The only course offered by a polytechnic in Singapore in the field of quality studies, the Diploma in Business Process & Quality Engineering (BPQE) is specially designed to meet the needs of companies involved in manufacturing, service and support services.

In keeping with global trends and developments, the curriculum focuses on quality management while retaining basic engineering modules. By combining engineering and management, BPQE produces highly sought after graduates with a sound grasp of modern quality techniques and concepts.

Students are exposed to an exciting variety of engineering, quality management and customer service concepts. Students take modules in diverse areas such as service management, project quality management, principles of marketing, and business process engineering.

The course also incorporates interdisciplinary studies and the application of various disciplines such as quality management, industrial and systems engineering, and materials and production engineering. This course is therefore particularly suitable for those who are technology- and business-minded.

In their final year, students can either undertake an industrial attachment locally or overseas, or participate in an in-house project. The Multidiscipline Engineering Division has a close relationship with companies such as Motorola, Yeakin Plastic, Dell Computer, Baxter Healthcare, and with industry bodies like the Singapore Quality Institute, which is affiliated with the American Society for Quality.

**ENTRY REQUIREMENTS**

To be eligible for consideration, candidates must have the following GCE ‘O’ Level examinations (or equivalent) results:

<table>
<thead>
<tr>
<th>Subject</th>
<th>‘O’ Level Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>1-7**</td>
</tr>
<tr>
<td>Mathematics (Elementary/Additional)</td>
<td>1-6</td>
</tr>
<tr>
<td>Science (with Physics or Chemistry or Biology component) or Design &amp; Technology</td>
<td>1-6</td>
</tr>
</tbody>
</table>

The aggregate computation for selection is based on grades obtained for English, Mathematics, Science or Design & Technology and two other subjects.

**Candidates with English as a second language (EL2) must have attained a minimum grade of 6.**

Candidates with severe vision deficiency should not apply for the course. Those with colour appreciation deficiency may be considered, subject to an in-house test.

**CAREER PROSPECTS**

BPQE graduates enjoy a host of diverse career opportunities in both the engineering and management-related sectors. Roles relating to the initiation, implementation and maintenance of quality management systems, such as those of a quality specialist, controller, consultant and auditor, would be particularly suitable for BPQE graduates. Prospects for advancement are good, and those who acquire further skills can progress to become Quality Managers and Quality Directors.

**ACCREDITATION FOR FURTHER STUDIES**

BPQE graduates may pursue further studies in areas such as Mechanical Engineering, Materials Engineering, Electrical Engineering, Industrial & Systems Engineering, Service Operations Management, and Engineering Management in both local and foreign universities.

In particular, BPQE graduates can gain direct admission to the second year of the Materials Engineering, Mechanical Engineering and Electrical Engineering courses at the Nanyang Technological University (NTU). Also available is direct admission with advanced standing to the Industrial & Systems Engineering and Mechanical Engineering courses at the National University of Singapore (NUS).

Graduates can also gain admission into business-related and other relevant courses at NUS, NTU and the Singapore Management University.

Graduates may also gain admission into related courses at most UK and Australian universities.
COURSE STRUCTURE

FIRST-YEAR MODULES

Level 1.1
• Engineering Mathematics 1
• Engineering Materials
• Fundamentals of Quality Management
• CAD & Geometric Tolerancing
• Engineering Mechanics
• Creativity & Applied Thinking Skills
• Sports & Wellness

Level 1.2
• Electrical Technology
• Computer Programming
• Applied Statistics
• Engineering Mathematics 2
• Individual & the Community
• Exploring Contemporary Issues

SECOND-YEAR MODULES

Level 2.1
• Financial Decision
• Economics
• Engineering Mathematics 3
• Quantitative Analysis & Simulation
• Product Innovation
• Any two Interdisciplinary Studies (IS) modules

Level 2.2
• Integrated Management System
• Operation & Manufacturing Processes
• Team & Project Management
• Decision Analysis
• Statistical Quality Control
• Innovation & Enterprise in Action

FINAL-YEAR MODULES

Level 3.1
• Industrial Engineering Practices
• Service Marketing
• Reliability & Preventative Management
• Business Process Engineering

Level 3.2 (Pathway 1)
• Product Design & Development or
• Industrial Attachment Programme

ACROSS-LEVEL MODULES (LEVEL 1.2 ONWARDS)

• Any 2 School of Engineering (SoE) elective modules

^ Denotes Interdisciplinary Studies module. For more details on IS modules, please log on to www.np.edu.sg/is/

* Students take two elective modules to complete their diploma. Electives are chosen and customised from a wide range of clusters under the Engineering and Non-Engineering categories.

