

## Innovation and Design Engineering

### Course Description

(Unless otherwise specified, all are 3-unit term courses of three hours of lecture and one hour of tutorial per week.)

\*IDE 1010

Design Graphics and CAD

IDE 1020

Computer-Aided Design and Practice

3 U; 1 Lect. 3 Prac.; 1st term

Introduction to CAD systems. A series of projects for students to learn and practice using various CAD packages for modelling, making detail drawings, animation and analysis. (Not for students who have taken ACE 1020 or IDE 1010.)

IDE 1800

Design Computing Laboratory

1 U; 1 Lab. 1 Tut.; 2nd term

A series of projects related to the use of computers in design. Topics include the use of graphics design tools, audio editing tools, design data exchange, web page design tools, and script writing.

IDE 2010

Design Methods

1st term

Design motivation. Perception and space illusion. Sources of design. Symmetries. Proportion. Rhythm. Abstracting essentials. Motions. Form design methods: structure variation, form variation. Form factors. Product appearance: aesthetics, form elements, combination of form elements, means of expression.

IDE 2020

Engineering Product Design

2nd term

The engineering design process. Managing design projects. Human factors in design. Design of machine elements and power transmission systems. Mechanism design. Modelling and simulation. Design analysis. Optimization in design. Statistical decisions. Design for reliability. (Not for students who have taken ACE 2020.)

IDE 2030

Human Values in Design

2nd term

Survey on central philosophy of product design. Relation and tradeoff between human and technical considerations. Balancing of aesthetic sensibility and logical reasoning, and formal theories and practical issues. Design as social process. Application within historical, technological, and sociological contexts. Design ethics. Case studies.

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\* Course offered in 2001-02.

IDE 2040

Multimedia Technology for Design

1st or 2nd term

Multimedia communication. Multimedia information. Systems and standards. Multimedia networks and services. Graphics, video, sound and audio data. Tools for sound generation and processing. Tools for manipulating video and graphics data. Applications of multimedia in design. Prerequisite: ACE 2050 or its equivalent.

IDE 2810

Design Realization Laboratory

2 U; 4 Lab; 2nd term

A series of laboratory projects of mechanical dissection, disassembly, product testing, and team work. Reinforcing engineering concepts and design principles of product functional decomposition, design embodiment, and conceptual designs. Practice of material and function realization and physical and rapid prototyping.

IDE 3010

Innovation and Creative Design

1st term

Innovation is a necessary component of any contemporary corporation's success and a major driving force for civilization. This course will explore how creative ideas are generated by learning, doing, comparing, and organizing thinking. It will discuss the nature of creative thinking, mental models as representation of experience, and building and manipulating mental models. The course will assign projects of conceptual design of product and evaluation of the design.

IDE 3020

Optimal and Robust Design

1st or 2nd term

The product design process. The concept of total quality. Taguchi Method. Design of experiments. Factorial design. Robust design. Parameter design. Optimization methods. Design optimization.

IDE 3030

Computer Game Design and Development

2nd term

Character design. Story boarding. Puzzle and mission design. Animation techniques including physical modelling, inverse kinematics, soft object modelling, procedural modelling, and motion capture techniques. Collision detection. Behaviour modeling. Scene management. Use of music and audio effects in games. The use and the interface of different peripherals. Tools for game development. Design of games on the Internet.

IDE 3810

Design Innovation Laboratory

2 U; 4 Lab; 1st term

Team-based design projects of innovative products. Practice of quality functional deployment and technological innovation in design. Understand team behaviour and tools and use multi-media design software and systems.

IDE 3910

Thesis I

3 U; 1st term

The final-year project in the first term of the third year of attendance.

IDE 3920

Thesis II

3 U; 2nd term

The Final-year project in the second term of the third year of attendance. Prerequisite: IDE 3910. (Graduation Project as prescribed by IDE 3910/3920 will carry a separate weight of 10% in honours classification in Innovation and Design Engineering.)

### Study Scheme

#### *Major Programme*

#### **A. Applicable to students admitted in 2003-04 and thereafter**

Students are required to complete a minimum of 78 units of Major courses as follows (Please see Notes 1-3):

(i)	Required Courses: ACE 1030, 1100, 1880, 2050 <sup>#</sup> , 2060 <sup>#</sup> , 2800 <sup>#</sup> , CSC 1110, ELT 1111, ERG 2014, 2015, 3820 <sup>#</sup> , FAA 1500, IDE 1020, 1800, 2010, 2020, 2030, 2810, 3010, 3810, 3910, 3920, SEG 2470 <sup>#</sup> Graduation Project as prescribed by IDE 3910/3920 will carry a separate weight of 10% in honours classification.	63 units
(ii)	Five Elective Courses from: ACE 2030 <sup>#</sup> , 2070 <sup>#</sup> , 2120 <sup>#</sup> , 3030 <sup>#</sup> , 3040 <sup>#</sup> , 3100 <sup>#</sup> , 3120 <sup>#</sup> , 3160 <sup>#</sup> , 3180 <sup>#</sup> , 3200 <sup>#</sup> , 3220 <sup>#</sup> , CSC 3170 <sup>#</sup> , ELE 3230 <sup>#</sup> , ERG 2020 <sup>#</sup> , IDE 2040, 3020, 3030, IEG 4180 <sup>#</sup> , PSY 4830 <sup>#</sup> , SEG 3450 <sup>#</sup> , SOC 2214 <sup>#</sup>	15 units
<hr style="width: 20%; margin-left: auto; margin-right: 0;"/>		Total : 78 units

