M.Sc Higher Mathematics I
Introduction to the Lecture
LectureSlide

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Introduction

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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.
- This lecture is a total of 2 SWS with a total of thirty (30) UE.
- A unit (UE) is defined as 45 min lecture.

- 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 content is also distributed as a WebBook which can be accessed from the Repo website.

- 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
Lecture Name	Higher Mathematics I
Semester	1
Season	WS
Lecturer	Daniel T. McGuiness, Ph.D
Module Responsible	DaM
Software	Python, SageMath
SWS Total	2
UE Total	30
ECTS	3
Working Language	English

- 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

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)

Table 2: Lecture sources which can be useful during the course of the lecture. For more information on sources, please consult the repo.

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

Topic	Units	Self Study
SUM	28	56