COURSE MODULES

LEVEL 1.1

Engineering Mathematics 1
This module is designed to provide students with the fundamental skills in mathematics required to solve basic engineering problems. Topics are introduced in an order that is intended to keep abreast of the application requirements in engineering modules. The emphasis in each topic is on simple applications and problem solving. Throughout the module, there is appropriate use of a Computer Algebra System. Topics include algebra, trigonometry, logarithms, matrices and complex numbers.

Fundamentals of Quality Management
This module introduces the basic principles of quality management. The concepts, philosophies and techniques of quality control are discussed with an emphasis on the practical application of this knowledge to analyse and solve quality problems. Where feasible, field trips will be organised to established companies to learn about the practical implementation of quality management in a manufacturing or service organisation.

CAD & Geometrical Tolerancing
Engineering Drawing or blueprint is a precise international language, and an understanding of it is essential for a great number of technologists, who are not directly involved in the actual preparation of drawing. This module furnishes an understanding of and the ability to read working drawings, and an appreciation of the use of CAD in design work. No prior engineering graphic or software knowledge is assumed.

Engineering Mechanics
Students learn to analyse problems in engineering mechanics based on basic principles and concepts such as equilibrium, friction, and Newton’s laws of motion. This module covers both statics and dynamics with emphasis on free-body diagrams, and application of basic principles to solve engineering problems.

LEVEL 1.2

Electrical Technology
This module provides a foundation in electricity to prepare the students for more specialised subjects. It deals with the basic concepts of electrical circuits and the methods used to analyse them. The module emphasizes an understanding of the basic electrical circuit laws (Ohm’s Law, Kirchhoff’s Voltage and Current Laws) and network theorems, and their application in electrical network analysis. Topics covered include fundamentals of electricity, network theorems, capacitance, electromagnetic induction and inductance, AC circuit theory and transformer fundamentals.

Computer Programming
This practical-oriented module equips students with the basic knowledge and skills in computer programming using “C” language. The main topics include basic computing concepts, fundamentals of C, branching, loops, and C functions. On completion of the module, students will be able to explain and write C programs for simple engineering applications.

Applied Statistics
Students are introduced to basic statistical knowledge and techniques to solve problems encountered in their studies and future careers. Topics include introduction to statistics, descriptive statistics, introduction to probability and probability distributions, normal probability distribution, sampling distributions and parameter estimation, hypothesis testing, simple linear regression and correlation. Students are also taught to analyse data and interpret the results using a software package.

Engineering Mathematics 2
This module provides students with the fundamental skills in mathematics that are required to solve basic engineering problems. Topics are introduced in an order that is intended to keep abreast of the application requirements in engineering modules. The emphasis in each topic is on simple applications and problem solving. Throughout the module, there is appropriate use of a Computer Algebra System. Topics include trigonometry, coordinate geometry, differentiation and integration with applications.
DIPLOMA IN BUSINESS PROCESS & QUALITY ENGINEERING
(BPQE) (3-YEAR COURSE)
SCHOOL OF ENGINEERING

LEVEL 2.1
Financial Decision
Students are introduced to a sound understanding of costs and cost behaviour, and the use of cost information for planning and control decisions, not just inventory valuation. The module equips students with knowledge in activity-based costing, target costing, the value chain, customer profitability analysis, and throughput costing while also including traditional topics such as job-order costing, budgeting and performance evaluation. This is to provide students with a systematic framework for financial decision-making.

Economics
This module gives an overview of macroeconomics and microeconomics. It focuses more on the microeconomics theory of demand and supply, resource allocation, consumer behaviour, market demand, production and cost theory, price and output of firms under conditions of perfect and imperfect competition. At the end of the module, students are able to apply the basic concepts of economics and its tools to analyse economic problems and issues. The section on macroeconomics provides students with the understanding of the working an economy. Macroeconomics issues such as economic growth, unemployment, inflation and the measurement of national income and national output will be discussed.

Engineering Mathematics 3
This module provides students with the fundamental skills in mathematics required to solve basic engineering problems. Topics are introduced in an order that is intended to keep abreast of the application requirements in engineering modules. The emphasis in each topic is on simple applications and problem solving. Throughout the module, there is appropriate use of a Computer Algebra System. Topics include integration with applications, differential equations, Laplace transform and Fourier Series.

Quantitative Analysis & Simulation
Students are introduced to the concepts and techniques related to the design, planning, control, and improvement of manufacturing and service operations. The module begins with a holistic view of operations, whereby we stress the coordination of product development, process management, and supply chain management. Topics include the areas of process analysis, materials management, production scheduling and product design.

