Automotive and Robotics Engineering

Introduction

Automotive Robotics Engineering (ARE) Program offers comprehensive approaches in developing students' excellent abilities towards Digital Era, implemented in wide spectrum of Intelligent Automotive Industries. ARE is a leading program prioritizing the implementations of robotics through Artificial Intelligence (AI).

The ability facilitates ARE students to analyze, design and build mechanical and automated electronic systems for automotive sub systems and manufacturing processes using design tools in global industries today. Subsequently, they are indispensable for students to be excellent in professional and/or entrepreneurship upon their study completion from BINUS ASO School of Engineering (BASE). Ultimately, the aforementioned abilities are aligned with current and incoming challenges in Digital Era of Industry 4.0; that include the design and development of mechanical systems with 3D tools, computerized electronic systems, intelligent automotive systems, and intelligent robotic systems for automation in various industries.

Vision

Becoming the most admired Automotive and Robotics Engineering program, which focus in intelligent automation system for well being, in providing young talented student with pride.

Mission

To contribute to the global community through the provision of world-class education by:

1. Educating students with the knowledge and skills of science and technology for the design, analysis, and application of mechanical and automation systems particularly for the automotive industry in a creative and resourceful manner.
2. Preparing graduates to become the future leaders in the global community with dignity, charm and discipline mind, while being sensitive to the social, environmental, and economic context.
3. Conducting high impact applied research in the field of engineering to improve quality of life and to contribute to the society which serves the profession of the faculties and enriches the students with contemporary issues.

Program Objective

The objectives of the program are:

1. Productively involved in identifying and solving engineering problems by creatively applying engineering principles in the broad areas of automotive and robotics engineering.
2. Attain successful careers with leadership positions in industry, academia, and public service.
3. Adapt to new technologies, tools and methodologies to respond to the rapidly changing world by continuously updating and renewing their knowledge throughout their careers.

Student Outcomes

At the end of the program, graduates will have these following competencies:

1. An ability to apply knowledge of math, science, and engineering.
2. An ability to design and conduct experiments, as well as analyze and interpret data.
3. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
4. An ability to identify, formulate, and solve engineering problems.

5.   An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

6.   An ability to function on multidisciplinary teams.

7.   An understanding of professional and ethical responsibility.

8.   An ability to communicate effectively.

9.   The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.

10. A recognition of the need for, and an ability to engage in life-long learning.

11. A knowledge of contemporary issues.

Prospective Career of the Graduates

1.   Automotive Automation Engineer
2.   Automated Driving Engineer
3.   Vehicle System Integration Engineer
4.   Automotive Electronic Test Engineer
5.   Industrial Robotics Integration Engineer
6.   Automation-based Solution Engineer
7.   Intelligent Embedded System Designer
8.   Technopreneur

Curriculum

The core curriculum of Automotive Robotics Engineering (ARE) Program complies with International acknowledged guideline of the Institute of Electrical and Electronics Engineers (IEEE) and Association for Computing Machinery (ACM). This compliance is one of competitive advantages for ARE Students toward International Recognition within Students' International Exposures in Professional and/or Entrepreneurship. Additionally, students will conduct their summer international study journey in Fukuoka, Japan. Throughout the summer semester course, students are exposed to comprehensive course and opportunity for internship in companies in Japan, coordinated by ASO College of Automotive Engineering and Technology. Ultimately, the aforementioned curriculum is orchestrated to ensure the balance between knowledge and industrial implementation through hands on projects.

This 4-year program covers basic courses and engineering fundamental to support concepts in automotive, electronics, and computer systems engineering. The technical, special courses and training for intelligent automotive robotics systems engineering, including internship and final project are provided both in Indonesia and Japan.

Course Structure

Sem	Code	Course Name	SCU	Total
1	CHAR6016	Character Building: *Pancasila*	2	20
	SCIE6058	Physics I	4/1	
	MATH6170	Calculus I	4	
	MATH6171	Linear Algebra	4	
	MATH6172	Chemistry	2	
	COMP6739	Physical Computing & Algorithm	3	
2	CHAR6017	Character Building: Kewarganegaraan	2	20
	SCIE6059	Physics II	4/1	
	MATH6173	Calculus II	4	
	MATH6174	Discrete Mathematics	4	
	CPEN6237	Circuit & Electronics	4/1	
3	STAT6182	Probability and Statistics	4	20
	CPEN6238	Computer Networks & Information Security	4/1	
	CPEN6115	Digital System	5/1	
	CPEN6118	Digital Signal Processing	2/1	
	ENTR6589	Entrepreneurship: Ideation	2	
4	CHAR6018	Character Building: Agama	2	20
	CPEN6117	Computer Organization and Architecture	4	
	AREN6028	Machine Learning	3/1	
	CPEN6239	IOT Design & Application	5/1	
	CPEN6240	Mobile Application Development for Engineer	2	
	ENTR6590	Entrepreneurship: Market Validation	2	
5	AREN6003	Strength of Materials	2	20
	AREN6029	Machine Element Design	4	
	Stream: Intelligent Robotics			
	AREN6030	Robot Kinematics and Dynamics	2/1	
	AREN6031	Data Science and Applications	3/1	
	AREN6032	Control Systems	3/1	
	AREN6033	Machine Learning for Robotics	2/1	
	Stream: Intelligent Automotive			
	AREN6034	Vehicle Propulsion & Energy Storage Systems	4/1	
	AREN6035	Computer Vision for Vehicle	2/1	
	AREN6036	Sensor Fusion for Vehicle	2/1	
	AREN6037	Autonomous Driving Systems	2/1	
6	**Enrichment Program I**		20	20
7	**Enrichment Program II**		20	20
8	AREN6014	Final Project	6	6
			TOTAL CREDITS 146 SCU	

Enrichment Program I (6th Semester) & Enrichment Program II (7th Semester):
-) *Student will take one of enrichment program tracks (off campus). See enrichment appendix for the tracks detail.*

Enrichment Track Scheme

Track	Semester 6							Semester 7						
	IN	FI	RS	EN	CD	SA	etc	IN	FI	RS	EN	CD	SA	etc
1	v								v					
2	v										v			
3	v												v	

Note:

IN	: Internship	CD	: Community Development
FI	: Field Project	SA	: Study Abroad
RS	: Research	PP	: Professional Practice
EN	: Entrepreneurship	etc	: Study Program Special Purposes

Description:
Student will take one of enrichment program tracks

Enrichment Internship Track

Code	Course Name	SCU	Total
Enrichment Program I			
AREN6038	Automotive Engineering***	4	20
AREN6039	Manufacturing Processes***	4	
AREN6040	Industrial Practice	8	
AREN6041	Current Technologies and Soft Skills	4	

*** *Summer Course in Fukuoka – Japan*

Enrichment Entrepreneurship Track

Code	Course Name	SCU	Total
Enrichment Program II			
AREN6045	Idea Generation and Prototyping	8	20
AREN6046	Business Plan Development	6	
AREN6047	New Knowledge Acquisition and Application	6	

Students develop his/her own business. This track must be supervised by at least a faculty member assigned by the Program.

Enrichment Field Project Track

Code	Course Name	SCU	Total
Enrichment Program II			
AREN6042	Knowledge and Skills Implementation	8	20
AREN6043	Communication and Teamwork	6	
AREN6044	New Knowledge Acquisition and Application	6	

Student work in the field such as: internship in a company/institution, community development, teaching in school, academic research, or independent project. This track must be supervised by at least a faculty member assigned by the Program.

Enrichment Study Abroad Track

Code	Course Name	SCU	Total
Elective courses list for study abroad*			
Enrichment Program II			
GLOB6272	Elective Course for Study Abroad 1	4	
GLOB6273	Elective Course for Study Abroad 2	4	
GLOB6274	Elective Course for Study Abroad 3	4	
GLOB6275	Elective Course for Study Abroad 4	4	
GLOB6276	Elective Course for Study Abroad 5	4	
GLOB6277	Elective Course for Study Abroad 6	2	20
GLOB6278	Elective Course for Study Abroad 7	2	
GLOB6279	Elective Course for Study Abroad 8	2	
GLOB6280	Elective Course for Study Abroad 9	2	
GLOB6281	Elective Course for Study Abroad 10	2	
GLOB6282	Elective Course for Study Abroad 11	3	
GLOB6283	Elective Course for Study Abroad 12	3	
GLOB6284	Elective Course for Study Abroad 13	3	
GLOB6285	Elective Course for Study Abroad 14	5	

*) Students take elective courses in top 200 International Universities with a total of 20 credit hours that support all the Program's Student Outcomes (SO1 - SO7).

Student should pass all of these quality controlled courses as listed below:

No.	Course Code	Course Name	Minimal Grade
1.	CHAR6016	Character Building: *Pancasila*	B