Introduction to the Lecture

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MCI

M.Sc Higher Mathematics I

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- The goal of this lecture is to introduce you to the tools you need to learn to tackle more advanced engineering problems.
- These could be ranging from doing circuit analysis to calculating the stress experienced by a bridge which will be covered in this lecture series as examples.
  The structure for this lecture is as follows.
- This lecture is a total of 2 SWS with a total of thirty (30) UE.
  - With 30 UE is devoted to lectures.

Introduction

- Lecture materials and all possible supplements will be present in its Github Repo.
  - You can easily access the link to the web-page from here.

> Github is chosen for easy access to material management and CI/CD capabilities and allowing hosting websites.

- In the lecture some exercises are solved using programming and can be accessed from the Repo website.

Introduction

- The student should be comfortable with working with calculus and be familiar with taking derivatives and doing integration.

Requirements	Taught Lecture	Code	Degree	Outcome
Calculus	Mathematics I	MAT I	B.Sc	Advanced Vector Calculus
Linear Algebra	Mathematics II	MAT II	B.Sc	ODE Solving Methods
-				Understanding Transforms
-				Eigenvalues, Eigenvectors
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Table 1: Distribution of materials across the semester.

Description	Value
Official Name	Höhere Mathematik 1
Lecture Code	HMA
Module Code	MECH-M-1-HMA-HMA-VO
Degree	M.Sc
Lecture Name	Drive Systems
Semester	1
Season	WS
Assignments	Personal Assignment Final Exam
Lecturer	Daniel T. McGuiness, Ph.D
Module Responsible	DaM
Software	Python, SageMath
SWS Total	2
UE Total	0
ECTS	3

Table 2: Information regarding the lecture.

Introduction

- The lecture will have a single personal assignment comprising of a set list of questions and a final exam comprising of all the topics covered in the lecture.
- For the written exam you are allowed to write your own equation reference paper, as long as it is a single sheet of A4, double sided and contains no exercise or solutions.

Assignment Type	Value
Personal Assignment	40
Final Exam	60
SUM	100

Table 3: Distribution of materials across the semester.

Title
Thomas Calculus (12th Edition)
Probability: A Graduate Course
Partial Differential Equations of Mathematical Physics
Partial Differential Equations - An Introduction
Probability and Statistics for Engineers & Scientists
Mathematical Methods in the Physical Sciences (3rd Edition)
Mathematical Methods for Physics and Engineering (3rd Edition)
Differential Equations with Applications and Historical Notes (3rd Edition)
Advanced Engineering Calculus (9th Edition)
Applied Statistics and Probability for Engineers (3rd Edition)
A Students Guide to Fourier Transform
Mathematics of Diffusion
Partial Differential Equations in Physics
Probability and Stochastics
Random Walks in Biology

Table 4: Lecture sources which can be useful during the course of the lecture. For more information on sources, please consult the repo.

Introduction

- The content and unit distribution of the lecture is as follows where a unit is defined as 45 min lecture.

Topic	Units	Self Study
First-Order Ordinary Differential Equations	2	4
Second-Order Ordinary Differential Equations	4	8
Higher-Order Ordinary Differential Equations	2	4
Systems of ODEs	4	8
Special Functions for ODEs	2	4
Laplace Transform	4	8
Linear Algebra I - Fundamentals	2	4
Eigenvalue Problems	4	8
Vector Differential Calculus	4	8
Vector Integral Calculus	2	4
Sum	30	60

Table 5: Distribution of materials across the semester.