Product Innovation
The module aims to provide students with a basic understanding of techniques for product innovation. Topics covered include the TRIZ principles, Value Engineering and House of Quality. The students learn how to apply these principles for product or service innovation. Case studies, project work will be used for teaching the module. Upon completion of the module, the student are able to understand the basics of product invention and use these techniques to develop prototype and for creative problem solving.

LEVEL 2.2
Integrated Management System
This module prepares the students for work in the area of documenting for the ISO 9000 series quality system. It provides grounding for all stages of reporting, both oral and written, with an emphasis on clarity, economy and readability. Special attention is given to understanding the principles of quality management, and implementing these principles through a documented quality management systems based on the requirements of the ISO 9000 series of standards. Students learn how to develop system procedures, work instructions and forms. Process mapping is done using flow-charting techniques. There will also be a course project to develop a quality manual. The students are also exposed to other International Standards that are currently used in the marketplace.

Operations and Manufacturing Processes
This module equips students with theoretical knowledge and practices in some of Singapore’s common basic manufacturing processes and operational practices. It provides the basic manufacturing knowledge and the necessary operational skills to develop a simple operational/process plan. Manufacturing practices, hands-on demonstrations and practical assignments enhance students’ understanding of the subject and enable them to work confidently with different processes or operations.

Team & Project Management
Students are introduced to the concepts and techniques related to project management and team management. The course begins with a holistic view of project management, and group and individual behaviour. Topics cover various aspects of project management techniques, foundations of individual behaviour, and the various factors affecting group behaviour.

Decision Analysis
Students will gain a sound understanding of the principles, basic concepts, and methodology of engineering economy. This helps them develop proficiency in these methods and in the process for making rational decisions in engineering project. The module provides a systematic framework of engineering economy for evaluating the economic aspects of competing design solutions. The foundation for such analyses is enumerated in the seven principles of engineering economy. These principles provide the basis for building predictive models of financial impact.

Statistical Quality Control
The module equips students with the necessary knowledge and skills to analyse problems in statistical process control, acceptance sampling and basic design of experiments. Topics covered are basic quality control chart theory, control charts for variables and attributes, acceptance sampling and fundamentals of experiment designs.
and improvement.

possibility of endless "system or scope creep", is the basis for innovation
concept for product or service management and redesign, where the
model, students are exposed to systemic thinking in developing the
knowledge can be created to drive improvement and build a competitive
the fundamentals of business system thinking, and demonstrates how
need to understand it as a system. This module provides students with
focusing on the interactions and interdependencies among the various
components. To improve the way something functions, we
the fundamentals of business system thinking, and demonstrates how
know ledge can be created to drive improvement and build a competitive
position. With reference to a developed Business Process Management
model, students are exposed to systemic thinking in developing the
concept for product or service management and redesign, where the
possibility of endless "system or scope creep", is the basis for innovation
and improvement.

Service Marketing
This module imparts the basic concepts and principles of the marketing
of goods and services. The module helps students better understand
and evaluate the marketing system, in which products and services
are planned, priced, promoted and distributed. It also helps them
appreciate the interaction of marketing variables and their impact on
marketing decisions. Students are provided opportunities to learn and
apply marketing concepts in a creative way through projects,
presentations and case studies.

Reliability and Preventive Management
The module furnishes students with an understanding of the concepts
and principles of reliability engineering. Students examine the fundamental
principles and concepts of incorporating "reliability" into the design of
a product, in addition to focusing on the "quality" aspect. Topics covered
include systems reliability, the "bathtub" curve, useful lifetime probability
models such as exponential distribution & Weibull distribution; reliability
prediction, redundancy, design review, failure data analysis, probability
plotting techniques, reliability in design, preventive maintenance
engineering, hazard analysis, failure mode effect analysis and fault
tree analysis.

Service Innovation
Students are introduced to the concepts and techniques related to all
aspects of the management and operation of services. The module is
designed to develop students' skills in both strategic and operational
issues pertaining to services. Topics covered include both qualitative
and quantitative aspects of service management and also balanced
scorecards and Six Sigma, so as to give students wide-ranging techniques
for ensuring quality and evaluating long-term strategy planning. Students
will be able to apply this knowledge for service innovations. Learner-
centred strategy, together with self-test quizzes, video clips, Service Model
Software, and the Mortgage Service Game, is used to enhance learning.

