

# Development of the NTU Graduate Programme

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*This paper emphasizes the vital role played by Nanyang Technological University, as the only technological university in Singapore, in enhancing the nation's technological stature through graduate education programme. The paper traces the development of the graduate programme at NTU which can be undertaken through research or coursework, part-time or full-time. A comprehensive account is given on the variety of graduate courses offered, the admission criteria required, the local and foreign student enrolment, and the outline of courses in Management, Computer Technology, Manufacturing Technology and Construction Technology. NTU, through its graduate programme, hopes to fulfil its vision of nurturing research manpower and supporting the nation's industry through new and advanced technology.*

## INTRODUCTION

SINCE THE inception of Nanyang Technological University (NTU) in 1981, the number of undergraduates doing engineering courses in the university has peaked at about 5,000 in the past two years, and is expected to remain at this figure for the next few years [1]. In comparison, the graduate student intake for the graduate programme which commenced in 1987, increased from 120 in 1990 to 673 in 1993 (Fig. 1)—over a 5-fold increase in three years. With the expected increase in new graduate courses and funded full-time graduate research positions that are available, the number is expected to increase in similar proportion for the next few years. While the main thrust of NTU continues to be the training of undergraduates to serve Singapore's needs, the development of the graduate programme in the University has taken

importance. This increase in emphasis is a logical progression for a growing university like the NTU.

The role of a graduate programme in a university can be seen in two perspectives. Firstly, it is often the key factor in determining the international standing of a university in general, and in establishing internationally acclaimed excellence in specific areas in particular. International recognition in turn would attract more academic researchers and research students of higher calibre. For a newly established university like NTU, international recognition is critical. The second and equally important role is to act as a medium for the introduction or transfer of higher technology to the country through continuing higher education. This is more so for a country such as Singapore, whose economic growth depends predominantly on technological upgrading. Transfer of technology to the industry can be successful only if there are people competently and specifically trained to manage the technology, as well as to transfer this know-how to lower levels. Due to its specialized nature, the curriculum of the graduate programme, whether by coursework or research, would have to meet the specific requirements of industry. Thus the planning of an appropriate research or coursework programme as well as the timing of its introduction become critical. This can only be achieved if the university maintains a strong link with industry. It is due to this crucial link with industry that NTU has been able to introduce an effective and timely graduate programme to service the technological upgrading of Singapore.

NTU, being the only technological university in Singapore, has a strategic role in helping the nation towards technological advancement, especially in graduate education and upgrading the technological skills of the workforce. This strategic role

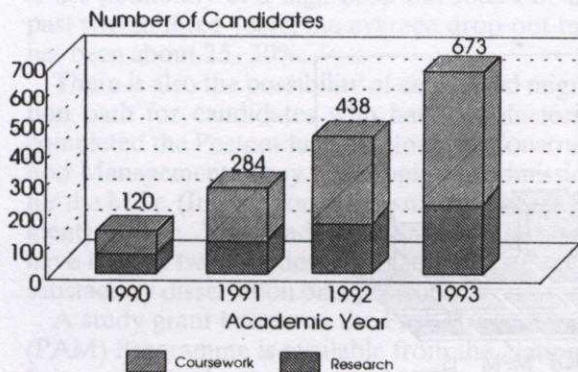


Fig. 1. Enrolment of postgraduate students doing research and coursework for the years 1990-1993.

thus provides the rationale for NTU to develop an extensive long-term graduate education programme. Over the last few years, the University has focused on several technological areas that industries in Singapore would require assistance in the upgrading of manpower. This has been reflected in the increasing number of courses that have been offered over the years—from two in 1990 to ten in 1993. The rising trend is expected to continue in the next few years as more graduate courses will be introduced.

Figure 2 indicates the courses offered in 1993 [2], as well as the student enrolment numbers. The increasing trend in the enrolment for more established courses can also be seen in Fig. 3, which shows the enrolment numbers of the courses from 1990–1993. The increase in the numbers enrolled is indicative of the overall demand for the upgrading of engineers in Singapore.

### DEVELOPMENT OF THE GRADUATE PROGRAMME

#### Research and coursework programmes

The development of the graduate programme in NTU falls basically into two main categories [2]. Both are discussed below:

*By research.* In this category, candidates are expected to fulfil their course requirement through research, and to submit a thesis of the research done. Both a M.Eng. and a Ph.D. degree can be conferred. For the former, the thesis will be examined by one internal and one external examiner. The minimum and maximum periods of candidature are 12 and 36 months, respectively. For the latter, the thesis is examined by one internal examiner, and two external examiners, and the candidate will be required to pass an oral examination on the thesis and related subjects. The minimum and maximum periods of candidature are 24 and 60 months, respectively.

