Syllabus

1. **Course name:** Application of Ultrasound and Magnetism in Biomedicine
2. **Course code:** BIAP332965
3. **Credits:** 2 credits (3:0:8) (2 lecture periods, 0 lab period, 4 self-study periods per week)
4. **Instructors**
   a. Chief lecturer: Assoc. Prof. Dr. Nguyen Thanh Hai
   b. Co-lecturers: Dr. Dương Thanh Tai
5. **Course Requirements:**
   Prerequisite course(s): None
   Previous course(s): None
6. **Course Description**

   The course on the application of ultrasound and magnetism in biomedicine provides learners with essential information and an overview of some advanced instrumental uses of ultrasound and magnetism in engineering and biology. The content is divided into two sections: ultrasound applications (including the interaction of ultrasound with the matter, sonochemistry, non-destructive materials diagnosis, and the use of high-power ultrasound in treatment) and magnetic applications (including the basics of magnetism and magnetic materials, magnetic sensors, nanomagnetic medical applications, and biomagnetic fields).

7. **Learning Outcomes (CLOs)**

CLOs	Descriptions *On successful completion of this course, students will be able to:*	ELO(s) /PI(s)	Compe- tency
CLO1	Demonstrate understandings of scientific knowledge to explain the applications of electromagnetic field and ultrasonography in biomedical engineering.	ELO1/PI1.2	R
CLO2	Address issues in ultrasonic and electromagnetic applications by analyzing, explaining, and reasoning	ELO2/PI2.1	R
CLO3	Collaborate and communicate effectively in a team while working on a project.	ELO5/PI5.1	R
CLO4	Compute and design ultrasound imaging and electromagnetic simulation software or hardware.	ELO7/PI7.3	R

8. **Content outline**
   – *The development of magnetic fields and ultrasonic applications*
   – *The basis of ultrasound*
   – *Non-destructive material diagnosis by ultrasound*
   – *Application of high-power ultrasound in the treatment*
   – *Basics of magnetism and magnetic materials*
   – *Magnetic sensors*
   – *Magnetic fields in biology*

– *Safe for Magnetic fields*

9. Teaching Methods

– *Presentation*

– *Teamwork*

10. Assessment(s)

– Grading scale: **10**

– Assessment plan:

No.	Content	CLOs	Compe-tency	Assessment methods	Assessment tools	Weighting %
Formative assessment						**50**
1.	– Signal of ultrasound – Ultrasound system – Magnetic fields	CLO1	R	Assigments	Score sheet (online)	*20*
2.	– Describe the characteristics of ultrasonic signals – Describe the characteristics of the magnetic field – State the application of ultrasound – Magnetic field application	CLO4	R	Assigments	Score sheet /Rubric (online)	*30*
Summative assessment						**50**
3.	Students study English papers and delivery presentations	CLO2, CLO3	R	report	Rubric	*50*

11. Learning Materials:

– Textbook(s):

[1] Lecter give presentation material

[2] Jerrold T. Bushberg et. al., The Essential Physics of Medical Imaging, 2nd Ed., Lippincott Williams & Wilkins, 2002

– References:

[1] Cheeke J.D.N.: Fundamentals and Applications of Ultrasonic Waves, CRC Press 2002.

[2] BUSCHOW K. H. J., BOER F.R.: Physics of Magnetism and Magnetic Materials, Kluwer Academic Publishers, 2004.

[3] Malmivuo A., Plonsey R.: Bioelectromagnetism, Oxford University Press, 1995.

[4] Kayvan N., Robert S., Biomedical Signal and Image Processing, Taylor and Francis Group, 2006.

[5] Introduction to the Mathematics of Medical Imaging, C.L. Epstein, Prentice Hall, 2003

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.

Flexibility Notice

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: