INDUSTRIAL ENGINEERING AND LOGISTICS MANAGEMENT

SYLLABUS

The syllabus applies to students admitted in the academic year 2016-17 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 fulfilment of the curriculum requirements of the degree of BEng in Industrial Engineering and Logistics 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 Courses.

Discipline Core Courses
Students are required to complete ALL discipline core courses (84 credits), comprising 36 credits of introductory core courses and 48 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 “CAES9532 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, comprising at least one and not more than two courses from each Area of Inquiry with not more than 24 credits of courses being selected within one academic year except where candidates are required to make up for failed credits during the whole period of study.
Capstone Experience
Students are required to complete the 12-credit “IMSE4174 Project” to fulfil the capstone experience requirement for the degree of BEng in Industrial Engineering and Logistics 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 Logistics Management) comprises 240 credits of courses with the following structure:

UG 5 Requirements (54 credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course</th>
<th>No. of credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAES1000</td>
<td>Core University English</td>
<td>6</td>
</tr>
<tr>
<td>CAES9532</td>
<td>Technical English for Industrial and Manufacturing Systems Engineering</td>
<td>6</td>
</tr>
<tr>
<td>CENG9001</td>
<td>Practical Chinese for Engineering Students</td>
<td>6</td>
</tr>
<tr>
<td>CC##XXXX</td>
<td>University Common Core Course (6 courses)*</td>
<td>36</td>
</tr>
<tr>
<td>Total for UG5 Requirements</td>
<td></td>
<td>54</td>
</tr>
</tbody>
</table>

* Students have to complete 36 credits of courses in the Common Core Curriculum, comprising at least one and not more than two courses from each Area of Inquiry with not more than 24 credits of courses being selected within one academic year except where candidates are required to make up for failed credits.

General Engineering Courses (36 credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course</th>
<th>No. of credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH1851</td>
<td>Calculus and ordinary differential equations</td>
<td>6</td>
</tr>
<tr>
<td>MATH1853</td>
<td>Linear Algebra, Probability &amp; Statistics</td>
<td>6</td>
</tr>
<tr>
<td>ENGG1111/ENGG1112</td>
<td>Computer programming and applications/ Computer programming and applications I</td>
<td>6</td>
</tr>
<tr>
<td>PHYS1050</td>
<td>Physics for engineering students</td>
<td>6</td>
</tr>
<tr>
<td>ENGG120X</td>
<td>Any two of the General Engineering Courses offered by the Dept. of IMSE or other Departments of the Faculty of Engineering+</td>
<td>12</td>
</tr>
<tr>
<td>Total for General Engineering Courses</td>
<td></td>
<td>36</td>
</tr>
</tbody>
</table>

+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
Discipline Core Courses (84 credits)

Introductory Courses (36 credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course</th>
<th>No. of credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMSE2102</td>
<td>Fundamentals of supply chain management</td>
<td>6</td>
</tr>
<tr>
<td>IMSE2109</td>
<td>Fundamentals of engineering design</td>
<td>6</td>
</tr>
<tr>
<td>IMSE2121</td>
<td>Engineering training</td>
<td>6</td>
</tr>
<tr>
<td>IMSE2132</td>
<td>Statistical analysis</td>
<td>6</td>
</tr>
<tr>
<td>IMSE2134</td>
<td>Operational research</td>
<td>6</td>
</tr>
<tr>
<td>IMSE2135</td>
<td>Mathematical optimisation</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total for Introductory Discipline Core Courses</strong></td>
<td></td>
<td><strong>36</strong></td>
</tr>
</tbody>
</table>

Advanced Courses (48 credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course</th>
<th>No. of credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMSE3102</td>
<td>Strategic supply chain management</td>
<td>6</td>
</tr>
<tr>
<td>IMSE3115</td>
<td>Engineering economics and finance</td>
<td>6</td>
</tr>
<tr>
<td>IMSE3126</td>
<td>Engineers in society</td>
<td>6</td>
</tr>
<tr>
<td>IMSE3134</td>
<td>Innovation and entrepreneurship</td>
<td>6</td>
</tr>
<tr>
<td>IMSE3136</td>
<td>Operations planning and control</td>
<td>6</td>
</tr>
<tr>
<td>IMSE4122</td>
<td>Global logistics systems</td>
<td>6</td>
</tr>
<tr>
<td>IMSE4135</td>
<td>Systems integration</td>
<td>6</td>
</tr>
<tr>
<td>IMSE4136</td>
<td>Transportation and distribution planning</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total for Advanced Discipline Core Courses</strong></td>
<td></td>
<td><strong>48</strong></td>
</tr>
</tbody>
</table>

Capstone Experience and Internship (18 credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course</th>
<th>No. of credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMSE4174</td>
<td>Project’</td>
<td>12</td>
</tr>
<tr>
<td>IMSE3129</td>
<td>Internship*</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total for Capstone Experience and Internship</strong></td>
<td></td>
<td><strong>18</strong></td>
</tr>
</tbody>
</table>

