Syllabus

1. **Course name:** Biomedical Electronic Circuit Design
2. **Course code:** MEDE330465
3. **Credits:** 3 credits (3:0:6) (3 lecture periods, 0 lab period, 6 self-study periods per week)
4. **Instructors**
   - a. Chief lecturer: MEng. Nguyen Thanh Tam
   - b. Co-lecturers:
   - MEng. Vo Duc Dung
   - Assoc. Prof. Dr. Nguyen Thanh Hai
5. **Course Requirements**

   Prerequisite course(s): None

   Previous course(s): Basic Electronis, Digital Systems
6. **Course Description**

   The course on biomedical electronic circuit design provides learners with knowledge related to the design of electronic circuits based on the knowledge of electronic circuits used in biomedical engineering systems. In particular, biomedical signal amplification circuits using Op-Amp circuits, biomedical signal filtering circuits (low-pass, high-pass, band-pass, blocking-pass filter circuits), measuring circuits connected to biomedical sensors such as electrocardiogram, electroencephalogram, electromyogram.

7. **Learning Outcomes (CLOs)**

CLOs	Descriptions *On successful completion of this course students will be to:*	ELO(s) /PI(s)	Compe-tency
CLO1	Ability to apply methods and formulas for calculating current, voltage and power circuit parameters	ELO1/PI1.2	M
CLO2	Ability to perform simulations of biomedical circuit experiments	ELO2/PI2.2	R
CLO3	Biết vận dụng các mạch điện tử, số cho hệ thống tín hiệu y sinh. Ability to apply electronic and digital circuits for biomedical signal systems	ELO4/PI4.2	M
CLO4	Ability to analyze and design biomedical electronic circuits.	ELO7/PI7.2	R

Notice: I (Introduction); R (Reinforce); M (Mastery)

8. **Content outline**
   - Review basic and digital electronics such as transistor gain calculations, resistor functions, Op-Amp, logic gates and others in circuits related to this subject
   - Overview of biomedical electronics related to applications in real biomedical devices and systems
   - Basic bio-analog electronic circuit design and analysis are often applied in practice
   - Basic digital biomedical electronic circuit design and analysis are often applied in practice.

- Biomedical electrodes, sensors and transducers for applications in biomedical circuits and systems.
- How to calculate, measure electromyographic signal (EMG), Measure electrocardiogram signal (ECG), Measure electroencephalogram signal (EEG), Measure signal of SPO2.
- Measuring principles and circuits of some biomedical signals and systems

9. Teaching Methods
- *Powerpoint presentation*
- *Teamwork*

10. Assessment(s)
- Grading scale: **10**
- Assessment plan:

No.	Content	CLOs	Compe-tency	Assessment methods	Assessment tools	Weighting %
Formative assessment						**50**
1.	Apply to biomedical digital electronic circuits, measuring principles to produce parameters and results	CLO1/ PI1.2	M	Multichoice questions	Online/paper sheets	30
2.	Design or simulate a biomedical signal measuring circuit	CLO2/ PI2.2	R	Written/Oral	Rubric	20
Summative assessment						**50**
3	Apply to biomedical signal measuring circuits. Analysis of biomedical digital electronic circuits	CLO3/ PI4.2 CLO4/ PI7.2	R	Written	Online/paper sheets	50

11. Learning Materials

- Textbook(s):

[1] Shakti Chatterjee; Aubert Miller, Biomedical Instrumentation Systems, Published by Delmar Cengage Learning, 2010

- References:

[2] Tran Thu Hà, *Basic Electronics*, National University publisher publisher, HCM city, HCMUTE, 2012.

[3] Nguyen Truong Duy, Vo Đuc Dung, Nguyen Thanh Hai, Nguyen Duy Thao, *Digital Systems*, National University publisher, HCMUTE, 2019.

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.

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Any 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.

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13. Approval Date: *<dd/mm/yyyy>*

14. Endorsement:

Dean	Head of Department	Chief Lecturer
Assoc. Prof. Dr. Nguyen Minh Tam	**Assoc. Prof. Dr. Nguyen Thanh Hai**	*<Full Name>*

15. Revision History:

1st Revision: *<dd/mm/yyyy>*	Lecturer: Head of Department: **Assoc. Prof. Dr. Nguyen Thanh Hai**
2nd Revision: *<dd/mm/yyyy>*	Lecturer: Head of Department: