomedical engineering
Ability to identify, formulate problems in biomedical engineering	Clearly identify and deeply describe main problems in biomedical engineering	Partly identify and well describe main problems in biomedical engineering	Slightly identify and partly describe main problems in biomedical engineering	Barely identify and describe main problems in biomedical engineering
Gain new knowledge and propose new solutions to overcome challenges in biomedical engineering	Well understand the challenges in medicine and propose excellent solutions with scientific and logic discussions in biomedical engineering	Partly understand the challenges in medicine and propose good solutions with scientific and logic discussions in biomedical engineering	Partly understand the challenges in medicine and propose solutions without scientific and logic discussions in biomedical engineering	Do not seem to understand understand the challenges in medicine and cannot propose solutions in biomedical engineering
Report writing	The writing report has a clear, logical, and understandable structures. no spelling and grammar errors, and uses the correct scienticfic words	The writing report has a clear, but not logical and understandable structures. A few spelling and grammar errors, and few mistake in use scientific words.	The writing report has a structure, but is not clear. Some spelling and grammar errors, and does not use the correct scienticfic words	The writing report has no structure at all. Many spelling and grammar errors

5.1. Grading checklist

Grading checklist for Written Reports			
Student: …………………………….. HW/Assignment: ………………. Date: ………………………………… Evaluator: ………………………			
	Max.	**Score**	**Comments**
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	**Description**
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	Milestone		Benchmark
	4	3	2	1
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.
Evidence *Selecting and using information to investigate a point of view or conclusion*	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone		Benchmark
	4	**3**	**2**	**1**
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

6. Date revised: March 20, 2024

Course Name: Thesis of Research-based program 1
Course Code: BM651

1. General information

Course designation	*At the beginning of the 2nd semester, the candidate is required to submit and defend in front of the Thesis Committee his/her proposal. The components of the Committee and the defense process follow the University rules. By the end of the 2nd semester the candidate submits to the Committee a progress report.*
	During the 3rd semester, the candidate is required to attend the Department seminars, present his/her work in-progress and answer to the critics. By the end of the semester, the candidate will defend his/her thesis in front of the Committee. The candidate can prolong the completion of his/her thesis within the permitted time frame allowed by the University rules. In such a case, a written request must be submitted to the Department.
Semester(s) in which the course is taught	2-4
Person responsible for the course	
Language	English
Relation to curriculum	Compulsory
Teaching methods	
Workload (hours)	Total workload: 3975 Theory: 0 Practice: 0 Project: 2385 Self-study: 1590
Credit points	53
ECTS	144.55
Required and recommended prerequisites for joining the course	None

Course objectives	The goal of the thesis is to give the opportunity to the candidate to prove that he/she has the capability to solve a scientific/engineering issue in a systematic way and in-depth. The investigation will help to advance knowledge of human biological processes or to develop a new medical device. The results must be publishable either in the form of an article in a peer-reviewed journal or a patent of invention.		
Course learning outcomes	Upon the successful completion of this course students will be able to:		
	Competency level	Course learning outcome (CLO)	
	Knowledge	CLO 1: Proficiency in core Biomedical Engineering principles CLO 2: Advance knowledge in research methodology CLO 6: Basic knowledge in Bioethics in scientific research	
	Skill	CLO 3: Capability in conducting and mentoring research in BME CLO 4: Proficiency in communication and pedagogical skills in inter and multidisciplinary environment	
	Attitude	CLO 5: Capability of appreciation and critics of research works	
Content	*The description of the contents should clearly indicate the weighting of the content and the level.*		
Examination forms	Report, presentation, publication		
Study and examination requirements			
Reading list			

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-6) and ASIIN Intended Learning Outcomes (ILO) (1-6) is shown in the following table:

	ILOs																			
	ILO.1		**ILO.2**				**ILO.3**			**ILO.4**				**ILO.5**				**ILO6**		
CLO	**1.1**	**1.2**	**2.1**	**2.2**	**2.3**	**2.4**	**3.1**	**3.2**	**3.3**	**4.1**	**4.2**	**4.3**	**4.4**	**5.1**	**5.2**	**5.3**	**5.4**	**6.1**	**6.2**	**6.3**
1.1	X,5	X,5		X, 5	X,5	X,5				X,5	X,5		X,5							
1.2							X,5			X,5	X,5	X,5					X,5			
2.1							X,5	X,5		X,5							X,5			
2.2			X,5	X,5			X,5		X,5						X,5		X,5			
3.1																		X,5		X,5

3.2			X,5					X,5	X,5					X,5	X,5
4								X,5	X,5	X,5	X,5			X,5	X,5

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
	Research proposal defense	1,2,3,5	Research proposal		
	Thesis Defense	1,2,3,4,5,6	Thesis report, Thesis Defense		
	Manuscript		Publication		

4. Assessment plan

Assessment Type	ILO1	ILO2	ILO3	ILO4	ILO5	ILO6
Research proposal and Proposal Defense	50%Pass	50%Pass	50%Pass	50%Pass	50%Pass	50%Pass
Thesis report and Thesis Defense	50%Pass	50%Pass	50%Pass	50%Pass	50%Pass	50%Pass
Publication						
Homework exercises (20%)						
Midterm exam (30%)						
Final exam (40%)						

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics (optional)

