Seoul National University of
Science & Technology
232 Gongneung-ro,Nowon-gu,
Seoul 01811 Korea

MSDE Module Descriptor

Module Title Robotics	**Module Code** MSDE 462	**Semester (Sem 1 / Sem 2)** Sem 2
Credits 10	**Level** 6	**Professor and email** Hyuk-Dong KWON atom@seoultech.ac.kr
Delivery Method Lecture / Project / Exam	**Delivery Location** SeoulTech, Mugung Hall	

Module Synopsis

This unit covers analysis and design of robot system. Main subjects are (1) robot kinematics, (2) Jacobian, (3) trajectory planning, (4) sensor and actuators, (5) robot vision. As a tool, MATLAB is used for analysis of robot kinematics. In the final stage, experiments using the motor-sensor control kit are performed.

Outline Syllabus

Coordinates and transformation matrix of manipulators
Coordinates set and its transformation by rotation and translation.

Transformation matrix generation for multiple manipulators using D-H notations
4 parameters constituting each link and joint. Overall transformation matrix linking reference frame to final frame

Robot sensors and actuators
Principle of sensors and appropriate usage. Motor control schemes and selection of IC chips
Integration of sensors and motors
Sensor employment to robot body. Sensor data process to robot main processor. Motor driving input signal generation, and motor output signal transfer

Robot vision
Vision process. Geometry identification. Feature recognition and image enhancement

Experiments
Unit of DC motor and various sensors for control and measurement. A sensor-motor control kit practice for the set up and system behaviours.

Indicative Reading

Saeed B. Niku, Introduction to Robotics, Analysis, Systems, Applications, Wiley, 2011
S.K. Saha, Introduction to Robotics, 4th ed., , McGraw-Hill, 2011

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NOTIONAL STUDENT WORKLOAD	**Hours**
MODE OF DELIVERY (FT / PT / DL)	FT
Lectures	50
Seminars	20
Tutorials	20
Laboratories/studios/practical	
Directed learning	
Independent Learning	10
Work experience/fieldwork	
Other: eg formal presentation	
Total Workload 100 hours for a 10 credit module 200 hours for a 20 credit module	100

Module Learning Outcomes	
KU 1,2	KU1. Evaluate and apply complex knowledge of the scientific and mathematical principles of engineering to solve Real-World problems. KU2. Perform advanced analysis of unfamiliar engineering systems.
IPSA 1,2,3	IPSA1. Apply advanced approaches to solving unfamiliar real world engineering problems. IPSA2. Professionally communicate a broad range of engineering concepts to expert and non-expert audiences using a variety of advanced formats and media. IPSA3. Derive solutions to complex health and safety, sustainability and environmental issues in the engineering sector.
PVA 2	PVA2. Critically analyse advanced solutions to complex engineering problems.

Assessments	Assessment Type	Weighting %	Midterm/interim/final
Coursework			
Project	Workshops, Assignment	20	Interim
Quiz			
Test	Written	20	Midterm
Laboratory			
Exam	Written	60	Final exam
Presentation			