

	<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:** Biosignal Processing
2. **Course Code:** BISI340765
3. **Credits:** 4 credits (4:0:8) (4-hour lecture and 8 hours of self-study per week)
4. **Course Instructor(s):**
 - A. Dr. Thanh-Nghia Nguyen
 - B. Dr. Thanh-Tai Duong
 - C. Assoc. Prof. Thanh-Hai Nguyen
 - D. Assoc. Prof. Hoang-Kha Ha
5. **Registration Requirements**
 - A. Pre-requisite Course(s): None
 - B. Previous Course(s): Signals and Systems

6. Course Descriptions:

This course provides students with the basics of human biostatistics and hypothesis testing. Furthermore, learners are provided with knowledge related to the collection and processing of electrocardiogram (ECG), electroencephalogram (EEG) and fNIRS signals. In addition, the course also provides learners with knowledge related to building noise filtering applications, processing of received biological signals, theoretical basis and algorithms implemented on Matlab software.

7. Course Learning Outcomes (CLOs)

CLOs	Descriptions After completing this module you should be able to:	ELO(s)/PI(s)	Competency
CLO1	Distinguish between IIR filter circuit and FIR filter circuit and the applicable conditions of each case.	ELO1/PI1.2	R
CLO2	Apply filters for each specific problem requirement to filter out ECG, EEG, EMG, and fNIRS signals.	ELO1/PI1.3	R
CLO3	Build a system to collect actual biomedical data, analyze and process data.	ELO2/PI2.2	R
CLO4	Present the filter circuit design method based on the initial requirements of the actual problem.	ELO6/PI6.1	R

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

8. Course Content

- Biostatistics and presentation of statistical results.
- Building a biomedical data collection system.
- Z transform method and Fourier analysis.
- Designing IIR and FIR filters.
- Programming and implementing biomedical signal filter circuits.
- Evaluating the effectiveness of biomedical signal processing.
- Processing ECG, EEG, and fNIRS signals.

9. Teaching Methods

- Presentation
- Group activities
- Problem solving

10. Student Assessments

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

No.	Content	CLOs	Competency	Assessment Methods	Assessment Tools	Weighting (%)
Formative Assessment						50
1	Theory of signals, Z-transforms and Fourier transforms, concepts of filter circuits and biomedical signals.	CLO1	3	MCQs	Grading scale	20
2	Calculating Z transform and Fourier transform, designing data collection system	CLO2	2	Essay	Grading scale	25
3	Actively participating in lessons	CLO4	3	Quick test	Grading rubric	5
Summative Assessment						50
4	Explanatory questions; calculating, designing signal filters; Fourier analysis of signals	CLO3	3	Essay	Grading scale	50

11. Learning Materials

A. Main reading:

- Lê Tiến Thường, Xử lý số tín hiệu và Wavelets, Nhà xuất bản ĐH Quốc Gia, Tp.HCM, Tp.HCM, 2016.

B. Extra reading:

- Keonwook Kim, Conceptual Digital Signal Processing with MATLAB, Springer Nature Singapore, Singapore, 2021.

- Samir I. Abood, Digital Signal Processing A Primer With MATLAB, CRC Press, Taylor & Francis Group, 2020.

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

	<p><i>Course Instructor</i></p> <p>Assoc. Prof. Thanh-Hai Nguyen <i>Head of Department</i></p>
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