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

MSDE Module Descriptor

Module Title Engineering Mathematics I	**Module Code** MSDE 213	**Semester (Sem 1 / Sem 2)** Sem 1
Credits 10	**Level** 4	**Professor and email** Hyo-Sok Ahn hsahn@seoultech.ac.kr
Delivery Method Lecture / Project	**Delivery Location** SeoulTech, Mugung Hall	

Module Synopsis

This module aims to provide students with the ability to model physical phenomena in mathematical terms and solve developed equations. The student will acquire the fundamental knowledge required to solve differential equations. Topics included are ordinary differential equations, Laplace transforms and their applications to physical problems, and partial differential equations. Assessment is made through three quizzes and a final exam at the end of the course.

Outline Syllabus

First order differential equations
Method of separation of variables. Use of integrating factor to solve equations.
Definition of exact differentials and solution for exact differential equations.
Solving Bernoulli's equation.

Second order differential equations
Reduction of order. Homogeneous and nonhomogeneous equations with constant Coefficients. Method of undetermined coefficients. Method of variation of parameters. Solving Cauchy-Euler equation. Solving systems of differential equations.

Higher order differential equations
Homogeneous and nonhomogeneous equations with constant coefficients.
Method of undetermined coefficients. Method of variation of parameters.

Laplace transforms
Definition. Inverse transforms. Translation theorem. Derivative of transforms.
Transform of integrals. Solving differential equations containing periodic functions
or Dirac Delta function.

Series solutions of linear differential equations
Introduction to power series. Series solutions of linear differential equations: Use of
Special functions

Indicative Reading

1) Advanced Engineering Mathematics, 4th Ed., D.G. Zill, W.S. Wright, and M.R. Cullen, Jones and Bartlett Publishers, 2010
2) Advanced Engineering Mathematics, 10th Ed., E. Kreyszig, Jone Wiley & Sons, 2015

NOTIONAL STUDENT WORKLOAD	**Hours**
MODE OF DELIVERY (FT / PT / DL)	FT
Lectures	60
Seminars	
Tutorials	10
Laboratories/studios/practical	
Directed learning	20
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. Demonstrate basic knowledge of the scientific and mathematical foundations of engineering to solve basic problems. KU2. Perform simple analysis of familiar engineering systems.
IPSA 1,4	IPSA1. Demonstrate the use of fundamental approaches to solving readily defined engineering problems. IPSA4. Illustrate solutions to basic engineering problems.
PVA2	PVA2. Demonstrate creativity in discussing solutions to standard problems.

Assessments	Assessment Type	Weighting %	Mid-Term/interim/final
Coursework			
Project			
Quiz	40 min exam	30	Interim
Test			
Laboratory			
Exam	2 hrs exam	70	Final
Presentation			