HO CHI MINH CITY UNIVERSITY OF TECHNOLOGY AND EDUCATION

FACULTY OF ELECTRICAL AND ELECTRONICS ENGINEERING

Programme: Biomedical Engineering

Programme Level: Undergraduate

Syllabus

1. **Course name:** Robotics Engineering
2. **Course code:** ROBO331129
3. **Credits: 3** credits (3:0:6) (3 lecture periods, 0 lab period, 6 self-study periods per week)
4. **Instructors**
   a. Chief lecturer: Assoc. Prof. Dr. Nguyen Truong Thinh
   b. Co-lecturers:
   - Dr. Truong Phuoc Tho
   - Dr. Nguyen Tien Dung
5. **Course Requirements**

Prerequisite course(s): None

Previous course(s): Automatic Control, Applied Programming in Engineering.

6. **Course Description**

This course equips learners with basic knowledge of robotics engineering (in the industrial revolution 4.0) such as kinematics and dynamics calculations following the transformation matrix method and the Denavit - Hatenberg method in robot control. In addition, students will be studied following the main orientations for robotics applications in industry and services. This helps learners to realize the impact (left and right) on the society of using robotics in human life.

7. **Learning Outcomes (CLOs)**

CLOs	**Descriptions** *On successful completion of this course students will be able to:*	**ELO(s) /PI(s)**	**Compe-tency**
CLO1	Ability to apply learned knowledge to transform computations in robotics	ELO1/PI1.2	M
CLO2	Ability to do experiments and simulations to verify the operation of a simple robot.	ELO2/PI2.2	R
CLO3	Ability to work in a team in the field of robotics.	ELO5/PI5.3	R
CLO4	Ability to analyze the accuracy of robot calculations and design by specialized software.	ELO7/PI7.1	R

8. **Content outline**

- Overview and background of robotics, in which basic robot structure and function, characteristics, classification are presented.
- Studying robotic kinematics, mathematical foundations and problems of robotics kinematics.
- Setting the robot's motion trajectory, learn how to program for the robot to move with different trajectories.
- Studying robotic dynamics, principles and Lagrange equations.
- Studying robotic control, kinematic source types and transfer functions.

9. **Teaching Methods**

- *Powerpoint presentation*

- *Teamwork*

10. Assessment(s)

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

No.	Content	CLOs	Compe-tency	Asses-sment methods	Assess-ment tools	Weighting %
Formative assessment						**50**
1	knowledge of calculation about robots, concepts of motion	CLO1/ PI1.2	M	Essay	Online/paper sheets	10
2	Calculation on optimal forward kinematics for robots using Matlab	CLO1/ PI1.2	M	Essay	Online/paper sheets	20
Lần 3	Calculations of inverse kinematics, velocity and static force for robots	CLO1/ PI1.2	M	Essay	Online/paper sheets	20
Summative assessment						**50**
Lần 4	Submit report with calculations, design, control, experiment, simulate results for system analysis	CLO3/ PI5.3 CLO2/ PI2.2 CLO4/ PI7.1	R	Written/Oral	Rubric	50

11. Learning Materials

- Textbook(s):

  [1] Saeed B. Niku, Introduction to Robotics: Analysis, Systems, Applications, Pearson Education, 2015.

  [2] Nguyễn Trường Thịnh, Giáo trình Kỹ thuật Robot, NXB Đại học Quốc gia TP.HCM, 2014.

- References:

  [3] John J. Craig, Introduction to Robotics: mechanics and control, Addison-Wesley Pub. Co, 2012.

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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these materials may not be sold or commercialized without the express permission of the instructor.

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: