

**Title (Units):** **GDSC1017 Science and Technology Behind the Movies (3,2,1)**

**Course Aims:** This course aims to make use of examples from movies and TV drama episodes as motivations to introduce students to some key concepts and latest developments in science and technology which can make significant impacts (e.g., new opportunities and experience) on our future ways of life. It provides first an overview on key milestones in science and technology development, and their impacts on our daily life. The major portion of the course covers selected concepts and principles in science and technology to be presented under themes like human-like robots, genetic engineering, space travel, etc. After taking the course, students should be able to gain better understanding on the science and technology frontiers, explain the key principles behind, and describe how they can be related to their future life.

**Prerequisite:** Nil

**Course Intended Learning Outcomes (CILOs):**

Upon successful completion of this course, students should be able to:

No.	Course Intended Learning Outcomes (CILOs)
	<b>Knowledge</b>
1	Describe some key concepts and latest developments in science and technology, and contrast them with those found in movies and TV drama episodes.
2	Explain the key principles behind some latest developments in science and technology.
3	Describe and explain how the latest developments in science and technology can make different new opportunities and experiences possible in our lives.
4	Identify the impacts of science and technology from past to future.

**Calendar Description:** This course aims to make use of examples selected from movies and TV drama episodes as motivations to provide students an introduction to some key concepts and latest developments in science and technology which can make significant impacts (e.g., new opportunities and experience) on our future ways of life.

**Teaching and Learning Activities (TLAs):**

CILOs	Type of TLA
1 - 4	- Short movie clips within lectures will be used to help students contrast things being described in movies and the latest developments - Lectures with in-class activities (e.g., group discussion) will be used to help students understand the key principles - Group project and/or presentation will be used to help students identify and analyze the science elements in movies and innovate on new opportunities and experiences for our future life.

**Assessment:**

No.	Assessment Methods	Weighting	CILOs to be addressed	Description of Assessment Tasks
1	Continuous Assessment	60%	1-4	Quizzes will test and reward students' understanding on science concepts and principles learned from lectures and readings. Projects and/or presentation will test how well students can identify the science elements, present them clearly, and innovate on possible new applications.
2	Examination	40%	1-4	A final examination will test the students' overall understanding on different science concept and principles and their relationships

**Assessment Rubrics:**

Criteria	Excellent (A)	Good (B)	Satisfactory (C)	Marginal Pass (D)	Fail (F)
<b>Describe and explain some key concepts, principles and latest developments in science and technology, and contrast them with those found in movies and TV drama episodes.</b>	Compare and contrast the key concepts and latest developments in science and technology with those found in movies and TV drama episodes; Explain the principles behind using some real-life examples as illustration	Describe the features of the key concepts and latest developments in science and technology; Explain the principles behind using some real-life examples as illustration	Describe the features of the key concepts and latest developments in science and technology	Identify key concepts, principles and latest developments in science and technology	Unable to identify key concepts, principles and latest developments in science and technology
<b>Describe and explain how the latest developments in science and technology can make different new opportunities and experiences possible in our lives.</b>	Compare and evaluate the features of the key deployment and applications of the latest developments in science and technology and suggest alternatives for a number of areas of application	Clearly describe the features of the key deployment and applications of the latest developments in science and technology and suggest alternatives for a particular areas of application	Describe the features of the key deployment and applications of the latest developments in science and technology make impact in our lives.	Identify areas where latest developments in science and technology make impact in our lives.	Unable to identify areas where latest developments in science and technology make impact in our lives.

#### Course Content and CILOs Mapping:

Content	CILO No.
I Overview of Milestones in Science and Technology Development	3,4
II Selected Concepts and Principles in Science and Technology	1-4

#### References:

- Mak, K., Don et.al. *Solving Everyday Problems with the Scientific Method*. City: World Scientific Publishing Company, 2009.
- Mark A. Griep and & Marjorie L. Mikasen. *ReAction! Chemistry in the Movies*. Oxford Univ. Press: 2009.
- Kakalios, J. *The Physics of Superheroes*. Gotham, 2006.
- Lim, Darren. Lights...Camera...Computer Science: Using Films To Introduce Computer Science to Non-Majors. *Journal of Computing Sciences in College*, 23(5), May 2008, pp. 58-64.
- Devlin, Keith, and Gary Lorden. *The Numbers behind Numb3rs*. New York: Plume, 2007.
- Sidney Perkowitz. *Hollywood Science*. Columbia University Press, 2007.
- *The Reality of Robot Surrogates*, IEEE Spectrum News – Inside Technology, URL: <http://spectrum.ieee.org/robotics/humanoids/the-reality-of-robot-surrogates>.
- *Nobelprize.org*, URL: <http://nobelprize.org/>
- *The Academy's Scientific & Technical Awards Winners*, URL: <http://www.oscars.org/awards/scitech/winners.html>
- *Biological issues in Jurassic Park*. Wikipedia, URL: [http://en.wikipedia.org/wiki/Biological\\_issues\\_in\\_Jurassic\\_Park](http://en.wikipedia.org/wiki/Biological_issues_in_Jurassic_Park).

## Course Content:

### Topic

- I. Overview of Milestones in Science and Technology Development
  - A. Important Breakthroughs
    - Examples from Nobel Prizes and Turing Awards
  - B. Their Impacts on healthcare, communication, quality of life, etc.
- II. Selected Concepts and Principles in Science and Technology

Note:

Three topics are to be covered in each semester and thus around 10 hours per topic.

The topics might be updated from time to time to reflect the latest developments in science and technology

Topic 1: Could human be mimicked by robot? (Sensors Technologies, Cognitive Science, Artificial Intelligence and Robotics)

- A. Sensing: Nanotechnology, biosensors, chemosensors, brain computer interfacing
- B. Vision: Computer vision; virtual and augmented reality
- C. Reasoning: Intelligent and emotional robots
- D. Group Interaction: Nature inspired computing

Topic 2: Could human be transformed to “super-heros” as in sci-fi movies? Could their “super-power” be realized? (Genetics and Biotechnology, Biochemistry, Physics)

- A. Biochemical related aspects:
  - Genetics and Principles of Inheritance
  - Structure of DNA and genetic codes
  - Latest genetic engineering and gene transfection
- B. Physics related aspects:
  - Physics of Light and Wave
  - Cloaking technology
  - Free-space display technology

Topic 3: Could human immigrate to Mars? - What make the Earth a sustainable environment for life? (Space Science and Sustainability Science)

- A. Space Science related aspects
  - Space travel and roles of robots
  - Terra-forming
- B. Sustainability Science
  - Sustaining an environment for life on Earth