

## Subject Description Form – General University Requirements (GUR)

<b>Subject Code</b>	AP1D01
<b>Subject Title</b>	Science and Technologies of Economic Importance
<b>Credit Value</b>	3
<b>Level</b>	1
<b>Pre-requisite and/or Exclusion(s)</b>	Nil
<b>Medium of Instruction</b>	English
<b>Objectives</b>	<p>Advancements in science and technologies continuously lead to new consumer and industrial products of great commercial or economic values to the society. They are important to us not only as individual consumers but also because of the new career opportunities they provide. We aim at studying the science and the working principles of technologies in electronics, communication, transportation, energy generation and materials which have good economic values. Their potentials and limits for further developments based on current scientific understandings will be discussed.</p>
<b>Intended Learning Outcomes</b>	<p>Upon completion of the subject, students will be able to:</p> <ul style="list-style-type: none"> <li>(a) explain the basis science and working principles of a range of technologies important to consumers and/or business;</li> <li>(b) describe examples on how scientific discoveries lead to new commercial or industrial products;</li> <li>(c) discuss the potential and limits of emerging technologies;</li> <li>(d) compare the viability of competing technologies;</li> <li>(e) better follow the development of technologies by reading from appropriate sources;</li> <li>(f) develop an enquiring mind on how things work.</li> </ul> <p><u>Literacy:</u></p> <p>Students are required to read articles in popular science and technology magazines besides reference books (outcome (e)). Writing of essays is also required.</p> <p><u>Higher order thinking:</u></p> <p>Studying the logics behind the science and technologies to be discussed requires exercising rigorous scientific methods and provides excellent training on higher order thinking (outcome (a)). Exercises on judgment of the potential, limits, and viability of given technologies provide further training.</p> <p><u>Skills for life-long learning:</u></p> <p>Development of a reading habit on books and popular science magazines (outcome (e)) and an enquiring mind of how things work (outcome (f)) should aid life-long learning.</p>

<b>Subject Synopsis/ Indicative Syllabus</b>	<p>The main focus is on the basic science and the working principles of selected technologies which have achieved widespread applications. We will emphasize logical deductions and the application of scientific methods rather than facts and detailed mathematics. The driving forces for the development of some of these technologies and the reasons for their commercial success will be briefly discussed.</p> <p><b><u>Keyword syllabus</u></b></p> <p><b>Electronics:</b> silicon, diode, LED, transistor, digital logic; working principles of computers, display devices; digital audio and visual entertainment;</p> <p><b>Communication:</b> radio wave and light, basic optics, optical fiber, mobile communication.</p> <p><b>Transportation:</b> electric motor and generator, fuel cell, combustion engine; automobile, electric and hybrid cars; jet engine, rocket, airplane, space tourism.</p> <p><b>Energy:</b> fossil fuel, solar panel, wind turbine, nuclear fission, nuclear fusion.</p> <p><b>Materials:</b> formation and mining of metal ores and precious stones; material strength, polymer, composite materials.</p>
<b>Teaching/Learning Methodology</b>	<p><u>Lectures:</u></p> <p>The main learning materials will be presented with emphasis on logical deduction and the use of scientific methods for in-depth understanding.</p> <p><u>Tutorials:</u></p> <p>Discussions on selected articles on new technologies of current interest as chosen by the lecturer and the students will be conducted. Group presentations on case studies of the science, development, and impacts of selected technologies will be carried out.</p> <p><u>Assessment:</u></p> <p>Assignments (30%) and tests (20%) will focus on the study of the science and the effectiveness of the technologies. They mainly involves logical and scientific deductions, and in certain cases also simple mathematics.</p> <p>Students will work in small groups on case studies. Each member will be responsible on a different aspect of a single or a number of closely related technologies chosen by the group. Extensive literature search and reading is required. Assessment on the works will be based on group presentations (20%) and essays (30%) submitted by each individual student.</p>

Assessment Method	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					
			a	b	c	d	e	f
	1. Assignments	30	√		√	√		
1. Tests	20	√		√	√			
2. Eassy	30	√	√	√	√	√	√	
3. Presentation	20	√	√	√	√	√	√	
Total	100							

  

Student Study Effort Expected	Class contact:	
	▪ Lecture	28 h
	▪ Tutorials	8 h
	Other student study effort:	
	▪ self-study	72 h
	Total student study effort	108 h

  

Reading List and Reference	<ol style="list-style-type: none"> <li>1. Scientific American, Scientific American Inc.</li> <li>2. Popular Mechanics, Popular Mechanics Co.</li> <li>3. Technology: Today and Tororrow, S.A. Brusic, J.F. Fales, and V.F. Kuetemeyer, Mcgraw-Hill 2003.</li> <li>4. How Things Work: The Physics of Everyday Life, 4<sup>th</sup> ed, L.A. Bloomfield, Wiley 2009.</li> </ol>
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