

	<p style="text-align: center;">HO CHI MINH UNIVERSITY OF TECHNOLOGY AND EDUCATION</p> <p style="text-align: center;">FACULTY OF ELECTRICAL AND ELECTRONICS ENGINEERING</p>	<p>Programme: Biomedical Engineering</p> <p>Programme Level: Undergraduate</p>
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Syllabus

1. **Course Name:** Biomedical Instrumentation Lab
2. **Course Code:** MEPR321565
3. **Credits:** 2 credits (0:2:4) (2-hour lab session and 4 hours of self-study per week)
4. **Course Instructor(s):**
 - A. Duc-Dung Vo, MEng
 - B. Dang-Khoa Tran, MEng
 - C. Thanh-Nghia Nguyen, MEng
5. **Registration Requirements**
 - A. Pre-requisite Course(s): Biomedical Instrumentation
 - B. Previous Course(s): Fundamental Electronics

6. **Course Descriptions:**

This course provides learners with knowledge about the structures and working principles of medical devices. It guides them on the operation of medical devices for patient examination, monitoring, and prognosis in healthcare. Some devices include newborn incubators, electrotherapy devices, ultrasound for therapy and diagnostic applications, sphygmomanometer, electrocardiogram, patient monitor, endoscope, etc. Students will learn how to measure parameters directly on the human body and analyze measurement or simulation results with proven real-world results.

7. **Course Learning Outcomes (CLOs)**

CLOs	Descriptions	ELO(s)/PI(s)	Competency
CLO1	<i>After completing this course, you should be able to:</i> Understand and compare medical device's measurement results for the prognosis in healthcare.	ELO1/PI1.3	R
CLO2	Operate multiple diagnostic medical devices to collect measurement data from patients.	ELO2/PI2.1	R
	Present technical reports with medical device's measurement data, data analysis and evaluation.	ELO2/PI2.3	R
CLO3	Demonstrate responsibilities and collaborative capability in group assignments while contributing to the success of the entire team.	ELO5/PI5.2	R
CLO4	Explain and communicate technical content related to biomedical engineering in written form.	ELO6/PI6.1	R

	Comprehend technical documents and user manuals written in English related to biomedical devices	ELO6/PI6.4	R
CLO5	Maintain, repair, and examine the functionality of medical devices.	ELO7/PI7.1	I

Notes: I: Introduction, R: Reinforce, M: Mastery

8. Course Content

- Course introduction: introduction to laboratories and practical equipment.
- Blood pressure monitor, SpO2 devices, and electronic thermometer.
- Spirometer: Studies of the device's structure, principles, operation, measurement methods, and technical standards.
- Electrocardiogram machine: Presenting the structure, principle, operation, measurement methods, technical standards, printing measured waveforms and analysis.
- Patient monitor: Presents the structure, principle, operation, measurement methods, technical standards, collects signal waveforms, and other parameters for monitoring.
- Newborn incubators: Safety, structure, principles, operation, measurement methods, technical standards, adjustable temperature for incubators.
- Endoscope: Safety, structure, principle, operation, processing results on the measuring screen.
- Ultrasound therapy machine: Safety, structure, principle, operation, method of therapeutic ultrasound.
- 3D and 4D diagnostic ultrasound machines: Safety, structure, principles, technical standards, ultrasound methods on humans.
- Writing a report of a chosen medical devices.

9. Teaching Methods

- Presentation
- Group activities
- Practical teaching

10. Student Assessments

- Grading scale: **10**
- Assessment plan:

No.	Content	CLOs	Competency	Assessment Methods	Assessment Tools	Weighting (%)
Formative Assessment						70
1	Using measurement results of blood pressure, SpO2, electrocardiogram, ultrasound, X-ray... for medical diagnosis.	CLO1	R	Essay	Questions	20
2	- Vận hành các thiết bị y tế để thu thập dữ liệu trên các thiết bị y tế.	CLO2	R	Essay	Questions	20

	- Operating medical devices to collect data on medical devices.					
3	- Contents of technical reports when measuring and collecting data on measuring devices, with analysis and comparison of results.	CLO4	R	Essay	Questions	15
4	- Attending the class, each team member is responsible for the assigned work to contribute to the success of the reports.	CLO3	R	Short-answer questions	Scenarios	5
5	Maintenance, repair, functional testing of medical equipment	CLO5	I	Essay	Questions	10
Summative Assessment						30
6	- Ability to explain and communicate work content in written form Ability to present technical reports when measuring and collecting data on measuring devices, with analysis and comparison of results.	CLO4 CLO2	R	Q&A session	Grading rubric	30

11. Learning Materials

- **Main reading:** Võ Đức Dũng, Nguyễn Thanh Nghĩa, Trần Đăng Khoa, Nguyễn Thanh Hải, Bài giảng thực tập thiết bị y tế, trường ĐH SPKT, TP.HCM, 2021.
- **Extra reading:** John G. Webster, John Wiley and Sons and Hand-outs Medical Instrumentation: Application and Design, Third Edition.

12. General Information

Academic Integrity

All students in this class are subject to HCMUTE's Academic Integrity Policy (<http://sao.hcmute.edu.vn/>) and should acquaint themselves with its content and requirements, including a strict prohibition against plagiarism. Any violations will be reported to the Faculty of Electrical and Electronic Engineering Dean's office.

Notice of Change

All information in this syllabus (other than grading and absence policies) may be subject to change with reasonable advanced notice. Students need to regularly update the information of their registered class.

Intellectual Property

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13. Approval Date:

14. Endorsement:

Dean of Faculty	Head of Department	Course Instructor
Assoc. Prof. Minh-Tam Nguyen	Assoc. Prof. Thanh-Hai Nguyen	

15. Revision History:

1 st Revision:	<i>Course Instructor</i> Assoc. Prof. Thanh-Hai Nguyen <i>Head of Department</i>
2 nd Revision:	<i>Course Instructor</i> Assoc. Prof. Thanh-Hai Nguyen <i>Head of Department</i>