COURSE SPECIFICATION

1. Administrative Information

Course Title :Engineering Mathematics (2)
Code :FSP 212
Department(s) offering the course :Mechanical power and Energy
Program (s) on which the course is given :Undergraduate level
Department offering the program (s) :Mechanical power and Energy
Academic year/level :Second year.
Semester :First Semester
Date of specification/revision :2004
Date of approval by Departmental/Faculty :05/10/2020
Taught hours:
Lecture: 4 hrs/week, **Tutorial:** 2 hr/week.
Total: 6 hrs/week.

2. Overall Aims of the Course

The course is designed to:

- Provide the student with theories and concepts used in solving differential equations.
- Teach students numerical procedure to solve differential equations.

3. Intended Learning Outcomes of the course (ILOs):

a- Knowledge and understanding:(A1, A5)

Upon completing this course, the student should be able to:

a_1- **Define** concepts used in differential equations and theories used to solve them, in addition to special functions and complex functions.
a_2-**Discuss** different methods of solving ordinary, ODE, and partial differential equations, PDE.
a_3-**Explain** the difference between solving ODE analytically or numerically.
a_4-**Describe** the Least-square method and its applications.

b- Intellectual skills: (B1, B2)

Upon completing this course, the student should be able to:

b_1- **Select** the appropriate solution of differential equations.
b_2- **Develop** numerical solution of differential equations.
b_3- **Apply** the least square method to fit engineering data.

c- Professional and practical skills: (C1)

Upon completing this course, the student should be able to:

c_1-**Use** different methods to solve differential equations arise in engineering applications.
c_2-**Apply** Fourier series to represent non-periodic functions into periodic functions.
c_3-**Evaluate** numerical solutions versus analytical ones in solving ODE.

d- General and Transferrable skills: (D1, D2)

Upon completing this course, the student should be able to:

d_1-**Collaborate** effectively and work with a team.
d_2-**Work** in stressful environment and manage tasks effectively.

4. Syllabus

CHAPTERS	CONTENTS
Chapter (1)	Complex Analytical functions
Chapter (2)	Limits, derivatives, exponents, logarithms, in complex plane
Chapter (3)	Power series to solve differential equations
Chapter (4)	Fourier series and integrals
Chapter (5)	Laplace transformers
Chapter (6)	Special methods to solve ordinary differential equations
Chapter (7)	Some special functions (Gamma-Beta)
Chapter (8)	Partial differential equation of second order and methods of solution
Chapter (9)	Numerical methods to solve differential equations
Chapter (10)	Least-square method

5. Teaching and Learning Methods

5.1- Lectures.
5.2- Tutorial
5.3- Discussion
5.3- Reports
5.4- Office hours.

6. Students Assessment:

6.1 Students Assessment Methods

6.1.1 Tutorial.
6.1.2 Reports
6.1.3 Mid-term exam.
6.1.4 Final Written exam.

6.2 Assessment schedule:

6.2.1 Tutorial	assignments every week
6.2.2 Reports	scheduled by the instructor according to the topic
6.2.3 Mid-term exam	Week # 8
6.2.4 Final Written exam	Scheduled by the faculty council

6.3 Weighing of assessments:

Semester Work (tutorial and reports)	10 %
Mid-Term Exam	23.3 %
Final Written Exam	66.7 %
Total	100 %

7-List of References

7.1-Course notes:

Course Notes: - Handouts prepared by the instructors.

7.2-Essential books (textbooks):

1- Merle C. PotterJack L. LessingEdward F. Aboufadel, 2019, "Advanced Engineering Mathematics", 4th Edition, Springer Nature Switzerland AG.

7.3-Recommended books:

1- J. David Logan, 1987, "Applied Mathematics, A Contemporary Approach". John Wiley & Sons, Inc.
2- Textbook of Engineering Mathematics, DebashisDatta, 2nd edition, 2006, New age international Publishers, India.
3- William Boyce, and Richard Diprima, 1965, "Elementary Differential equations", John Wiley & Sons Inc.
4- Thomas and Finney, 1984, "Calculus and Analytic Geometry ", Addison – Wesley Co.
5- Solution to engineering mathematics, vol III, C.P.Gandhi, First edition, 2006, Laxmi publications, India.

7.4-Periodicals, websites, etc.:

The main book is available through Egyptian Knowledge Bank (EKB):
https://0810255t7-1103-y-https-link-springer-com.mplbci.ekb.eg/book/10.1007/978-3-030-17068-4#about

8-Other Resources/ Facilities required for teaching and learning to achieve the above ILOs.

- Student library.
- Well-prepared white boards.
- data show
- Student computer lab.

9- We certify that all of the information required to deliver this course is contained in the above specification and will be implemented.

Course Coordinator:

Name: Mohamed R. O. Ali, PhD

Signature: ……..……..**Date: Oct. 2020**

Head of Department

Name: Prof. Dr. Ibrahim M. M. El-Moghazy

Signature: ……..……..**Date: Oct. 2020**

Course Curriculum Map

Course title: Engineering Mathematics (2)
Course coordinator: Mohamed R. O. Ali, PhD
Course aim: The course is designed to:

- provide the student with theories and concepts used in solving differential equations.
- Teach students numerical procedure to solve differential equations.

Course code	Intended Learning Outcomes (ILOs)				Topics	Week #	Teaching Methods	Assessment Methods	Evidences
	Knowledge and understanding	Intellectual skills	Professional and practical skills	General and transferable skills					
FSP 212	a1+a2	b1	c1	d1 + d2	Laplace Transformers	1- 3	-Lectures -Tutorial -Reports -Discussion -Office hours	-Semester work (tutorial assignments and reports) Mid-term exam. Final Written exam	Course file, Exam samples, Regular reports,
	a1+a2	b1	c1	d1 + d2	Power series to solve differential equations	3-5			
	a1+a2	b1	c2	d1 + d2	Fourier series and integrals	5-7			
	a1	b1	c3	d1 + d2	Complex functions, limits, derivatives, exponents, logarithms	9			
	a1+a2+a3	b1+b2	c1	d1 + d2	Partial Differential Equation and	9-11			
	a1+a2+a3	b2	c1+c3	d1 + d2	Numerical methods for solving differential equations	11			
	a1+a4	b3	c4	d1 + d2	Special functions and Least square method	11-13			

Department Head: Prof. Dr. Ibrahim M. M. El-Moghazy