

# **INDUSTRIAL ENGINEERING AND TECHNOLOGY MANAGEMENT**

## **SYLLABUS**

The syllabus applies to students admitted in the academic year 2015-16 and thereafter under the four-year curriculum.

### Definition and Terminology

Each course offered by the Department of Industrial and Manufacturing Systems Engineering shall be classified as either introductory level course or advanced level course.

A Discipline Core course is a compulsory course which a candidate must pass in the manner provided for in the Regulations.

A Disciplinary Elective course refers to any technical course offered by the Department of Industrial and Manufacturing Systems Engineering for the fulfillment of the curriculum requirements of the degree of BEng in Industrial Engineering and Technology Management that are not classified as discipline core course.

### **Curriculum**

The Curriculum comprises 240 credits of courses as follows:

#### General Engineering Courses

Students are required to complete at least 36 credits of General Engineering Course.

#### Discipline Core Courses

Students are required to complete ALL discipline core courses (84 credits), comprising 30 credits of introductory core courses and 54 credits of advanced core courses.

#### Discipline Elective Courses

Students are required to complete at least 36 credits of discipline elective courses offered by the Department of Industrial and Manufacturing Systems Engineering.

#### Elective Courses

Students are required to complete 12 credits of elective courses offered by either the Department of Industrial and Manufacturing Systems Engineering, or other departments within or outside of the Faculty of Engineering.

#### University Requirements

Students are required to complete:

- a) 12 credits in English language enhancement, including 6 credits in “CAES1000 Core University English” and 6 credits in “CAES9520 Technical English for Industrial and Manufacturing Systems Engineering”;
- b) 6 credits in Chinese language enhancement course “CENG9001 Practical Chinese for Engineering Students”; and
- c) 36 credits of courses in the Common Core Curriculum, selecting not more than one course from each Area of Inquiry within one academic year and at least one but no more than two courses from each Area of Inquiry during the whole period of study.

#### Capstone Experience

Students are required to complete the 12-credit “IMSE4174 Project” to fulfill the capstone experience requirement for the degree of BEng in Industrial Engineering and Technology Management.

### Internship

Students are required to complete the 6-credit internship “IMSE3129 Internship”, which normally takes place after their third year of study.

### **Degree Classification**

The degree of Bachelor of Engineering shall be awarded in five divisions in accordance with EN16 of the Regulations for the Degree of Bachelor of Engineering and UG9 of the Regulations for the First Degree Curricula.

### **The details of the distribution of the above course categories are as follows:**

The curriculum of BEng (Industrial Engineering and Technology Management) comprises 240 credits of courses with the following structure:

#### **UG 5 Requirements (54 credits)**

<b>Course Code</b>	<b>Course</b>	<b>No. of credits</b>
CAES1000	Core University English	6
CAES9520	Technical English for Industrial and Manufacturing Systems Engineering	6
CENG9001	Practical Chinese for Engineering Students	6
CC##XXXX	University Common Core Course (6 courses)*	36
<b>Total for UG5 Requirements</b>		<b>54</b>

\* Students can select not more than one course from each Area of Inquiry within one academic year and at least one but no more than two courses from each Area of Inquiry during the whole period of study.

#### **General Engineering Courses (36 credits)**

<b>Course Code</b>	<b>Course</b>	<b>No. of credits</b>
MATH1851	Calculus and Ordinary Differential Equations	6
MATH1853	Linear Algebra, Probability & Statistics	6
ENGG1111/ ENGG1112	Computer Programming and Applications/ Computer Programming and Applications I	6
PHYS1050	Physics for engineering students	6
ENGG120X	Any two of the General Engineering Courses offered by the Dept. of IMSE or other Departments of the Faculty of Engineering*	12
<b>Total for General Engineering Courses</b>		<b>36</b>

\*Choose two General Engineering Courses from the following list:

ENGG1201	Engineering for sustainable development
ENGG1202	Foundation of computer science
ENGG1203	Introduction to electrical and electronic engineering
ENGG1204	Industrial management and logistics
ENGG1205	Introduction to mechanical engineering
ENGG1206	Introduction to biomedical engineering
ENGG1207	Foundations of biochemistry for medical engineering

#### **Discipline Core Courses (84 credits)**

**Introductory Courses (30 credits)**

Course Code	Course	No. of credits
IMSE2102	Fundamentals of supply chain management	6
IMSE2109	Fundamentals of engineering design	6
IMSE2121	Engineering training	6
IMSE2132	Statistical analysis	6
MECH2407	Multivariable calculus and partial differential equations	6
<b>Total for Introductory Discipline Core Courses</b>		<b>30</b>

**Advanced Courses (54 credits)**

Course Code	Course	No. of credits
IMSE3105	Managerial accounting and finance	6
IMSE3106	Manufacturing technology	6
IMSE3109	Quality management	6
IMSE3126	Engineers in society	6
IMSE3155	Integrative studies	6
IMSE3132	Operational research	6
IMSE4101	Computer integrated manufacturing	6
IMSE4116	Operations planning and control	6
IMSE4135	Systems integration	6
<b>Total for Advanced Discipline Core Courses</b>		<b>54</b>

**Capstone Experience and Internship (18 credits)**

Course Code	Course	No. of credits
IMSE4174	Project <sup>+</sup>	12
IMSE3129	Internship*	6
<b>Total for Capstone Experience and Internship</b>		<b>18</b>

+Capstone Experience

\*Training

**Discipline Elective Courses (36 credits)**

Course Code	Course	No. of credits
IMSE2112	Engineering technology	6
IMSE2113	Information systems	6
IMSE2114	Product development	6
IMSE2117	Engineering systems analysis	6
IMSE3102	Strategic supply chain management	6
IMSE3103	Systems automation	6
IMSE3107	Systems modelling and simulation	6
IMSE3110	Supply chain finance	6
IMSE3111	Intelligent optimisation	6
IMSE3116	Internet technology for e-commerce	6
IMSE3118	Industrial organisation and management	6
IMSE3119	Stochastic decision systems	6
IMSE3127	Facilities planning and design	6
IMSE3128	Human factors engineering	6
IMSE4102	Engineering project management	6
IMSE4110	Financial engineering	6

IMSE4118	Advanced manufacturing technology	6
IMSE4119	Digital enterprises and e-commerce	6
IMSE4120	Technology marketing	6
IMSE4121	Strategic management of business and technology	6
IMSE4128	Innovation and entrepreneurship	6
IMSE4129	Manufacturing system analysis and design	6
<b>Complete six discipline elective courses for a total of 36 credits</b>		<b>36</b>

Note: Course availability and electives are subject to change.

### **Elective Courses (12 credits)**

At least 12 credits of courses offered by either the Department of Industrial and Manufacturing Systems Engineering, or other departments within or outside of the Faculty of Engineering.

### **Summary of curriculum structure of BEng (Industrial Engineering and Technology Management)**

<b>Course Categories</b>	<b>No. of credits</b>
UG5 Requirements	54
General Engineering Courses	36
Discipline Core Courses (Introductory)	30
Discipline Core Courses (Advanced)	54
Capstone Experience and Internship	18
Discipline Elective Courses	36
Elective Courses	12
<b>Total</b>	<b>240</b>

The proposed syllabus by study year is as follows:

### **FIRST YEAR**

#### **General Engineering Courses (36 credits)**

MATH1851	Calculus and Ordinary Differential Equations
MATH1853	Linear Algebra, Probability & Statistics
ENGG1111/	Computer Programming and Applications/
ENGG1112	Computer Programming and Applications I
PHYS1050	Physics for engineering students
ENGG120X	Any two of the General Engineering Courses offered by IMSE or other Departments of the Faculty of Engineering

#### **University Requirements (UG5) (24 credits)**

CAES1000	Core University English
CC##XXXX	Three Common Core Courses

### **SECOND YEAR**

#### **Introductory Core Courses (30 credits)**

IMSE2102	Fundamentals of supply chain management
IMSE2109	Fundamentals of engineering design
IMSE2121	Engineering training
IMSE2132	Statistical analysis
MECH2407	Multivariable calculus and partial differential equations

**Discipline Elective Courses (12credits)**

**University Requirements (UG5) (18 credits)**

CC##XXXX Three Common Core Courses

**THIRD YEAR**

**Advanced Core Courses (36 credits)**

IMSE3105 Managerial accounting and finance  
IMSE3106 Manufacturing technology  
IMSE3109 Quality management  
IMSE3126 Engineers in society  
IMSE3132 Operational research  
IMSE3155 Integrative studies

**Internship (6 credits)**

IMSE3129 Internship

**University Requirements (UG5) (12 credits)**

CAES9520 Technical English for Industrial and Manufacturing Systems Engineering  
CENG9001 Practical Chinese for Engineering Students

**Discipline Elective Courses (6 credits)**

**FOURTH YEAR**

**Advanced Core Courses (18 credits)**

IMSE4101 Computer integrated manufacturing  
IMSE4116 Operations planning and control  
IMSE4135 Systems integration

**Discipline Elective Courses (18 credits)**

**Capstone Experience (12 credits)**

IMSE4174 Project

**Elective Courses (12 credits)**

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**LOGISTICS ENGINEERING AND SUPPLY CHAIN MANAGEMENT**

**SYLLABUS**

The syllabus applies to students admitted in the academic year 2015-16 and thereafter under the four-year curriculum.

Definition and Terminology

Each course offered by the Department of Industrial and Manufacturing Systems Engineering shall be classified as either introductory level course or advanced level course.

A Discipline Core course is a compulsory course which a candidate must pass in the manner provided for in the Regulations.

A Disciplinary Elective course refers to any technical course offered by the Department of Industrial and Manufacturing Systems Engineering for the fulfillment of the curriculum requirements of the degree of BEng in Logistics Engineering and Supply Chain Management that are not classified as discipline core course.

## **Curriculum**

The Curriculum comprises 240 credits of courses as follows:

### General Engineering Courses

Students are required to complete at least 36 credits of General Engineering Course.

### Discipline Core Courses

Students are required to complete ALL discipline core courses (84 credits), comprising 30 credits of introductory core courses and 54 credits of advanced core courses.

### Discipline Elective Courses

Students are required to complete at least 36 credits of discipline elective courses offered by the Department of Industrial and Manufacturing Systems Engineering.

### Elective Courses

Students are required to complete 12 credits of elective courses offered by either the Department of Industrial and Manufacturing Systems Engineering, or other departments within or outside of the Faculty of Engineering.

### University Requirements

Students are required to complete:

- a) 12 credits in English language enhancement, including 6 credits in “CAES1000 Core University English” and 6 credits in “CAES9520 Technical English for Industrial and Manufacturing Systems Engineering”;
- b) 6 credits in Chinese language enhancement course “CENG9001 Practical Chinese for Engineering Students”; and
- c) 36 credits of courses in the Common Core Curriculum, selecting not more than one course from each Area of Inquiry within one academic year and at least one but no more than two courses from each Area of Inquiry during the whole period of study.

### Capstone Experience

Students are required to complete the 12-credit “IMSE4174 Project” to fulfill the capstone experience requirement for the degree of BEng in Logistics Engineering and Supply Chain Management.

### Internship

Students are required to complete the 6-credit internship “IMSE3129 Internship”, which normally takes place after their third year of study.

## **Degree Classification**

The degree of Bachelor of Engineering shall be awarded in five divisions in accordance with EN16 of the Regulations for the Degree of Bachelor of Engineering and UG9 of the Regulations for the First Degree Curricula.

**The details of the distribution of the above course categories are as follows:**

The curriculum of BEng (Logistics Engineering and Supply Chain Management) comprises 240 credits of courses with the following structure:

**UG 5 Requirements (54 credits)**

Course Code	Course	No. of credits
CAES1000	Core University English	6
CAES9520	Technical English for Industrial and Manufacturing Systems Engineering	6
CENG9001	Practical Chinese for Engineering Students	6
CC##XXXX	University Common Core Course (6 courses)*	36
<b>Total for UG5 Requirements</b>		<b>54</b>

\* Students can select not more than one course from each Area of Inquiry within one academic year and at least one but no more than two courses from each Area of Inquiry during the whole period of study.

**General Engineering Courses (36 credits)**

Course Code	Course	No. of credits
MATH1851	Calculus and Ordinary Differential Equations	6
MATH1853	Linear Algebra, Probability & Statistics	6
ENGG1111/ ENGG1112	Computer Programming and Applications/ Computer Programming and Applications I	6
PHYS1050	Physics for engineering students	6
ENGG120X	Any two of the General Engineering Courses offered by the Dept. of IMSE or other Departments of the Faculty of Engineering*	12
<b>Total for General Engineering Courses</b>		<b>36</b>

\*Choose two General Engineering Courses from the following list:

- ENGG1201      Engineering for sustainable development
- ENGG1202      Foundation of computer science
- ENGG1203      Introduction to electrical and electronic engineering
- ENGG1204      Industrial management and logistics
- ENGG1205      Introduction to mechanical engineering
- ENGG1206      Introduction to biomedical engineering
- ENGG1207      Foundations of biochemistry for medical engineering

**Discipline Core Courses (84 credits)**

**Introductory Courses (30 credits)**

Course Code	Course	No. of credits
IMSE2102	Fundamentals of supply chain management	6
IMSE2109	Fundamentals of engineering design	6
IMSE2121	Engineering training	6
IMSE2132	Statistical analysis	6
MECH2407	Multivariable calculus and partial differential equations	6
<b>Total for Introductory Discipline Core Courses</b>		<b>30</b>

**Advanced Courses (54 credits)**

Course Code	Course	No. of credits
IMSE3102	Strategic supply chain management	6
IMSE3105	Managerial accounting and finance	6
IMSE3121	Transportation and distribution planning	6
IMSE3126	Engineers in society	6
IMSE3132	Operational research	6
IMSE3155	Integrative studies	6
IMSE4116	Operations planning and control	6
IMSE4122	Global logistics systems	6
IMSE4135	Systems integration	6
<b>Total for Advanced Discipline Core Courses</b>		<b>54</b>

**Capstone Experience and Internship (18 credits)**

Course Code	Course	No. of credits
IMSE4174	Project <sup>+</sup>	12
IMSE3129	Internship*	6
<b>Total for Capstone Experience and Internship</b>		<b>18</b>

+Capstone Experience

\*Training

**Discipline Elective Courses (36 credits)**

Course Code	Course	No. of credits
IMSE2112	Engineering technology	6
IMSE2113	Information systems	6
IMSE2114	Product development	6
IMSE2117	Engineering systems analysis	6
IMSE3103	Systems automation	6
IMSE3107	Systems modelling and simulation	6
IMSE3109	Quality management	6
IMSE3110	Supply chain finance	6
IMSE3111	Intelligent optimisation	6
IMSE3116	Internet technology for e-commerce	6
IMSE3118	Industrial organisation and management	6
IMSE3119	Stochastic decision systems	6
IMSE3120	Purchasing and supply management	6
IMSE3127	Facilities planning and design	6
IMSE3128	Human factors engineering	6
IMSE4101	Computer integrated manufacturing	6
IMSE4102	Engineering project management	6
IMSE4110	Financial engineering	6
IMSE4119	Digital enterprises and e-commerce	6
IMSE4120	Technology marketing	6
IMSE4121	Strategic management of business and technology	6
IMSE4123	Warehousing and terminal operations	6
IMSE4128	Innovation and entrepreneurship	6
<b>Complete six discipline elective courses for a total of 36 credits</b>		<b>36</b>

Note: Course availability and electives are subject to change.

### Elective Courses (12 credits)

At least 12 credits of courses offered by either the Department of Industrial and Manufacturing Systems Engineering, or other departments within or outside of the Faculty of Engineering.

### Summary of curriculum structure of BEng (Logistics Engineering and Supply Chain Management)

Course Categories	No. of credits
UG5 Requirements	54
General Engineering Courses	36
Discipline Core Courses (Introductory)	30
Discipline Core Courses (Advanced)	54
Capstone Experience and Internship	18
Discipline Elective Courses	36
Elective Courses	12
<b>Total</b>	<b>240</b>

The proposed syllabus by study year is as follows:

#### FIRST YEAR

##### General Engineering Courses (36 credits)

MATH1851	Calculus and Ordinary Differential Equations
MATH1853	Linear Algebra, Probability & Statistics
ENGG1111/	Computer Programming and Applications/
ENGG1112	Computer Programming and Applications I
PHYS1050	Physics for engineering students
ENGG120X	Any two of the General Engineering Courses offered by IMSE or other Departments of the Faculty of Engineering

##### University Requirements (UG5) (24 credits)

CAES1000	Core University English
CC##XXXX	Three Common Core Curriculum Courses

#### SECOND YEAR

##### Introductory Core Courses (30 credits)

IMSE2102	Fundamentals of supply chain management
IMSE2109	Fundamentals of engineering design
IMSE2121	Engineering training
IMSE2132	Statistical analysis
MECH2407	Multivariable calculus and partial differential equations

##### University Requirements (UG5) (18credits)

CC##XXXX	Three Common Core Courses
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##### Discipline Elective Courses (12 credits)

## THIRD YEAR

### Advanced Core Courses (36 credits)

IMSE3102	Strategic supply chain management
IMSE3105	Managerial accounting and finance
IMSE3121	Transportation and distribution planning
IMSE3126	Engineers in society
IMSE3132	Operational research
IMSE3155	Integrative studies

### Internship (6 credits)

IMSE3129	Internship
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### University Requirements (UG5) (12 credits)

CAES9520	Technical English for Industrial and Manufacturing Systems Engineering
CENG9001	Practical Chinese for Engineering Students

### Discipline Elective Courses (6 credits)

## FOURTH YEAR

### Advanced Core Courses (18 credits)

IMSE4116	Operations planning and control
IMSE4122	Global logistics systems
IMSE4135	Systems integration

### Discipline Elective Courses (18 credits)

### Capstone Experience (12 credits)

IMSE4174	Project
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### Elective Courses (12 credits)

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### Minor in Industrial Engineering and Technology Management [not eligible for BEng(IETM) and BEng(LESCM) students]

Candidates who are interested in pursuing minor in Industrial Engineering and Technology Management must satisfy the following prerequisites:

- Level 3 or above in Mathematics and
- Level 3 or above in Physics or Combined Science with Physics component in the Hong Kong Diploma in Secondary Education (HKDSE) Examination

Candidates are required to complete a total of 36 credits of courses in the following manner:

<u>Code</u>	<u>Course Name</u>	<u>Credits</u>
<i>(i) 12 credits of core courses</i>		
IMSE3107	Systems modelling and simulation	6
IMSE3127	Facilities planning and design	6
<i>(ii) 24 credits of discipline elective courses selected from the following:</i>		
IMSE2114	Product development	6

IMSE2132	Statistical analysis	6
IMSE3105	Management accounting and finance	6
IMSE3126	Engineers in society	6
IMSE4101	Computer integrated manufacturing	6

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**Minor in Logistics Engineering and Supply Chain Management  
[not eligible for BEng(IETM) and BEng(LESCM) students]**

Candidates who are interested in pursuing minor in Industrial Engineering and Technology Management must satisfy the following prerequisites:

- Level 3 or above in Mathematics and
- Level 3 or above in Physics or Combined Science with Physics component in the Hong Kong Diploma in Secondary Education (HKDSE) Examination

Candidates are required to complete a total of 36 credits of courses in the following manner:

<u>Code</u>	<u>Course Name</u>	<u>Credits</u>
<i>(i) 12 credits of core courses</i>		
IMSE2102	Fundamentals of supply chain management	6
IMSE3121	Transportation and distribution planning	6
<i>(ii) 24 credits of discipline elective courses selected from the following:</i>		
IMSE2132	Statistical analysis	6
IMSE3102	Strategic supply chain management	6
IMSE3105	Managerial accounting and finance	6
IMSE3107	Systems modelling and simulation	6
IMSE3126	Engineers in society	6
IMSE4119	Digital enterprises and e-commerce	6

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**COURSE DESCRIPTIONS**

Candidates will be required to do the coursework in the respective courses selected. Not all courses are offered every semester.

**General Engineering Courses**

ENGG1111	Computer programming (6 credits) or
ENGG1112	Computer programming I (6 credits)
MATH1851	Calculus and Ordinary Differential Equations (6 credits)
MECH2407	Multivariable calculus and partial differential equations (6 credits)
MATH1853	Linear Algebra, Probability & Statistics (6 credits)
PHYS1050	Physics for engineering students (6 credits)
ENGG1201	Engineering for sustainable development (6 credits)
ENGG1202	Foundation of computer science (6 credits)
ENGG1203	Introduction to electrical and electronic engineering (6 credits)
ENGG1204	Industrial management and logistics (6 credits)
ENGG1205	Introduction to mechanical engineering (6 credits)
ENGG1206	Introduction to biomedical engineering (6 credits)
ENGG1207	Foundations of biochemistry for medical engineering (6 credits)

Please refer to the General Engineering Courses in the syllabus for the degree of BEng for details.