#### **B. Applicable to students admitted in 2001-02 and 2002-03**

Students are required to complete a minimum of 78 units of Major courses as follows (Please see Notes 1-3):

(i)	Required Courses: ACE 1030, 1100, 1880, 2050 <sup>#</sup> , 2060 <sup>#</sup> , 2800 <sup>#</sup> , CSC 1110, 1140, ELT 1111, ERG 2014, 2015 (2017 <sup>A</sup> ), 3820 <sup>#</sup> , FAA 1500, IDE 1020 (1010 <sup>A</sup> ), 2010, 2020, 2030, 2810, 3010, 3810, 3910, 3920, SEG 2470 <sup>#</sup> Graduation Project as prescribed by IDE 3910/3920 will carry a separate weight of 10% in honours classification.	63 units
(ii)	Five Elective Courses from: ACE 2030 <sup>#</sup> , 2070 <sup>#</sup> , 2120 <sup>#</sup> , 3030 <sup>#</sup> , 3040 <sup>#</sup> , 3100 <sup>#</sup> , 3120 <sup>#</sup> , 3160 <sup>#</sup> , 3180 <sup>#</sup> , 3200 <sup>#</sup> , 3220 <sup>#</sup> , CSC 3170 <sup>#</sup> , ELE 3230 <sup>#</sup> , ERG 2020 <sup>#</sup> , IDE 2040, 3020, 3030, IEG 4180 <sup>#</sup> , PSY 4830 <sup>#</sup> , SEG 3450 <sup>#</sup> , SOC 2214 <sup>#</sup>	15 units
<hr style="width: 20%; margin-left: auto; margin-right: 0;"/>		Total : 78 units

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<sup>D</sup> *Applicable to students admitted in 2001-02.*

**Recommended course pattern****I. Applicable to students admitted in 2003-04 and thereafter**

<b>Term 1</b>	<b>Units</b>	<b>Term 2</b>	<b>Units</b>	<b>Term 3</b>	<b>Units</b>
General Education	3	General Education	3	General Education	3
Physical Education	1	Physical Education	1	IDE 2010	3
ACE 1030	3	ACE 1100	3	ACE 2050	3
CSC 1110	3	ACE 1880	3	ACE 2800	2
ERG 2014	3	IDE 1800	1	SEG 2470	3
FAA 1500	3	ELT 1111	3	1 Major Elective	3
IDE 1020	3	ERG 2015	3		
	—		—		—
	19		17		17
<b>Term 4</b>	<b>Units</b>	<b>Term 5</b>	<b>Units</b>	<b>Term 6</b>	<b>Units</b>
General Education	3	ERG 3820	2	IDE 3920	3
ACE 2060	3	IDE 3010	3	2 Major Electives	6
IDE 2020	3	IDE 3810	2	2 Free Electives	5
IDE 2030	3	IDE 3910	3		
IDE 2810	2	1 Major Elective	3		
1 Major Elective	3	1 Free Elective	2		
	—		—		—
	17		15		14

**II. Applicable to students admitted in 2001-02 and 2002-03**

<b>Term 1</b>	<b>Units</b>	<b>Term 2</b>	<b>Units</b>	<b>Term 3</b>	<b>Units</b>
General Education	3	General Education	3	General Education	3
Physical Education	1	Physical Education	1	IDE 2010	3
ACE 1030	3	ACE 1100	3	ACE 2050	3
CSC 1110	3	ACE 1880	3	ACE 2800	2
ERG 2014	3	CSC 1140	1	SEG 2470	3
FAA 1500	3	ELT 1111	3	1 Major Elective	3
IDE 1020	3	ERG 2015	3		
(IDE 1010 <sup>a</sup> )	(3)	(ERG 2017 <sup>a</sup> )	(3)		
	—		—		—
	19		17		17
<b>Term 4</b>	<b>Units</b>	<b>Term 5</b>	<b>Units</b>	<b>Term 6</b>	<b>Units</b>
General Education	3	ERG 3820	2	IDE 3920	3
ACE 2060	3	IDE 3010	3	2 Major Electives	6
IDE 2020	3	IDE 3810	2	2 Free Electives	5
IDE 2030	3	IDE 3910	3		
IDE 2810	2	1 Major Elective	3		
1 Major Elective	3	1 Free Elective	2		
	—		—		—
	17		15		14

<sup>a</sup> Applicable to students admitted in 2001-02.

**SUMMARY**

	Units
General Education	12
Physical Education	2
Major Required Courses	63
Major Electives	15
Free Electives	7
Total	<hr/> 99

- Notes: 1. Major courses coded IDE 2000 and above will be included in the calculation of the Major GPA for honours classification. Courses with “#” are to be included in the Major GPA as well.
2. Number of “free elective” courses to be taken each term may be adjusted as long as the units requirement of the programme for graduation is fulfilled.
3. Students are strongly advised to consult their academic advisers in choosing elective courses.