*Capstone Experience

*Internship

Discipline Elective Courses (36 credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course</th>
<th>No. of credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMSE2112</td>
<td>Engineering technology</td>
<td>6</td>
</tr>
<tr>
<td>IMSE2113</td>
<td>Information systems</td>
<td>6</td>
</tr>
<tr>
<td>IMSE2114</td>
<td>Product development</td>
<td>6</td>
</tr>
<tr>
<td>IMSE2117</td>
<td>Engineering systems analysis</td>
<td>6</td>
</tr>
<tr>
<td>IMSE3103</td>
<td>Systems automation</td>
<td>6</td>
</tr>
<tr>
<td>IMSE3106</td>
<td>Manufacturing technology</td>
<td>6</td>
</tr>
<tr>
<td>IMSE3107</td>
<td>Systems modelling and simulation</td>
<td>6</td>
</tr>
<tr>
<td>IMSE3109</td>
<td>Quality management</td>
<td>6</td>
</tr>
<tr>
<td>IMSE3110</td>
<td>Supply chain finance</td>
<td>6</td>
</tr>
<tr>
<td>IMSE3111</td>
<td>Intelligent optimisation</td>
<td>6</td>
</tr>
<tr>
<td>IMSE3116</td>
<td>Internet technology for e-commerce</td>
<td>6</td>
</tr>
<tr>
<td>IMSE3118</td>
<td>Industrial organisation and management</td>
<td>6</td>
</tr>
</tbody>
</table>
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 Logistics Management)

<table>
<thead>
<tr>
<th>Course Categories</th>
<th>No. of credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>UG5 Requirements</td>
<td>54</td>
</tr>
<tr>
<td>General Engineering Courses</td>
<td>36</td>
</tr>
<tr>
<td>Discipline Core Courses (Introductory)</td>
<td>36</td>
</tr>
<tr>
<td>Discipline Core Courses (Advanced)</td>
<td>48</td>
</tr>
<tr>
<td>Capstone Experience and Internship</td>
<td>18</td>
</tr>
<tr>
<td>Discipline Elective Courses</td>
<td>36</td>
</tr>
<tr>
<td>Elective Courses</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>240</td>
</tr>
</tbody>
</table>

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 (36 credits)**

IMSE2102 Fundamentals of supply chain management
IMSE2109  Fundamentals of engineering design
IMSE2121  Engineering training
IMSE2132  Statistical analysis
IMSE2134  Operational research
IMSE2135  Mathematical optimisation

University Requirements (UG5) (18 credits)
CC##XXXX  Three Common Core Courses

Discipline Elective Courses (6 credits)

THIRD YEAR

Advanced Core Courses (30 credits)
IMSE3102  Strategic supply chain management
IMSE3115  Engineering economics and finance
IMSE3126  Engineers in society
IMSE3134  Innovation and entrepreneurship
IMSE3136  Operations planning and control

Capstone Experience (6 credits)
IMSE3129  Internship

University Requirements (UG5) (12 credits)
CAES9532  Technical English for Industrial and Manufacturing Systems Engineering
CENG9001  Practical Chinese for engineering students

Discipline Elective Courses (12 credits)

FOURTH YEAR

Advanced Core Courses (18 credits)
IMSE4122  Global logistics systems
IMSE4135  Systems integration
IMSE4136  Transportation and distribution planning

Discipline Elective Courses (18 credits)

Capstone Experience (12 credits)
IMSE4174  Project

Elective Courses (12 credits)

Minor in Industrial Engineering and Logistics Management
[not eligible for BEng(IELM) students]

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

- Level 4 or above in Mathematics 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:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) 12 credits of core courses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMSE2102</td>
<td>Fundamentals of supply chain management</td>
<td>6</td>
</tr>
<tr>
<td>IMSE4136</td>
<td>Transportation and distribution planning</td>
<td>6</td>
</tr>
<tr>
<td>(ii) 24 credits of elective courses selected from the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMSE2132</td>
<td>Statistical analysis</td>
<td>6</td>
</tr>
<tr>
<td>IMSE3102</td>
<td>Strategic supply chain management</td>
<td>6</td>
</tr>
<tr>
<td>IMSE3115</td>
<td>Engineering economics and finance</td>
<td>6</td>
</tr>
<tr>
<td>IMSE3106</td>
<td>Manufacturing technology</td>
<td>6</td>
</tr>
<tr>
<td>IMSE3107</td>
<td>Systems modelling and simulation</td>
<td>6</td>
</tr>
<tr>
<td>IMSE4119</td>
<td>Digital enterprises and e-commerce</td>
<td>6</td>
</tr>
</tbody>
</table>

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 and applications (6 credits) or
ENGG1112  Computer programming and applications I (6 credits)
MATH1851  Calculus and ordinary 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.

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.
CAES9532. 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 through report writing and oral presentation with a focus on the former. 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 project-based courses as nominated by the Department of Industrial and Manufacturing Systems Engineering. Assessment is wholly by coursework.