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### **University Requirements on Language Enhancement Courses**

**CAES1000. Core University English (6 credits)**

**CENG9001. Practical Chinese for engineering students (6 credits)**

Please refer to the University Language Enhancement Courses in the syllabus for the degree of BEng for details.

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**CAES9520. Technical English for Industrial and Manufacturing Systems Engineering (6 credits)**

This 6-credit English-in-the-Discipline course will introduce IMSE students to professional and technical communication in the context of oral presentation and report writing. The course will provide an intensive English environment and engage students in activities which help them prepare for the completion of the assessments required by the disciplinary course titled “IMSE2103 Introduction to business and management”. Assessment is wholly by coursework.

Co-requisite: IMSE3155

Adjunct course: IMSE3155

Assessment: 100% continuous assessment

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### **University Common Core Curriculum**

36 credits of courses in the University Common Core Curriculum, in which students can select not more than one course from each Area of Inquiry within one academic year and at least one but no more than two courses from each Area of Inquiry during the whole period of study:

- Scientific and Technology Literacy
  - Humanities
  - Global Issues
  - China: Culture, State and Society
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**IMSE2102. Fundamentals of supply chain management (6 credits)**

Definition, importance and objectives of logistics; the roles of logistics in supply chain management; business of production; business environment; transport fundamentals and transport decisions; storage and handling systems and decisions; inventory policies; forecasting logistics requirements; facility location analysis; network planning process; purchasing scope and objectives; purchasing structure and organisation; purchasing variables – price, time and quality; buying commodities; buying capital goods; buying services; purchasing systems.

Assessment: 20% continuous assessment, 80% examination

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**IMSE2109. Fundamentals of engineering design (6 credits)**

Visualization of technical information; application of CAD software to prepare product design models and drawings; principles of engineering graphics: orthographic projections, isometric views, auxiliary

views, sectioning, dimensioning and tolerancing; assembly modelling and drawing; design of components; general principles of product and tool design.

Assessment: 100% continuous assessment

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**IMSE2112. Engineering technology (6 credits)**

Kinematics and dynamics of rigid bodies, centre of percussion, design for reduction of impact stress; analysis, simulation and applications of 4-bar mechanisms, velocity diagram and instantaneous centre of rotation; Geneva mechanism, gear train and motion transmission; analysis and applications of simple harmonic motion, damping of vibrations; fundamental electrical circuit analysis; alternating current electricity, AC circuits and phasors.

Assessment: 20% continuous assessment, 80% examination

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**IMSE2113. Information systems (6 credits)**

Information systems; the strategic role of information technology; data communications and networking; online databases and their applications; development and implementation of information systems.

Prerequisite: ENGG1111 Computer programming and applications or  
ENGG1112 Computer programming and applications I

Assessment: 60% continuous assessment, 40% examination

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**IMSE2114. Product development (6 credits)**

Organisation and management, performance measurement; market research, product design specification, product safety, product and the environment, concept generation and selection, design review and improvements; product appraisal from functional, ergonomic and aesthetic, manufacturing and economical aspects; design theory and methodology, information / literature search.

Assessment: 40% continuous assessment, 60% examination

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**IMSE2117. Engineering systems analysis (6 credits)**

Fundamental and elements of engineering system; system analysis and design principles; structured system analysis and design method (SSADM), object-oriented analysis and design (OOAD); applications of SSADM and OOAD for engineering system development.

Assessment: 20% continuous assessment, 80% examination

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**IMSE2121. Engineering training (6 credits)**

Metal work, manufacturing practice, practical networking, computing practice, design practice, plastic processing, metrology, CNC programming and CAD/CAM, electronics, work study.

Assessment: 100% practical work

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**IMSE2132. Statistical analysis (6 credits)**

Discrete and continuous random variables; some important probability distributions; joint probability distributions; mathematical expectation; random sampling and sampling distributions; point estimation of parameters, confidence interval; tests of hypotheses; analysis of variance; linear regression; logistic regression and classification problems.

Prerequisite: MATH1851 Calculus and ordinary differential equations or  
MATH1853 Linear algebra, probability & statistics

Assessment: 30% continuous assessment, 70% examination

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**IMSE3102. Strategic supply chain management (6 credits)**

Supply chain overview; operating objectives; barriers to internal integration; supply chain performance cycles; logistics positioning; supply chain environmental assessment; time-based supply chains; information flow; alternative supply chain strategies; supply chain integration theory; logistics location structure; warehouse location patterns; transportation economies; inventory economies; least total cost design; formulating supply chain strategy; planning and design supply chain methodology; supply chain administration and dimensions of change management.

Prerequisite: IMSE2102 Fundamentals of supply chain management

Assessment: 20% continuous assessment, 80% examination

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**IMSE3103. Systems automation (6 credits)**

Fundamental of systems automation; basic components of system automation for services and manufacturing industries; electric, pneumatic/hydraulic systems, automation systems design, open-loop and closed-loop control; system performance analysis, analogue and digital control systems; introduction to robotics and the application of robots in industry; artificial intelligence and their roles and applications in system automation.

