BIEN 1620 – Revolutionizing Health: Biomedical Innovations in Everyday Life

School:	**School of Engineering**
Subject Area:	**Bioengineering**
Course Credit:	**3**
Instructor:	**TBC**
Pre-requisite/co-requisite:	**Nil**

Notes:

- The syllabi provided here is for reference only and may be subject to changes and adjustments as determined by the course instructors.

The Hong Kong University of Science and Technology

UG Course Syllabus

Revolutionizing Health: Biomedical Innovations in Everyday Life

BIEN1620 – Summer AY25/26

3 Credits

No pre-/co-requisites

Instructor Name: LINARDI, Darwin

Email: kedarwin@ust.hk

Office Hours: By appointment

Course Description

BIEN1620 provides a comprehensive introduction to the field of biomedical engineering, integrating principles from the medical sciences, physics, biology, and engineering. Students will build a solid foundation in the basic sciences and human physiology, establishing the context necessary to understand key biomedical engineering innovations in healthcare and medicine. The course explores four core areas of biomedical engineering: bioinstrumentation, bioimaging, biomolecular engineering, and bioinformatics. Throughout the course, students will apply an engineering and user-centered design framework to analyze real-world healthcare problems and propose technologically feasible, patient-focused solutions. Through these approaches, students will develop a holistic understanding of how biomedical engineers collaborate across disciplines to develop medical technologies that advance human health and quality of life.

Intended Learning Outcomes (ILOs)

1. Describe key concepts in biomedical engineering and illustrate their applications in everyday life.
2. Apply engineering principles to solve bioengineering problems, supported by relevant examples from personal experiences.
3. Understand the significance and understanding of human anatomy and physiology for biomedical engineering professionals.
4. Critically assess current medical technologies in the market, leveraging knowledge of bioengineering principles.
5. Evaluate the social, ethical, and economic implications of innovations and technologies in biomedical engineering.
6. Demonstrate effective teamwork and presentation skills, showcasing the ability to collaborate and communicate ideas clearly.

Assessment and Grading

This course will be assessed using criterion-referencing, and grades will not be assigned using a curve. Detailed rubrics for each assignment are provided below, outlining the criteria used for evaluation.

Assessments:

Assessment Task	Contribution to Overall Course grade (%)	Due date
Quizzes	10%	Each week
Report	15%	End of semester
Presentation	15%	Topic dependent
Midterm exam	30%	Middle of semester
Final exam	30%	End of semester

Mapping of Course ILOs to Assessment Tasks

Assessed Task	Mapped ILOs	Explanation
Quizzes	ILO1-3	Assess understanding of key biomedical engineering concepts, application of engineering principles, and knowledge of human anatomy and physiology through short, focused assessments.
Report	CILO-1-6	Evaluates comprehensive learning through written analysis of biomedical problems, integrating conceptual understanding, ethical and societal perspectives, and teamwork and communication skills.
Presentation	CILO-1-6	Measures students' ability to explain and apply core concepts, critique technologies, and demonstrate effective communication and collaboration in a professional context.
Midterm exam	CILO-1, 3, 4	Tests foundational knowledge, understanding of human physiology, and ability to analyze current medical technologies.
Final exam	CILO-1, 3, 4	Tests foundational knowledge, understanding of human physiology, and ability to analyze current medical technologies.

Grading Rubrics

BIEN1620 - Report Grading Rubric

Criteria	Excellent (5)	Good (4)	Satisfactory (3)	Needs Improvement (2)	Unsatisfactory (1)
Technical accuracy and understanding (30%)	Demonstrates exceptional understanding of biomedical engineering concepts; analysis is precise, well-integrated, and strongly supported by evidence.	Strong grasp of concepts; minor gaps in explanation or evidence.	Adequate understanding; explanations generally correct but lack depth.	Limited comprehension with notable errors in reasoning or concept use.	Shows minimal understanding; substantial inaccuracies throughout.
Critical evaluation (20%)	Provides deep insights, addressing ethical, social, and scientific contexts with sophistication.	Demonstrates some analysis of implications and limitations.	Shows limited critical reflection or consideration of context.	Minimal evaluation with superficial commentary.	No evidence of reflective or analytical thought.
Application and problem-solving (20%)	Innovatively applies engineering principles to complex biomedical challenges; solutions are logical and technically sound.	Applies principles effectively with mostly appropriate solutions.	Applies principles at a basic level; reasoning may be formulaic.	Attempts application but includes conceptual or methodological errors.	Unable to apply engineering concepts meaningfully.
Organization and clarity (15%)	Report is excellently structured; ideas flow logically and writing is clear and professional.	Clear organization with minor issues in flow or emphasis.	Structure is adequate but transitions may be weak or inconsistent.	Organization is uneven, leading to difficulty following arguments.	Disorganized report with little coherence or clarity.
Data, figures, and references (15%)	Data well-presented; figures effective and properly labeled; referencing accurate and consistent throughout.	Data and references mostly accurate; minor formatting issues.	Sufficient data but analysis or referencing could be improved.	Inadequate or inconsistent use of data and references.	Serious lack of supporting data or incorrect referencing.