Candidates can be either full-time or part-time. The majority of these candidates are supported either by a full-time research scholarship, or by full-time employment as a teaching or research assistant by the university. Of the total 1993 enrolment for both M.Eng. and Ph.D. degrees, 33% are full-time candidates, whilst 67% are taking the programme part-time [3]. The high percentage of part-time students probably reflects the relatively high opportunity cost involved for these students to embark on a full-time basis. Included in this category are the teaching/research assistants, comprising more than 45% of the part-time students (or 31% of the total enrolment). Although

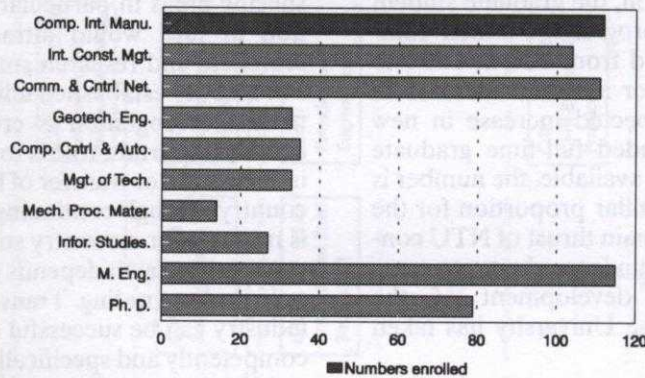


Fig. 2. Postgraduate programmes offered in 1993 and their respective enrolments.

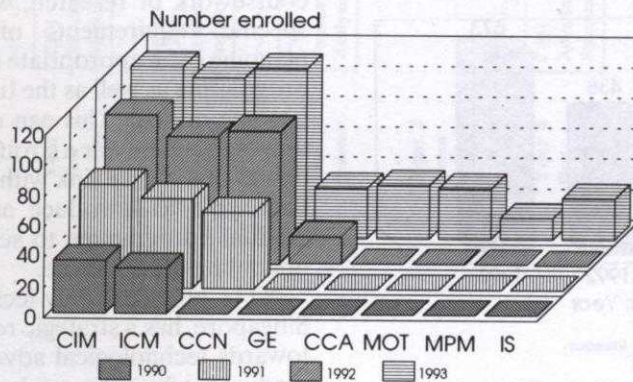


Fig. 3. Postgraduate programmes offered in 1990–1993 and their respective enrolments for each year.

these teaching/research assistants have been enrolled as part-time candidates, due to their intensive involvement in the university's research programme, their contributions are effectively closer to that of the full-time students, and they form a vital group of research manpower in the university.

It is interesting to note that of the total number of students enrolled for both the M.Eng. and Ph.D. degrees, 45% are foreign candidates who are not citizens or permanent residents. The majority of these are full-time candidates supported by the university's Research Scholar funding. NTU has been able to attract a significant number of foreign student candidates. These foreign candidates contribute significantly to the university's research effort while undergoing their studies. Should they choose to stay in Singapore after graduation, they would add to the talent pool of the nation.

The Ph.D. programme, in comparison to the M.Eng. programme, requires a significantly higher and more fundamental level of research effort by the candidate. Of the total candidates registered for M.Eng. and Ph.D. degrees in 1991 and 1993, about 23% and 41%, respectively, have been enrolled for the Ph.D. degree. The increasing ratio of Ph.D. candidates indicates the higher quality of candidates as well as the increasing demand for qualified research manpower in the industry. This reinforces the increasingly important role of the graduate research programme in NTU.

*By coursework.* Candidates are required to attend a modular system coursework for two years with a requirement to pass prescribed examinations and, in most cases, to submit a project dissertation. For such courses, a Postgraduate Diploma or a Master's degree can be conferred.

The courses have all been conducted on a part-time basis at NTU, though several programmes are also offered on a full-time basis. This is mainly because most applicants for these courses have full-time jobs and are unlikely to pay the high opportunity costs of studying full-time for the degree. The main advantage of a part-time approach is that it enables more applicants to undertake the programme. The main disadvantage is the possibility of a high drop-out rate. For the past two to three years, the average drop-out rate has been about 25–30%.

There is also the possibility of an upward migration path for candidates who have satisfactorily completed the Postgraduate Diploma in Construction Management. They may apply for admission for the M.Sc. (International Construction Management) course. When admitted, a candidate will have to pass two additional subjects and submit a satisfactory dissertation on a project.

A study grant known as the Part Time Masters (PAM) Programme is available from the National Science and Technology Board (NSTB). Company-sponsored candidates who are accepted for the M.Sc. (Precision Engineering) or M.Sc. (Computer

Integrated Manufacturing) may apply for this. Under this programme, the NSTB and the sponsoring company will respectively fund 70% and 30% of the tuition and other compulsory fees.

#### *Admission criteria*

The minimum admission criteria for a Master's degree by coursework and dissertation in NTU is a relevant Bachelor's degree or its equivalent. In the case of a M.Eng. or a Ph.D. by research, the minimum criteria is a Bachelor's degree with honours at least at second-class level, and the ability to pursue research in the candidate's proposed field of advanced study. The latter can be ascertained by research publications or related project reports, referees' comments on the candidate's aptitude for research work or by the results of his or her final-year project.

