Course Syllabus (Academic Year 2021)

School of Interdisciplinary Studies, Kanchanaburi Campus, Mahidol University

1. **Course No. and Title:** KAED 220 Engineering Mathematics

   Credit (study hours): 3 (3-0-6)

2. **Program Name:** Bachelor of Engineering in Environmental Engineering and Disaster Management

3. **Course Module:** Major Required Courses

   Pre/co-requisite: SCMA Ordinary Differrential Equations

4. **Class Semester:** ☑ 1st Semester ☐ 2nd Semester Academic Year 2021

5. **Class Schedule & Venue:** 09.00-12.00 on Thurdday, Webex Platform

6. **Class Coordinator:** Dr. Wimonmas Boonyungyuen

   Mobile: 081-9066678   Email: bwimonmas@yahoo.com

7. **Course Description**

   Engineering applications of ordinary differential equations, System of linear differential equations, Mathematical induction; Sequences and series of numbers, Taylor series expansions of elementary functions, Power series solutions of differential equations, Laplace transformation, Vector differential calculus, Polar coordinate, Calculus of real-valued functions of several variables, Vector integral calculus, Line integral, Volume integral, Green's theorem, Surface integrals, Divergence theorem of Gauss, Stokes's theorem, numerical methods; Engineering applications.

8. **Course Objectives / Course Learning Outcomes (CLOs)**

No	Objectives / CLOs	Expected Skills / Knowledge			PLOs
		Specific (S)	Generic (G)	Knowledge (K)	
1	To understand and be able to explain concepts and theories of engineering mathematics	S1	G1	K1	1
2	To apply concepts and theories in solving engineering problems	S1, S2	G1	K1,K2	1,3

   Specific Competences

   S1 Ability to create mathematics scripts

   S2 Ability to apply concepts and theories in solving engineering problems

Generic Competence

G1 Systematic thinking, problem solving, and analytical skills

Knowledge Competence

K1 Fundamentals and principles of Ordinary Differential Equations

K2 Incorporating engineering knowledge into Engineering Mathematics

9. Class Instructor List

9.1 Dr. Asawathep Cuntavepanit   Email: asawathep.cun@mahidol.ac.th

10. Course Outline

Week	Date	Contents	CLOs	Teaching & Learning method	Instructors
1	11/8/21 (13.00-16.00)	-Introduction -Theory of Ordinary Differential Equations	1	Course Syllabus and Lecture	AC and WB
2	19/8/21	Theory of Ordinary Differential Equations	1	Lecture and Assignment	AC
3	26/8/21	System of differential equations	1	Lecture, Activity, and Quiz	AC
4	2/9/21	System of differential equations for engineering	1	Lecture and Assignment	AC
5	9/9/21	Inference math sequence and series	1	Lecture and Assignment	AC
6	16/9/21	Series solutions of ordinary differential equations	1,2	Lecture, Activity, and Quiz	AC
7	23/9/21	Series solutions of ordinary differential equations	1,2	Lecture and Assignment	AC
8	30/9/21	Polar coordinates	1,2	Lecture and Assignment	AC
9	7/10/21	Mid-term Examination			AC
10	14/10/21	Laplace conversion results	1,2	Lecture and Assignment	AC
11	21/10/21	Laplace conversion results	1,2	Lecture and Assignment	AC
12	28/10/21	Differential calculus vector	1,2	Lecture, Activity, and Quiz	AC
13	4/11/21	Differential calculus vector	1,2	Lecture and Assignment	AC
14	11/11/21	Calculus of multivariate real-value functions	1,2	Lecture, Activity, and Quiz	AC
15	18/11/21	vector integral calculus - Line integrals, Green's theory, surface integrals	1,2	Lecture and Assignment	AC

16	25/11/21	Fundamentals of Numerical Methodology	1,2	Lecture and Assignment	AC
17	2/12/21	Final Examination	1,2		AC

11. Course Assessment

No.	Methods / Activities	Regulations	CLOs	Week	Weight Distribution (%)
11.1	Mid-term exam	☑ Content (Week 1-8) ☑ Closed book ☑ Faculty-approved calculator ☑ 3 Hours		9	30
11.2	Final exam	☑ Content (Week 10-16) ☑ Closed book ☑ Faculty-approved calculator ☑ 3 Hours		17	30
11.3	Quiz	- Each 30-min quiz will be given in class and cover the content from the previous weeks. There will be no make-up quizzes.		3,6,12 and 14	15
11.4	Assignments	- Each student will receive assignments or Homework by the given deadline.		1-8 and 10-16	20
11.5	Class participation	Student must attend class more than 80% of course.		1-8 and 10-16	5
				Total	**100**

12. Grading System

Grade	Score
A	≥80
B	75-79.99
B+	70-74.99
C+	65-65.99
C	60-64.99
D+	55-59.99
D	50-54.99
F	<50

13. References

- Boyce, W.E. (2006). *Elementary differential equations and boundary valued problems* (8th ed.). New York: Wiley.

- Kreyszig, E. (2011). *Advanced Engineering Mathematics* (10th ed.):John Wiley & Son, INC.

- Amos Gilat, Vish Subramanian (2008). *Numerical Methods for Engineers and Scientists: An Introduction with Applications Using MATLAB*. John Wiley & Son, INC.