



# THE FEDERAL UNIVERSITY OF TECHNOLOGY, AKURE

## *Department of Mathematical Sciences*

### MTS 315 – Engineering Mathematics

#### COURSE PARTICULARS

**Course Code:** MTS 315

**Course Title:** Engineering Mathematics

**No. of Units:** 3

**Course Duration:** Two hours of theory and one hour of tutorial per week for 15 weeks.

**Status:** Compulsory

**Course Email Address:** mts315@gmail.com

**Course Webpage:** <http://www.mts.futa.edu.ng/courseschedule.php?coursecode=MTS%20204>

**Prerequisite:** MTS 102, MTS 201

#### COURSE INSTRUCTORS

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#### COURSE DESCRIPTION

This course is the first course in Mathematical sciences designed for students in School of Engineering only. The focus of the course is to teach students an application of mathematics in the real life problems in the area of Engineering. Topics to be covered include first order ordinary differential equations, Existence and uniqueness theorem, second order ordinary differential equations, linear dependence, Wronskian, reduction of undetermined coefficient, variation of parameters, general theory of nth order linear equation, Series solution about ordinary and regular points, special functions, Bessel, Legendre and Hypergeometric. Laplace transform and application to initial value problems.

## COURSE OBJECTIVES

The objectives of the course are to:

- provide students the opportunity to identify real life problems leading to practical problems in engineering;
- introduce students to real life problems in the area of engineering;
- students should be able to identify real life problems in engineering and solve it mathematically;
- students should be able to solve theoretically real life ODE problems in the field of engineering.

## COURSE LEARNING OUTCOMES / COMPETENCIES

At the completion of the course, student will be able to:

*(Knowledge based)*

- classify given practical engineering problems into different types of ODEs problems ;
- identify real life problems leading to any of these equations;
- classify and explain real life engineering problems leading to special ODEs functions such as Bessel, Legendre and Hypergeometric function;

*(Skills)*

- solve the given ODEs equations with appropriate methods
- solve initial value problems using Laplace transform.

## GRADING SYSTEM FOR THE COURSE

This course will be graded as follows:

Class Attendance	5%
Quizzes/Assignments	15%
Test(s)	10%
<u>Final Examination</u>	<u>70%</u>
<b><u>TOTAL</u></b>	<b><u>100%</u></b>

## GENERAL INSTRUCTIONS

**Attendance:** It is expected that every student will be in class for lectures and also participate in all practical exercises. Attendance records will be kept and used to determine each person's qualification to sit for the final examination. In case of illness or other unavoidable cause of absence, the student must communicate as soon as possible with any of the instructors, indicating the reason for the absence.

**Academic Integrity:** Violations of academic integrity, including dishonesty in assignments, examinations, or other academic performances are prohibited. You are not allowed to make copies of another person's work and submit it as your own; that is plagiarism. All cases of

academic dishonesty will be reported to the University Management for appropriate sanctions in accordance with the guidelines for handling students' misconduct as spelt out in the Students' Handbook.

**Assignments and Group Work:** Students are expected to submit assignments as scheduled. Failure to submit any given assignment, as at when due, will earn the student zero for that assignment. Only under extenuating circumstances, for which a student has notified any of the instructors in advance, will late submission of assignments be permitted.

**Code of Conduct in Lecture Rooms and Laboratories:** Students should turn off their cell phones during lectures. Students are prohibited from engaging in other activities (such as texting, watching videos, etc.) during lectures. Food and drinks are not permitted in the laboratories.

## READING LIST

<sup>1</sup>Dass, H. K.: Advanced Engineering Mathematics. S. Chand & Company Limited, New Delhi, 2008

<sup>3</sup> Stroud ,K.A. :Further Engineering Mathematic. Macmillan Press Limited ,1996

### **Legend**

1- Available in Departmental/School Libraries

2- Available on the Internet.

3- Available as Personal Collection

4- Available in local bookshops.

## COURSE OUTLINE

Week	Topic	Remarks
1 & 2	First order ordinary differential equation	During this first class, students should know how to solve first order ODEs.
3	Existence and uniqueness theorem	Class quiz and exercises will be administered to the students.
4 & 5	Second order ODEs	exercises and take-home assignments will be given to the students.
6&7	Linear dependence, Wronskian & reduction of undetermined coefficient	exercises will be administered to the students.
8	Variation of parameters	Class quiz will be administered to the students.
	Mid-Semester's Test	administration of mid-semester's test
9	General theory of nth order linear equation	Students should understand general theory of nth order ODEs.
10	Series solution about ordinary and regular points	Class quiz and exercises will be administered to the students.
11&12	Special functions; Bessel, Legendre, Hypergeometry	exercises will be administered to the students.
13	Laplace transformation	Students should understand how to solve initial value problems using Laplace transformation.
14	Revision	Students prepare for semester's examinations. Evaluation will be done to assess how far the students' expectations for the course have been met.
15	Examination	Semester final examination.