MTS 307 – Introduction to Mathematical Modelling.

COURSE PARTICULARS

Course Code: MTS 307
Course Title: Introduction to Mathematical Modelling
No. of Units: 3
Course Duration: Two hours of Lecture and one hour of tutorial per week for 15 weeks.
Status: Compulsory
Course Email Address:
Course Webpage: http://www.mts.futa.edu.ng/courseschedule.php?coursecode=MTS%20302
Prerequisite: MTS 206

COURSE INSTRUCTORS

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COURSE DESCRIPTION

This course is an introductory course on Mathematical Modelling. It is designed for students studying mathematical sciences (i.e. Mathematics and Statistics). It may, however, be useful to students in sciences, engineering and other related fields. It introduces students to basic concepts in mathematical modelling. It also equips the students with mathematical modelling skills with emphasis on using mathematical models to solve real- life problems. Topics to be covered in this course includes: methodology of model building, problem identification and definition, model formulation and solution, consideration of varieties of models involving equations like algebraic, ordinary differential equation, partial differential equation, difference equation, integral and functional equations, consideration of some specific applications of mathematical models to biological, social, and behavioural sciences.

COURSE OBJECTIVES

The objectives of this course are to:

- enable students understand how mathematical models are formulated, solved , and interpreted.
- make students appreciate the power and limitations of mathematics in solving practical real-life problems.
- equip students with the basic mathematical modelling skills.

COURSE LEARNING OUTCOMES / COMPETENCIES

Upon successful completion of this course, the student will be able to:

- understand what a mathematical model is and explain the series of steps involved in a mathematical modelling process.
- state and explain the different classifications of mathematical models stating examples in each classes
- explain the essential features of a good model and discuss the benefits of using a mathematical model.
- Identify some simple real-life problems that can be solved using mathematical models, model the problem(s), solve the resulting problem, and interpret the solution.
- Mention and discuss some applications of mathematical modelling in solving problems in engineering, physical, biological, social and behavioral sciences
- Acquire basic mathematical modelling skills that will enable them carry out simple modelling tasks individually or as a group.

GRADING SYSTEM FOR THE COURSE

This course will be graded as follows:

Assignments and/or Group works	20%
Test(s)	20%
Final Examination	60%
TOTAL	**100%**

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 an assignment as at when due will earn you 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 lecture room.

READING LIST

[1] Berry J. And Houston K. (1995). Mathematical Modelling. Edward Arnord , London, United Kingdom. 142p.

[1]Finkelstein, L and Carson E.R. (1985). Mathematical Modelling of Dynamic Biological Systems (2nd Edition). Research Studies Press, Herfordshire, England. 355p

[3]IL Chern. (2008). Mathematical Modelling and Ordinary differential Equations. *scicomp.math.ntu.edu.tw/wiki/images/c/c0/Chern_ode.*

[4]Joshua Paul Abrams. Mathematical Modeling: Teaching the Open-ended Application of Mathematics. www.meaningfulmath.org

Legend
1- Available in the University Library
2- Available in Departmental/School Libraries
3- Available on the Internet.
4- Available as Personal Collection
5- Available in local bookshops.

COURSE OUTLINE

Week	Topic	Remarks
1	Introduction and Course Overview • Brief introduction • Course outline • Introduction to mathematical modelling.	During this first class, students are to be given an indication of what is to be covered and how the course will be assessed. Here, students should be able to differentiate between mathematical model and mathematical modelling. They should also be able explain the basic steps in mathematical modelling.
2 ,3 & 4	• Classes of mathematical models and examples of each • Features of good models • Benefits of using mathematical models	Students should be able to explain the different classes of mathematical model and give examples of each. They should also be able to tell the features that make a model a good one and discuss some benefits of using Mathematical models.
5,6,7 & 8	Model formulation and Solution • Sample model(s) from Physics/Engineering • Sample model(s) in Biological Sciences • Sample model(s) in Economics/ Social Sciences.	Here, students should be able to understand how each of the sample models are formulated , solved and interpreted.
9 &10	MODELLING GROUP WORK	Students will be divided into groups of 3-5 students. Each group will be given a modelling task to carryout and write report of the modelling exercise. Also, each group will give a brief presentation of their report. Each member of the group will be scored based on their individual participation in the group work, the content of the report and the oral presentation.

11,12,13 & 14	Some additional applications of Mathematics modelling • Biological applications • Social and behavioral sciences applications • Physics and Engineering applications.	Students should be able to identify problem(s) in real life either in a biological, social, or engineering context; model the problem; solve the model mathematically and interpret the result to address the identified problem. SEMESTER TEST
15	REVISION	This is the revision week for the students which will enable them prepare adequately for the examination.