Prerequisite: MATH1851 Calculus and ordinary differential equations (6 credits)

Assessment: 20% continuous assessment, 80% examination

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**IMSE3105. Managerial accounting and finance (6 credits)**

Cost accounting - procedures; direct costs, absorption costing; marginal costing. Planning and control – activity-based costing systems; standard costing systems; capital expenditure and investment; health, safety and environmental aspects of company activities; contemporary issues in management accounting; financial accounting - accounting rules; basic financial accounts; manufacturing accounts; company account; financial performance – ratio analysis; interpretation of accounting data.

Assessment: 30% continuous assessment, 70% examination

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**IMSE3106. Manufacturing technology (6 credits)**

Introduction to manufacturing, safety in manufacturing, manufacturing and the environment; metrology, measuring standards, limits and fits, geometrical tolerances, limit gauging, surface texture; casting processes, pattern and gating, permanent and non-permanent moulds; forming processes,

principles of bulk deformation and sheet metal working; joining processes, fastening, liquid and solid states welding, powder metallurgy; machining processes, cutting and grinding operations, non-traditional machining, cutting conditions; plastics materials and processing.

Assessment: 40% continuous assessment and 60% examination

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**IMSE3107. Systems modelling and simulation (6 credits)**

Basic concepts of modelling and simulation; discrete-event simulation techniques; introduction to computer-aided simulation and the use of simulation packages; methodology of simulation study of industrial systems; model development for industrial systems, analysis of systems; model validation and verification; analysis of simulation results, case studies of industrial and manufacturing systems using discrete event simulations.

Assessment: 60% continuous assessment, 40% examination

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**IMSE3109. Quality management (6 credits)**

Total quality management; management tools for quality; benchmarking; ISO9000 series; national quality awards; design of industrial experiments; statistical process control; control charts; acceptance sampling; business process reengineering; customer services quality; Six Sigma; DMAIC process; Poka-yoke; failure mode and effect analysis; reliability engineering.

Assessment: 30% continuous assessment, 70% examination

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**IMSE3110. Supply chain finance (6 credits)**

Financial markets; derivatives for risk transfer in supply chain, forward, futures, options, swap; binomial model and Black-Scholes model for evaluating options; risk measures, value-at-risk (VaR), returns and utility functions. Managing supply chain risks: financial and nonfinancial risks; uncertain customer demand, material price, exchange rates; logistics financing and risks; development of risk hedging models: price models, demand models, optimal hedging policies. Strengthening of financial and risk protection capabilities of supply chain members: financing for optimising members' working capital.

Assessment: 40% continuous assessment and 60% examination

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**IMSE3111. Intelligent optimisation (6 credits)**

Evolutionary computation overview; Genetic algorithms; Particle swarm optimisation; data warehousing; data mining overview; probabilistic approach to data mining; data compression approach; Data mining with big data; fuzzy information and fuzzy system; fuzzy modeling; fuzzy optimisation; Fuzzy evaluation; Decision table overview; Decision table structure; Limited-entry decision table.

Assessment: 30% continuous assessment and 70% examination

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**IMSE3116. Internet technology for e-commerce (6 credits)**

Overview of e-Business and e-Commerce; Electronic Business Solutions (EBS) and technology; roles and applications of e-business solutions; design and development of e-business systems;; adoption and implementation: internet programming, web-based system development, online database design and implementation.

Prerequisite: ENGG1111 Computer programming and applications or  
ENGG1112 Computer programming and applications I

Assessment: 60% continuous assessment and 40% examination

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### **IMSE3118. Industrial organisation and management (6 credits)**

Managing and managers; evolution of management theory; planning - decision making; strategic management; strategy implementation, strategic management; organising - organisational design and structure; power and the distribution of authority; managing organisational change and innovation; leading – motivation, leadership, teams and teamwork; controlling, principles of effective control, operations control.

Prerequisite: IMSE2102 Fundamentals of supply chain management

Assessment: 40% continuous assessment, 60% examination

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### **IMSE3119. Stochastic decision systems (6 credits)**

Decision analysis: decision making under uncertainty, axioms of decision analysis, methodology of decision analysis, analytical hierarchy approach, quantification of judgemental uncertainties, assessing utilities, and group decision problems; game theory and gaming: extensive and normal forms, zero-sum two-person games, two-persons nonzero-sum games, n-persons games, teaching and training and operational gaming; stochastic processes: random walks, recurrent events, Markov chains, and renewal-processes.

Prerequisite: MATH1851 Calculus and ordinary differential equations and  
MATH1853 Linear algebra, probability & statistics

Assessment: 30% continuous assessment, 70% examination

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### **IMSE3120. Purchasing and supply management (6 credits)**

Introduction of purchasing function/process; quality management for goods and service; sourcing and market analysis; make-or-buy decisions and subcontracting ; negotiation; controlling price and costs; vendor selection; commodity buying; service buying; capital buying; strategic purchasing; e-procurement and public procurement

Assessment: 40% continuous assessment, 60% examination

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### **IMSE3121. Transportation and distribution planning (6 credits) [for BEng(LESCM)]**

The evolution of transportation management; traffic management; transportation alternatives and technologies; transportation infrastructure; transportation performance analysis; total transportation cost analysis; fleet development and management; fleet performance indicators; routing and scheduling; shipment planning; containerisation-alternatives and selection criteria; mode selection criteria; transportation management and information systems requirements; international transportation strategies; implementation organisational issues.