Business Process Engineering
The key to improving business performance is systems thinking –
 focusing on the interactions and interdependencies among the various
business components. To improve the way something functions, we
need to understand it as a system. This module provides students with
the fundamentals of business system thinking, and demonstrates how
knowledge can be created to drive improvement and build a competitive
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concept for product or service management and redesign, where the
possibility of endless "system or scope creep", is the basis for innovation
and improvement.

LEVEL 3.1
Industrial Engineering Practices
Students are introduced to theoretical knowledge and practical skills
in some of the common industrial engineering practices that are
applicable to service and manufacturing industries. This module provides
the basic knowledge and nurtures the necessary practical skills for
developing and implementing some of the common industrial practices
that are pertinent to operational efficiency and effectiveness. As it is a
highly practical approach, the content and projects enhance students' understanding of the subject matters and enable them to work confidently
either in service or manufacturing operations.

LEVEL 3.2
Industrial Attachment Programme (IAP)
Through this attachment programme, students have a longer period of
practical experience in the quality assurance environment to prepare
them for future careers in the manufacturing or service industry. Students
are attached, on a full-time basis, to a company for six months, where
they will work on a project assigned to them. This helps students to
associate classroom knowledge with practical experience and to develop
their problem-solving, interpersonal and communication skills under a
job-training environment.

Product Design & Development (PDD)
Through this module, the students will integrate what they have learnt
in the course to design and fabricate a product. This project could be
done in-house with the school or with a company, on a part-time basis.
This helps students to associate classroom knowledge with practical
experience and to develop their problem solving, interpersonal and
communication skills under a job-training environment.

Service Marketing
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and improvement.
### COURSE CURRICULUM

<table>
<thead>
<tr>
<th>Module No.</th>
<th>Module Name</th>
<th>Credit Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1</td>
<td>Engineering Mathematics 1</td>
<td>5</td>
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<tr>
<td></td>
<td>Engineering Materials</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Fundamentals of Quality Management</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>CAD &amp; Geometric Tolerancing</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Engineering Mechanics</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Creativity &amp; Applied Thinking Skills</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Sports &amp; Wellness</td>
<td>2</td>
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<td>Level 1.2</td>
<td>Electrical Technology</td>
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<td>Computer Programming</td>
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<td>Applied Statistics</td>
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<td>Engineering Mathematics 2</td>
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<td>Individual &amp; the Community</td>
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<td>Exploring Contemporary Issues</td>
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<td>Level 2</td>
<td>Financial Decision</td>
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<tr>
<td></td>
<td>Economics</td>
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<td></td>
<td>Engineering Mathematics 3</td>
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<td></td>
<td>Quantitative Analysis &amp; Simulation</td>
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<td></td>
<td>Product Innovation</td>
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<td></td>
<td>Interdisciplinary Studies (IS) module</td>
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<td></td>
<td>Interdisciplinary Studies (IS) module</td>
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<td>Level 2.2</td>
<td>Integrated Management System</td>
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<tr>
<td></td>
<td>Operation &amp; Manufacturing Processes</td>
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<td>Team &amp; Project Management</td>
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<tr>
<td></td>
<td>Decision Analysis</td>
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<td></td>
<td>Statistical Quality Control</td>
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<tr>
<td></td>
<td>Innovation &amp; Enterprise in Action</td>
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<td>Level 3</td>
<td>Industrial Engineering Practices</td>
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<td></td>
<td>Service Marketing</td>
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<td>Reliability &amp; Preventive Management</td>
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<td></td>
<td>Service Innovations</td>
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<td></td>
<td>Business Process Engineering</td>
<td>4</td>
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<tr>
<td></td>
<td>World Issues: A Singapore Perspective</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Interdisciplinary Studies (IS) module</td>
<td>2</td>
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</tbody>
</table>

**Notes:**
- For more details on Interdisciplinary Studies (IS) modules, please log on to [www.np.edu.sg/is/](http://www.np.edu.sg/is/).
- For more details on School of Engineering elective modules, please refer to page 182.

**IS Modules**

The School of Interdisciplinary Studies (IS) delivers the interdisciplinary curriculum, which nurtures a new generation of professionals with multidisciplinary skills and an innovative and entrepreneurial spirit to meet the challenges of a knowledge-based economy. IS modules challenge boundaries and offer insights into Communication, Entrepreneurship, Life Skills, Media & the Arts, and Science & Technology.

**School of Engineering (SoE) Elective Modules**

The SoE elective modules fall under a wide range of clusters under both Engineering and Non-Engineering categories. The aim is to provide students with the opportunity to broaden their knowledge and deepen their discipline-specific areas. Each cluster comprises a minimum of three 3-hour modules. Students are required to take two modules in order to satisfy the minimum graduating requirement.