PRE-UNIVERSITY PROGRAM

ENGINEERING FACULTIES

INTRODUCTION:

In general, universities do not consider the diversity of backgrounds among students, as the students came from different countries with differentt levels of knowledge.

The course aims to close the readiness gap between high school and university. It was specifically developed for potential future students: it covers **physics and calculus** topics that are a prerequisite for most of engineering programs. The course not only covers the content needed for further study but also introduces the different ways in which knowledge is presented at university level to ensure an easy entry to a new degree program.

PRE-PHYSICS

COURSE OVERVIEW:

Physics is the foundation of many important science and engineering disciplines. Understanding its basics is fundamental for advanced studies. In this course, you will have the chance to review the fundamentals to ensure you have a smooth start in the first year of your Bachelor's degree.

INSTRUCTOR:

Dr. Eng. Louay Karaker (PhD in Structural Engineering in Istanbul University – Cerrahpasa). Academic tutoring and teaching experience since 2016.

COURSE DETAILS:

This course is distributed through 10 hours (4 sessions / 2.5 hours) covering the following topics:

1. Introduction

- 1.1.1. What is physics?
- 1.1.2. Physics and Measurement
- 1.1.3. Physical Quantities
- 1.1.4. Unit Systems
- 1.1.5. Unit Prefixes
- 1.1.6. Conversion of Units
- **1.1.7.** Significant Figures

2. Vectors and Scalars

- 2.1. Vectors and Scalars
- 2.2. Vector Addition and Subtraction
- 2.3. Components of Vectors
- 2.4. Coordinate Systems
- 2.5. Unit Vectors
- 2.6. Products of Vectors
- 2.6.1. Scalar Product
- 2.6.2. Vector Product

3. Motion

- 3.1. Motion Along a Straight Line
- 3.2. Motion in Two Dimensions
- 3.3. Motion with Constant Acceleration
- 3.4. Projectile Motion
- 3.5. Motion in a Circle

4. Newton's Laws of Motion

- 4.1. Newton's Laws of Motion
- 4.2. Newton's Laws Applications

5. Work and Energy

- 5.1. Work Done by a Constant Force
- 5.2. Work–Kinetic Energy Theorem
- 5.3. Potential Energy of a System
- 5.4. Conservation of Energy

PRE-CALCULUS

COURSE OVERVIEW:

Calculus is one of the most important courses that engineering student study in his first year. This course aims to provide the new engineering students with the fundamentals which are expected by the professors at the universities.

INSTRUCTOR:

Dr. Eng. Anas Hesham (Ph.D. at Istanbul Technical University).
5 years of experience in teaching math and calculus courses for several universities.

COURSE DETAILS:

This course is distributed through 10 hours (4 sessions / 2.5 hours) covering the following topics:

1. **Review on math:**
   - 1.1. Expressions: Combining like terms, Expansion and factoring, etc.
   - 1.2. Solving equations
   - 1.3. System of equations
   - 1.4. Inequalities
   - 1.5. Long division
   - 1.6. Absolute values
   - 1.7. Lines and circles
   - 1.8. Operations on fractions
   - 1.9. Introduction to logarithms

2. Review on Trigonometry:

- 2.1. Introduction: sin, cos, tan, sec, csc, cot
- 2.2. Famous triangles: 30°-60°, 45° right triangles
- 2.3. Unit circle
- 2.4. Famous trigonometric identities
- 2.5. Double and half angle formulas

3. Introduction to functions

- 3.1. Definition
- 3.2. Functions graphs
- 3.3. Domain and range

4. Basic differentiation

- 4.1. Differentiation rules

DATE AND TIME: Summer course (2 weeks) - 9/2022

COURSE TIMETABLE:

Date	Time: 2:00 - 4:30 PM	Topics
Monday 12-09-2022	PRE-PHYSICS	Introduction
Tuesday 13-09-2022	PRE-PHYSICS	Vectors and Scalars
Wednesday 14-09-2022	PRE-CALCULUS	Review on Math
Thursday 15-09-2022	PRE-CALCULUS	Review on Trigonometry
Monday 19-09-2022	PRE-PHYSICS	Motion & Newton's Laws
Tuesday 20-09-2022	PRE-PHYSICS	Work and Energy
Wednesday 21-09-2022	PRE-CALCULUS	Introduction to Functions
Thursday 22-09-2022	PRE-CALCULUS	Basic Differentiation