Prerequisite: IMSE2102 Fundamentals of supply chain management  
Assessment: 30% continuous assessment, 70% examination

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**IMSE3126. Engineers in society (6 credits)**

Economic, industrial and social context of engineering; responsibilities of professional engineers, the legal, environmental, economical and ethical roles of engineers in society, judgment and decision process based on non-technical aspects such as financial, environmental and cultural considerations, meeting with professional engineers from the industrial and logistics sectors.

Assessment: 30% continuous assessment, 70% examination

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**IMSE3127. Facilities planning and design (6 credits)**

Plant location problem; advanced techniques in plant layout design, computer-based layout planning, and quantitative approaches; materials handling, storage and warehousing for global manufacturing; lean manufacturing, cellular manufacturing, one-piece flow; workplace design in the information age; digital factory; fire safety and security; study cases drawn from the manufacturing and service industries.

Assessment: 30% continuous assessment, 70% examination

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**IMSE3128. Human factors engineering (6 credits)**

Human-organization interaction; human-machine interface usability and design; workplace safety and health; applied anthropometry and biomechanics; physical work and manual material handling; workplace and environmental design, illumination, noise, thermal; information processing; display and control; skills and learning; job design and shift work.

Assessment: 40% continuous assessment, 60% examination

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**IMSE3129 Internship (6 credits)**

An internship in an appropriate industry six to twelve weeks duration. All Year 3 students must undergo a 6 to 12-week Internship in the summer immediately after the second semester of Level 3 studies ends. Most students undergo Internships in services or manufacturing companies in Hong Kong or China. The content of such on-the-job training may include engineering design and modification, installation, repairing, computation, programming, site inspection, measurement, quality assurance, warehouse management, etc. In some companies, the training programmes are project-orientated and often predetermined. The Internship is an important part of this 4-year BEng programme, as it gives students an opportunity to gain practical experience in industry and to develop their professional skills.

At the end of the training period, all the sponsoring organisations will complete an appraisal form on the trainees' performance. Students must submit a report after the training, and assessments are based on both the training logbook and performance appraisal.

Assessment: 100% practical work

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**IMSE3132. Operational research (6 credits)**

Formulation of linear programming; Geometry of linear programming; Simplex method; Sensitivity analysis; Duality theory; Formulation of integer programming; Branch-and-bound; Network flow; Application of queueing models; Poisson process; Birth-and-death process; M/M/1 queue; M/M/k queue

Prerequisite: MATH1851 Calculus and ordinary differential equations or  
MATH1853 Linear algebra, probability & statistics  
Assessment: 30% continuous assessment and 70% examination

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**IMSE3155. Integrative studies (6 credits)**

To apply industrial and systems engineering principles and methodologies in an integrated manner. The major element of the course is a group project on product or system design and development, which serves as the vehicle for integrating the applications of various topics including: product and system design methodologies; project management; product life-cycle management; manufacturing and business logistics; cost accounting; scheduling; process planning and workflow; human factors; distribution and marketing.

The course will also develop students in the areas of technical literature survey, analysis and assimilation of materials, skills of written and oral presentation, composition and implementation of ideas, communication and interactive skills through student-centred activities, interactive and project-based learning.

Pre-requisite: IMSE2109 Fundamentals of engineering design  
Assessment: 100% continuous assessment

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**IMSE4101. Computer integrated manufacturing (6 credits)**

Overview of Computer Integrated Manufacturing (CIM) system and CAD/CAM functions; geometric modelling in CAD - principles of surface and solid modelling; CNC applications in CAM; computer aided process planning, automated process planning; rapid and virtual manufacturing; CAD and CAM integration.

Prerequisite: IMSE2109 Fundamentals of engineering design  
Assessment: 30% continuous assessment, 70% examination

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**IMSE4102. Engineering project management (6 credits)**

Fundamentals of engineering project management; project environment; project evaluation; risk management process; project selection and proposal preparation; project scheduling and contingency setting and control; control of variation and claims; project management methodologies and techniques, change management; multi-criteria decision making process; analytic hierarchy process; PERT/GANTT techniques for project control and resources allocation; simulation of critical paths; case studies.

Assessment: 30% continuous assessment, 70% examination

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**IMSE4110. Financial engineering (6 credits)**

Financial markets and financial securities, portfolio management and investment strategies; international finance, foreign exchange markets; project evaluation and financing, present value, cost of capital, cost-benefit ratio and internal rates of return; financial instruments, forwards, futures; swaps, options and hedging strategies; foreign trade and investment in China.

Prerequisite: IMSE3105 Managerial accounting and finance  
Assessment: 30% continuous assessment, 70% examination

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**IMSE4116. Operations planning and control (6 credits)**

The use of operations planning and control systems in forecasting, scheduling and inventory control; functions and organisation of production and inventory control systems; demand forecasting; deterministic and stochastic inventory control problems; aggregate production planning; master production scheduling; requirements and capacity planning systems; operations scheduling and control of production systems; Just-In-Time techniques; balancing of assembly lines; information reporting and processing; supply chain management.

