

# GE2301: SCIENCE AND TECHNOLOGY: FASCINATING MECHANICAL ENGINEERING

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## Effective Term

Semester A 2022/23

## Part I Course Overview

### Course Title

Science and Technology: Fascinating Mechanical Engineering

### Subject Code

GE - Gateway Education

### Course Number

2301

### Academic Unit

Mechanical Engineering (MNE)

### College/School

College of Engineering (EG)

### Course Duration

One Semester

### Credit Units

3

### Level

A1, A2 - Associate Degree

B1, B2, B3, B4 - Bachelor's Degree

### GE Area (Primary)

Area 3 - Science and Technology

### Medium of Instruction

English

### Medium of Assessment

English

### Prerequisites

Nil

### Precursors

Nil

### Equivalent Courses

Nil

### Exclusive Courses

Nil

## Part II Course Details

### Abstract

Science and technology are not only essential parts of human civilization. They are also important for transforming business based on labor-intensive, low value-added activities to knowledge-intensive, high value-added activities. The continued success of business often depends on making creative and effective use of science and technology. Graduates will have many opportunities to work with science and technology establishments in their professional capacities as business executives, public administrators, legal practitioners, mass media professionals, etc. This course will help the students understand the importance of technology and applied sciences in different aspects with a focus on mechanical engineering. This course also intends to help the students develop an appreciation for scientific inquiry and critical reasoning. These basic skills are useful for students' career development in different disciplines.

### Course Intended Learning Outcomes (CILOs)

CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Identify the principles of scientific methodology / reasoning as they are applied to solving everyday problems.		x	
2	Evaluate alternative methods / solutions comprehensively, using a wide array of criteria such as technological attributes, ethics and impacts on the environment.		x	
3	Analyze the relationships between science and technology and society as well as how they affect socio-economic developments.		x	x

#### A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

#### A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

#### A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

### Teaching and Learning Activities (TLAs)

TLAs	Brief Description	CILO No.	Hours/week (if applicable)	
1	Lecture	Lectures on selected science and technology topics.	1, 2, 3	39 hrs (total)

### Assessment Tasks / Activities (ATs)

ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)	
1	Mid-term Test	1, 2, 3	50	

**Continuous Assessment (%)**

50

**Examination (%)**

50

**Examination Duration (Hours)**

2

**Additional Information for ATs**

For a student to pass the course, at least 30% of the maximum mark for both coursework and examination should be obtained.

**Assessment Rubrics (AR)**

**Assessment Task**

1. Mid-term Test

**Criterion**

1.1 Ability to describe the important factors and issues of certain disciplines of science and technology affecting the society.  
1.2 Ability to evaluate and integrate the information using process(es) of scientific reasoning to identify facts from wishful thinking.

**Excellent (A+, A, A-)**

High

**Good (B+, B, B-)**

Significant

**Fair (C+, C, C-)**

Moderate

**Marginal (D)**

Basic

**Failure (F)**

Not even reaching marginal levels

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**Assessment Task**

2. Final examination

**Criterion**

2.1 Ability to describe the basic principles of certain disciplines of science and technology.  
2.2 Ability to describe the important factors and issues of certain disciplines of science and technology affecting the society.  
2.3 Ability to draw conclusions based on valid evidence or proof.

**Excellent (A+, A, A-)**

High

**Good (B+, B, B-)**

Significant

**Fair (C+, C, C-)**

Moderate

**Marginal (D)**

Basic

**Failure (F)**

Not even reaching marginal levels

**Additional Information for AR**

Note: For a student to pass the course, at least 30% of the maximum mark for both coursework and examination should be obtained.

**Part III Other Information****Keyword Syllabus**

- History of technology development and its impacts on human civilization.
- Discipline specific topics: statics and dynamics, engineering materials, mechanics, thermodynamics and heat transfer, fluid mechanics, automation and control, robotics, mechanical product design (CAD/CAM), and energy harvest/vibration/ green manufacture.

**Reading List****Compulsory Readings**

Title	
1	Nil

**Additional Readings**

Title	
1	A. Ede and L.B. Cormack, A History of Science in Society, From Philosophy to Utility. Peterborough, Broadview Press.
2	Whitfield, P., History of Science. Danbury, CT: Grolier Educational.
3	Bridgstock et al., Science, technology, and society: an introduction. Cambridge, U.K.; New York: Cambridge University Press.
4	Joerges, B. and Nowotny, H., Social studies of science and technology: looking back, ahead. Dordrecht; Boston: Kluwer Academic Publishers.
5	Sismondo, S., An introduction to science and technology studies. Malden, MA: Blackwell Pub.
6	James E. McClellan III and Harold Dorn, Science and technology in world history: an introduction. Baltimore: Johns Hopkins University Press.
7	Temple, Robert K. G., The genius of China: 3,000 years of science, discovery, and invention. London: Prion.
8	BBC News (Science & Nature) <a href="http://news.bbc.co.uk/2/hi/science/nature/default.stm">http://news.bbc.co.uk/2/hi/science/nature/default.stm</a>
9	New York Times Science Page <a href="http://www.nytimes.com/pages/science/index.html">http://www.nytimes.com/pages/science/index.html</a>
10	New York Times Technology Page <a href="http://www.nytimes.com/pages/technology/index.html">http://www.nytimes.com/pages/technology/index.html</a>
11	CNN/Technology <a href="http://edition.cnn.com/TECH/">http://edition.cnn.com/TECH/</a>

**Annex (for GE courses only)**

A. Please specify the Gateway Education Programme Intended Learning Outcomes (PILOs) that the course is aligned to and relate them to the CILOs stated in Part II, Section 2 of this form:

Please indicate which CILO(s) is/are related to this PILO, if any (can be more than one CILOs in each PILO)

**PILO 1: Demonstrate the capacity for self-directed learning**

3

**PILO 2: Explain the basic methodologies and techniques of inquiry of the arts and humanities, social sciences, business, and science and technology**

1, 2, 3

**PILO 3: Demonstrate critical thinking skills**

1, 2, 3

**PILO 4: Interpret information and numerical data**

2, 3

**PILO 10: Demonstrate the attitude and/or ability to accomplish discovery and/or innovation**

1, 2, 3

**B. Please select an assessment task for collecting evidence of student achievement for quality assurance purposes. Please retain at least one sample of student achievement across a period of three years.**

**Selected Assessment Task**

Final examination