BIEN1620 - Presentation Grading Rubric

Criteria	Excellent (5)	Good (4)	Satisfactory (3)	Needs Improvement (2)	Unsatisfactory (1)
Content mastery (25%)	Displays exceptional understanding and integration of biomedical principles; addresses questions confidently.	Good comprehension with accurate content and minor omissions.	Basic understanding with occasional inaccuracies.	Limited understanding and weak evidence of preparation.	Inaccurate or incomplete understanding of material.
Organization and structure (20%)	Presentation is logically structured with clear progression and transitions.	Logical sequence with minor clarity issues.	Structure mostly clear though uneven in flow.	Weak organization causing occasional confusion.	Disorganized; lacks coherent structure.
Delivery and communication (20%)	Clear, engaging delivery with confident tone and effective pacing.	Mostly clear and engaging delivery; minor pacing or articulation issues.	Understandable but lacks engagement or confidence.	Difficult to follow; lacks energy or clarity.	Inaudible or unfocused presentation style.
Visuals and design (25%)	Slides are visually appealing, data-rich, and enhance understanding.	Clear visuals supporting communication with minor inconsistencies.	Visuals adequate but overly text-heavy or simplistic.	Weak visuals or minimal integration with content.	Poor-quality visuals that detract from presentation.
Team coordination and Q&A (10%)	Team interacts smoothly; all members contribute equally and respond to questions thoughtfully.	Collaboration generally effective with minor imbalance.	Reasonable team coordination; uneven participation.	Poor coordination or unclear individual roles.	Team uncoordinated or unable to handle questions effectively.

Final Grade Descriptors:

Grades	Short Description	Elaboration on subject grading description
A	Excellent Performance	Demonstrates outstanding mastery of concepts and skills with evidence of original thinking, strong analysis, and clear, effective communication. Work is consistently well-organized, accurate, and insightful, showing independent learning and depth of understanding.
B	Good Performance	Shows a solid grasp of the subject matter and effective application of knowledge. Work is clear, well-structured, and mostly accurate, with some evidence of critical thinking and problem-solving ability. Minor errors or lack of depth may be present but overall quality is strong.
C	Satisfactory Performance	Meets essential learning outcomes and displays an adequate understanding of content. Work is generally correct but may be descriptive rather than analytical. Organization and clarity are sufficient, though gaps or inconsistencies in reasoning may occur.
D	Marginal Pass	Shows minimal understanding and limited application of subject material. Work demonstrates significant errors, lack of depth, and weak analysis or organization. Performance just meets the minimum required for credit and improvement is needed.
F	Fail	Demonstrates inadequate understanding of concepts, with major errors, lack of analysis, and insufficient evidence of learning. Work fails to meet the minimum standards for credit and does not achieve course learning outcomes.

Course AI Policy

ChatGPT, Poe, etc. can be used to refine your own writing and presentation or help you learn. They should not be used to complete your assignments for you.

Communication and Feedback

Assessment marks for individual assessed tasks will be communicated via Canvas within two weeks of submission. Feedback on assignments will include [specific details, e.g., strengths, areas for improvement]. Students who have further questions about the feedback, including marks should consult the instructor within five working days or the announced deadline, whichever is earliest, after the feedback is received.

Resubmission Policy

Only the latest work submitted by the deadline will be graded. Submissions after the deadline will be subject to grade penalties without valid reasoning.

Required Texts and Materials

No specific texts required.

Academic Integrity

Students are expected to adhere to the university's academic integrity policy. Students are expected to uphold HKUST's Academic Honor Code and to maintain the highest standards of academic integrity. The University has zero tolerance of academic misconduct. Please refer to Academic Integrity | HKUST – Academic Registry for the University's definition of plagiarism and ways to avoid cheating and plagiarism.