Prerequisite: IMSE3132 Operational research Assessment: 20% continuous assessment, 80% examination

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**IMSE4118. Advanced manufacturing technology (6 credits)**

Metal cutting and machining, analysis of cutter geometry and materials; mechanics of cutting, tool wear and tool life, cutting optimisation, analysis of milling, grinding, EDM, ECM, LBM; analysis of metal forming processes; engineering plasticity, Upper-Bound Theorem, CAD/CAM for mould and dies, rapid prototyping technologies; melt rheology, temperature and pressure effects, viscosity, mixing systems, polymeric materials, analysis of injection, extrusion, mould and die design.

Prerequisite: IMSE3106 Manufacturing technology  
Assessment: 20% continuous assessment, 80% examination

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**IMSE4119. Digital enterprises and e-commerce (6 credits)**

Enterprise resource management; EDI applications; data mining and warehousing; virtual enterprises; advanced Internet and web applications in product development, industrial applications of virtual reality; digital design and manufacturing technology: 3D printing, virtual prototyping and virtual manufacturing; electronic product and component cataloguing; cryptographic systems and digital watermarking; capability maturity model; social accountability and responsibility standards; E-commerce business models; technological, business planning and social issues of E-commerce; order taking and processing; mobile technology and electronic payment systems, smart cards, RFID and NFC.

Prerequisite: IMSE3116 Internet technology for e-commerce or  
IMSE2113 Information systems or  
ENGG1111 Computer programming and applications or  
ENGG1112 Computer programming and applications I  
Assessment: 50% continuous assessment, 50% examination

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**IMSE4120. Technology marketing (6 credits)**

Customer relationships and value, marketing strategies and plans, marketing environment, ethical and social responsibility in marketing, marketing mix, marketing research and forecasting, marketing segmentation and positioning, technology trend, distribution channels, intellectual property, e-marketing.

Assessment: 30% continuous assessment, 70% examination

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**IMSE4121. Strategic management of business and technology (6 credits)**

Analysis of the external environment and industry clusters for local industries – threats and opportunities from government policies as well as the legal, economic, social and technological environment; competitive forces from industry rivals, customers and other sources; analysis of internal weaknesses and strengths – resources, competences and success factors; mission and strategic intent; strategic directions and methods – conditions and implications; implementing and evaluating strategic changes; management for technology innovation.

Prerequisite: IMSE2102 Fundamentals of supply chain management

Assessment: 30% continuous assessment, 70% examination

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**IMSE4122. Global logistics systems (6 credits)**

Global operations and logistics strategies, strategic changes required by globalisation, the strategic framework for integrating global operations, the role of logistics in global operations and marketing strategies; global operations and logistics planning, supplier network development, physical distribution, global logistics network design, global supply chain management, foreign exchange risk management in global operations; operations analysis of global supply chains, information management for global logistics, performance measurement and evaluation in global logistics.

Prerequisite: IMSE2102 Fundamentals of supply chain management

Assessment: 20% continuous assessment, 80% examination

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**IMSE4123. Warehousing and terminal operations (6 credits)**

Introduction to warehousing; material handling technologies, MH principles, container and unitizing equipment, storage and retrieval equipment, AS/RS, material transport equipment, automatic data collection and communication equipment, packaging; warehouse management system, receiving, cycle counting, order processing, picking, replenishment, shipping; warehouse planning and design: simulation model and software; design procedures.

Introduction to container terminal and air cargo terminal, basic operation flow at ship, quay, container yard, gate and CFS, container handling equipment and operation modes organization structure of a terminal and its various functions, container ship structure and generations, terminal management system, terminal planning and design methodology and analysis tools.

Prerequisite: IMSE2102 Fundamentals of supply chain management

Assessment: 30% continuous assessment, 70% examination

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**IMSE4128. Innovation and entrepreneurship (6 credits)**

Entrepreneurship in the new world economy, developments in the Pacific region and Greater China; general characteristics of entrepreneurs; enterprise formation, organizational structure, new economy business models; enterprise resources, business plan, venture capital; technological growth; environmental and contingency factors; case studies. Skill workshops: identifying strengths and improving skills; organising yourself and your time; communication; systematic problem solving; group work; negotiating and assertiveness; coping with pressure; leadership.

Assessment: 30% continuous assessment, 70% examination

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**IMSE4129. Manufacturing system analysis and design (6 credits)**

Types of manufacturing systems; modelling and analysis of manufacturing systems, material flow analysis, assembly line balancing, discrete-event simulation; stochastic modelling: Markov chains, central server model, network of queues; factory physics, effects of variability on performance; competitive manufacturing: just-in-time production, quick-response manufacturing; advanced manufacturing systems, group technology, flexible manufacturing systems, holonic manufacturing.

Prerequisite: IMSE2132 Statistical analysis

Assessment: 30% continuous assessment, 70% examination

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**IMSE4135. Systems integration (6 credits)**

Student-centred learning on system integration and analysis and evaluation of system performance. The module is based on case studies and covers the application of various techniques as follows:

Business analysis and decision making process; industrial modelling and simulation; project management, strategic management; industry analysis; value chain analysis and critical success factors.

Facility location analysis; locational economics; network planning process; warehouse design and management; supply and inventory management; supply chain performance analysis; alternative supply chain strategies; systems modelling and simulation; customer-supplier relationship; regional and international transportation strategies.

Assessment: 100% continuous assessment

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**IMSE4174. Project (12 credits)**

A dissertation or report on a topic consisting of design, experimental or analytical investigation in the field of industrial engineering and technology management; logistics engineering and supply chain management.

Assessment: 100% continuous assessment

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