Co-requisite: IMSE3134 Innovation and entrepreneurship
Adjunct course: IMSE3134 Innovation and entrepreneurship
Assessment: 100% continuous assessment

University Common Core Curriculum

Successful completion of 36 credits of courses in the Common Core Curriculum, comprising at least one and not more than two courses from each Area of Inquiry with not more than 24 credits of courses being selected within one academic year except where candidates are required to make up for failed credits:

- Scientific and Technology Literacy
- Humanities
- Global Issues
- China: Culture, State and Society

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

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
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

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

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

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

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

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

IMSE2134. **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

IMSE2135. **Mathematical optimisation (6 credits)**

Multivariable functions, partial derivatives and multiple integrals; multivariable unconstrained optimisation; optimisation problems with equality and inequality constraints; nonlinear optimization; gradient methods and Newton-Raphson method; industrial applications of optimisation techniques.

Prerequisite: MATH1851 Calculus and ordinary differential equations
Assessment: 30% continuous assessment, 70% examination

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

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

Introduction to robotics and automation, fundamental of robotics; basic components of robotic systems; robot applications including industrial robots, services robots, space robots, and medical robots; robot intelligence, integration of robotics systems for automation, applications of automation in manufacturing, logistics, and smart city; Global trend and development in robotics and systems automation.

Prerequisite: MATH1851 Calculus and ordinary differential equations
Assessment: 30% continuous assessment, 70% examination
**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

**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

**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

**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

**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.
IMSE3115. Engineering economics 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 and 70% examination

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: ENNG1111 Computer programming and applications or ENNG1112 Computer programming and applications I

Assessment: 60% continuous assessment and 40% examination

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

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

IMSE3126. Engineers in society (6 credits)

Responsibilities of professional engineers in society; role of ethics in engineering; engineering health and safety; accident prevention and management; environmental considerations; the fundamentals of
the Hong Kong legal system; legal issues and the laws relevant to engineering practice; meeting with professionals from industry for sharing knowledge about engineering ethics and responsibility.

Assessment: 30% continuous assessment, 70% examination

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

Human-organization interaction; human-technology interface usability and design; workplace safety and health; applied anthropometry and biomechanics; physical work and manual material handling; time and motion study; 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

**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

**IMSE3134. Innovation and entrepreneurship**

The course is designed to apply industrial engineering principles and methodologies in an integrated manner for formulating strategies for innovation and entrepreneurship. The main element of the course is a group project on developing a conceptual product, or a service, or a system with innovative ideas and designing a start-up business plan. This project serves as a vehicle for integrated 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 students will learn about entrepreneurship in the new world economy, general characteristics of entrepreneurs, marketing of products and services, business plan, venture capital, environmental and contingency factors, time management, communication, systematic problem solving, group work, negotiating and assertiveness, coping with pressure, and leadership.

Pre-requisite: IMSE2109 Fundamentals of engineering design
Co-requisite: CAES9532 Technical English for Industrial and Manufacturing Systems Engineering
Adjunct course: CAES9532 Technical English for Industrial and Manufacturing Systems Engineering
Assessment: 100% continuous assessment
IMSE3136. 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: IMSE2134 Operational research
Assessment: 20% continuous assessment, 80% examination

IMSE3137. Virtual reality for systems engineering (6 credits)

Fundamental of virtual reality, concepts of virtual, augmented and mixed reality, visualization and interacting with complex information and systems with virtual reality, applications of virtual reality technology in engineering systems design and analysis, immersive and interactive virtual environments; innovation and consciousness with virtual reality system development and deployment, ethical issues and social impacts of adopting virtual reality in system development. Designing and building virtual systems with immersive virtual reality systems including CAVE-like environment and VR headsets.

Assessment: 60% continuous assessment, 40% examination

IMSE3138. 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

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 prototyping (3D printing) and virtual manufacturing; CAD and CAM integration.
Prerequisite: IMSE2109 Fundamentals of engineering design
Assessment: 40% continuous assessment, 60% examination

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

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: IMSE3115 Engineering economics and finance
Assessment: 30% continuous assessment, 70% examination

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: IMSE2113 Information systems or ENGG1111 Computer programming and applications or ENGG1112 Computer programming and applications I
Assessment: 50% continuous assessment, 50% examination

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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**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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**IMSE4136. Transportation and distribution planning (6 credits)**

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:** IMSE2134 Operational Research  
**Assessment:** 30% continuous assessment, 70% examination

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**IMSE4137. Operational risk management (6 credits)**

Basics of risk management, risk and return, lifecycle of risk management, operational risk management (ORM) components; risk management framework: standards, management environment, management processes; operational risk assessment: assessment, identification, scale of assessment;
risk reporting: risk indicators, risk map. Risk management strategies: risk avoidance, mitigation, transfer and acceptance; applications: supply chain management, product development, environment, health and safety risks; crisis management.

Assessment: 30% continuous assessment, 70% examination

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**IMSE4138.  Asset and portfolio management (6 credits)**

Statistics of asset and portfolio management: univariate statistics, multivariate statistics, modelling the market; portfolio selection theories: mean-variance analysis, asset pricing theory; factor model: arbitrage pricing theory, factor model estimation, principal component analysis; asset price dynamics; portfolio management strategies: tracking error, information ratio, passive and active strategies; portfolio monitor and adjustment; rebalancing; basic machine learning algorithms.

Assessment: 30% continuous assessment, 70% examination

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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