	HO CHI MINH UNIVERSITY OF TECHNOLOGY AND EDUCATION **FACULTY OF ELECTRICAL AND ELECTRONICS ENGINEERING**	**Programme:** Biomedical Engineering **Programme Level:** Undergraduate

Syllabus

1. **Course Name:** Biosignal Processing Lab

2. **Course Code:** BIPR322165

3. **Credits:** 1 credits (0:1:2) (5-hour lab session and 10 hours of self-study per week)

4. **Course Instructor(s):**

    A. Dr. Thanh-Nghia Nguyen

    B. Assoc. Prof. Thanh-Hai Nguyen

    C. Dr. Thanh-Tai Duong

    D. Assoc. Prof. Hoang-Kha Ha

5. **Registration Requirements**

    A. Pre-requisite Course(s): Biomedical Signal Processing

    B. Previous Course(s): None

6. **Course Descriptions:**

    This course allows students to practice with different biomedical signal and data acquisition methods, methods of signal preprocessing, and statistical analysis of the data. Students will work with various biomedical signals, including ECG, EEG, fNIRS, etc. Moreover, the course also teaches students to use MATLAB software to perform signal processing tasks.

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

CLOs	**Descriptions** **After completing this module you should be able to:**	ELO(s)/PI(s)	Competency
CLO1	Apply various methods of biomedical data acquisition and statistical analysis to solve biomedical signal processing problems.	ELO1/PI1.1	R
CLO2	Demonstrate the knowledge and the ability to utilize biomedical software and data acquisition devices for processing ECG, EEG, SpO2 data.	ELO2/PI2.2	R
CLO3	Demonstrate understandings of the ethical responsibilities involved in the collection of biomedical data and personal information of research participants.	ELO3/PI3.2	I
CLO4	Apply new techniques and methods in biomedical signal processing in a lifelong learning strategy.	ELO4/PI4.2	R

CLO5	Demonstrate roles and responsibilities in the process of teamwork to complete an assigned signal processing problems.	ELO5/PI5.2	R

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

8. Course Content

- Using MATLAB software proficiently to design biomedical signal processing systems.
- Designing protocol for biomedical data collection.
- Designing low-pass, high-pass and band-pass filter circuits to filter noise on the received biomedical signal.
- Applying filter evaluation methods to evaluate the effectiveness of the designed filter.
- Programming, designing, implementing biomedical signal filtering circuits and building tool to evaluate the effectiveness of the filter using MATLAB software.
- Building a specific biomedical signal processing problem and applying theoretical methods to solve that problem.
- Writing technical report for the problem of biomedical signal processing which has been done.
- Presenting results of biomedical signal processing.

9. Teaching Methods

- Thuyết trình
- Dạy học theo dự án
- Hoạt động nhóm
- Nêu và giải quyết vấn đề
- Báo cáo nhóm

- Presentation
- Project-based teaching
- Group activities
- Raising and solving problems
- Group report

10. Student Assessments

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

No.	Content	CLOs	Competency	Assessment Methods	Assessment Tools	Weighting (%)
Formative Assessment						**50**
1	Presenting methods to evaluate signal quality after processing and implementing these methods on MATLAB.	CLO1	3	Lab report Q&A	Grading rubric	10

2	Presenting the process of designing and collecting biomedical data using data collection devices.	CLO2	3	Lab report Q&A	Grading rubric	20
3	Designing filter and applying noise filter on signal using MATLAB.	CLO4	2	Lab report Q&A	Grading rubric	20
Summative Assessment						**50**
6	Explanatory questions; calculating and designing signal filters; Fourier analysis of signals	CLO3, CLO5	3	Lab report Q&A	Grading rubric	50

11. Learning Materials

– Main reading: SJ. Orfanidis, DSP Lab manual, Rutgers University, 2014.
– Extra reading: Thad B. Welch, Cameron H.G. Wright, Michael G. Morrow, Real-Time Digital Signal Processing from MATLAB®to C with the TMS320C6x DSPs, 3th edition, CRC Press, Taylor & Francis Group, 2016.

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:

1st Revision:	*Course Instructor* **Assoc. Prof. Thanh-Hai Nguyen** *Head of Department*
2nd Revision:	*Course Instructor* **Assoc. Prof. Thanh-Hai Nguyen** *Head of Department*