5.1. Grading checklist for Written Proposal and Manuscript

Student: …………………………….. HW/Assignment: ……………….			
Date: …………………………………… Evaluator: ………………………			
	Max.	Score	Comments
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		

Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

5.2. Master thesis evaluation form for academic advisor

1.   Student's Information:
Name: ID:
Advisor's name:
Thesis:
2.   Comments of advisor:
a)   Does student demonstrate a well understanding of the research problem through comprehensive exploration of existing knowledge in the literature and realization of the knowledge gap(s) to be addressed in the thesis?
………
………
………………………………………………
b)   Does student clearly formulate the research problem and identify realistic constraints?
………
………
………………………………………………
c)   Does student use appropriate methods, tools and instrumentation to solve the research problem?
………
………
………………………………………………
d)   Does the result meet or exceed the research objectives?
………
………………………………………………………………………
e)   How does student conduct evaluation of the result's validity and reliability or perform the designed system, component, or process?
………
………
………………………………………………
f)   How does student recognize the significance of the problem solved in the research, including positive and negative impacts (if any), and project the applicability of the solution?

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g)   Does student have a clear and well-structured written report in the correct format?
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h)   Recommendations about student's Attitude.
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....

Date:
Signature

5.3. Master thesis comment form for reviewer

Student Name:

Student Number: Intake:

Specialization:

Title of Paper:

Date:

Supervisor (Name):

Reviewer (Name):

1.   Content of the Thesis

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2.   Significance of the Thesis
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3.   Strengths of the Thesis

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4.   Weaknesses of the Thesis

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5.   Evaluator's Proposal: Qualified for Defending or Unqualified for Defending?

 6.   Challenging questions (please raise 2 questions):

   ....
   ....
   ....
   ....

7.   General Evaluation:_____ Grade:*_____

(* Hints for your grading)

	Maximum score	**Score**
CONTENT	**100**	
1. Formulation research question (problem statement, research question)	15	
2. English writing and Grammar	10	
3. Relevance of approach (Availability of information and data, treatment of data, reliability of data)	20	
4. Scope of analysis (Application of concepts, structure and consistency of argument/logic, problem solution)	30	
5. Strength of conclusions and recommendations (Generalizability, internal coherence, awareness of limitations)	10	
6. Form (Style, structure, abstract, bibliography and references)	15	

 Date:

Signature

5.1. Master thesis evaluation form for member of master thesis grading committee

Student's name: ID:

Thesis title:

Supervisor (Name):

No.	Criteria	Maximum score	Score
1	Usefulness and applicability of the work	20	
2	Research methodology	20	
3	Oral presentation	20	
4	Defense	20	
5	Thesis report	20	
Total		100	

Questions/Comments

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Name of Examiner

 Date of Signed

6. Date revised: February 22, 2024

Course Name: Project Study
Course Code: BM650

1. General information

Course designation	*Students undertake a research topic. The research topic should be related to the research orientation given in the Research proposal. The content of the topic is divided into two parts: theory and practice. Students research documents and synthesize information and knowledge related to the research topic. Besides, students perform experiments related to the given topic.*
Semester(s) in which the course is taught	2
Person responsible for the course	
Language	English
Relation to curriculum	Compulsory
Teaching methods	Project
Workload (hours)	Total workload: 675 Theory: 0 Practice: 0 Project: 405 Self-study: 270
Credit points	9
ECTS	24.55
Required and recommended prerequisites for joining the course	None
Course objectives	The goal of the course is to provide the opportunity to demonstrate that they are capable of solving a scientific problem in the field of medical examination in a systematic and in-depth manner. The results must be published in the form of a scientific article in a peer-reviewed scientific journal or a patent.

Course learning outcomes	Upon the successful completion of this course students will be able to:		
	Competency level	Course learning outcome (CLO)	
	Knowledge	CLO 1: Proficiency in core Biomedical Engineering principles CLO 2: Advance knowledge in research methodology CLO 6: Basic knowledge in Bioethics in scientific research	
	Skill	CLO 3: Capability in conducting and mentoring research in BME	

Content	*The description of the contents should clearly indicate the weighting of the content and the level.* Weight: lecture session (3 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize)		
	Topic	**Weight**	**Level**
			I, T, U
			I, T, U
			I, T, U
			I, T, U
			I, T, U
			I, T, U
			I, T, U
			I, T, U
			I, T, U
			I, T, U

Examination forms	Report, presentation
Study and examination requirements	
Reading list	

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-6) and ASIIN Intended Learning Outcomes (ILO) (1-6) is shown in the following table:

ILOs					
ILO.1	**ILO.2**	**ILO.3**	**ILO.4**	**ILO.5**	**ILO6**

CLO	1.1	1.2	2.1	2.2	2.3	2.4	3.1	3.2	3.3	4.1	4.2	4.3	4.4	5.1	5.2	5.3	5.4	6.1	6.2	6.3

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
	Project	1,2,3,6	Report, Presentation		

4. Assessment plan

Assessment Type	ILO1	ILO2	ILO3	ILO4	ILO5	ILO6
Project (100%)	50%Pass	50%Pass	50%Pass	50%Pass	50%Pass	50%Pass

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics (optional)

Grading checklist for Written Reports			
Student: …………………………….. HW/Assignment: ……………….			
Date: ………………………………… Evaluator: ………………………			
	Max.	Score	Comments
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		

Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)	10		
TOTAL SCORE	100		

6. Date revised: February 22, 2024