### OUTLINE OF GRADUATE COURSES IN NTU

The outline of graduate coursework programmes in NTU is summarized in Appendix I, which includes the course structure, core and optional subjects offered, duration of courses as well as the admission requirement of courses [2]. The aims and objectives of the courses are briefly discussed below:

#### *Management courses*

*MBA (Management of Technology).* This course is offered jointly by the School of Accountancy and Business and the Engineering Schools. The main objectives of the course are: to prepare graduates to assume senior management roles in technological and manufacturing resources, both in private industries and government organizations, and to provide a broad-based management education coupled with specialized knowledge in the management of technology.

*Master of Science (International Construction Management).* The course aims to develop competent and well-rounded managers with the ability to source, secure and effectively manage projects both local and overseas. Its emphasis is on construction marketing, project financing, techniques of project planning and cost management of international projects.

Of special interest is that the programme includes construction management at an international level. The idea of managing overseas projects in the course is in line with the recent push by Singapore's industries towards regionalization.

*Postgraduate Diploma (Construction Management).* This course is conducted jointly by the University together with the Construction Industrial and Development Board and the Institute of Engineers Singapore. The objective of this course is to increase the pool of better-trained construction managers in Singapore through systematic

upgrading of the management skills of the construction professional.

#### *Computer technology*

*Master of Science (Communications and Computer Networking)*. This course is designed for professionals currently involved in the planning, management and implementation of communications and computer networks in the industry. The aim is to provide them with the necessary knowledge and skills in the design, development, integration and operation of such systems, and to provide the necessary background for networking computers and systems for effective wired and wireless communications. The course presently has one of the highest number of enrolments at 111.

*Master of Science (Information Studies)*. The course aims to produce graduates who have an in-depth knowledge and understanding in the area of information studies so that they can pursue successful careers as information service professionals in all types of libraries, information centres and related settings. Students undertaking this course will develop, through formal coursework, laboratory exercises and research projects, the requisite skills and aptitudes in the following areas:

- Appreciation/understanding of the information environment.
- Application of information technology in information work.
- Application of modern management and research techniques in information work.
- Collection, organization and dissemination of information systems and services.

#### *Manufacturing technology*

*Master of Science (Computer Control and Automation)*. The objective is to provide practising engineers with advanced and yet practical tools in the development, integration and operation of computer-based control and automation systems. The course is particularly meant to provide specialized advanced tools to electrical engineers or those with equivalent qualifications, who are working in an interdisciplinary area of computer-based control and automation systems. This course currently has the highest enrolment at 112.

*Master of Science (Computer Integrated Manufacturing)*. The course has been structured for practising engineers and information technologists employed in the manufacturing sector. Its objective is to equip these professionals with the expertise for planning, implementing and managing computer-integrated manufacturing systems.

*Master of Science (Mechanics and Processing of Materials)*. The course is specifically designed for graduate engineers as well as materials scientists to acquire an in-depth knowledge of the mechanics and the processing of advanced engineering materials. The course is conducted jointly by the

School of Mechanical and Production Engineering and the School of Applied Science.

*Master of Science (Consumer Electronics)*. This new course will be offered in the academic year 1994/95. It aims to equip practising engineers with advanced but practical knowledge for the design, development and manufacture of electronic products applied to the consumer electronics industry. It also aims to provide relevant training in the implementation of advanced technology by investigative work.

#### *Construction technology*

*Master of Science (Geotechnical Engineering)*. The course is to provide participants with advanced knowledge in the design, analysis and construction in geotechnical engineering. Students attending this course are typically drawn from design and consulting firms, construction companies and government organizations.

*Master of Science (Airport Engineering)*. The course is to provide graduate engineers and other related professionals with an adequate level of expertise in airport engineering. The objective is to provide technical advanced knowledge in air transportation and related fields important to the proper planning and evaluation of airport development requirements, design of facilities, execution of engineering projects and maintenance of facilities.

*Postgraduate Diploma (Airport Engineering)*. This postgraduate diploma course is conducted jointly by NTU, the Civil Aviation Authority of Singapore and the Public Works Department, Singapore, which together will award the Diploma to successful candidates. The course is specifically designed to provide technical knowledge essential to airport-related engineering responsibilities for airport development, facilities design and maintenance.

## CONCLUSION

The graduate programme at NTU forms a vital part of the University's role in nurturing research manpower, and introducing new and higher technology necessary for the nation's industry. Both the number of student enrolment and the variety of the programmes offered have significantly increased in the last few years, with foreign students forming a significant number in the enrolment. With the assistance of appropriate levels of research funding, the research programme has been able to accept an increasing number of full-time local and foreign candidates. Having all the courses on a part-time basis has enabled more applicants to participate without sacrificing their career opportunities. The infrastructure presently established will ensure that the graduate programme at NTU continues to play its vital role in the long term.

REFERENCES

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Course Title	Course Structure	Subjects	Prerequisites
ME 6001: Graduate Seminar	1. Seminar Topics in the Field 2. Professional Subjects in the Field 3. Outgoing Experience in the Field	ME 6001: Graduate Seminar ME 6002: Graduate Seminar ME 6003: Graduate Seminar ME 6004: Graduate Seminar ME 6005: Graduate Seminar ME 6006: Graduate Seminar ME 6007: Graduate Seminar ME 6008: Graduate Seminar ME 6009: Graduate Seminar ME 6010: Graduate Seminar	Two semesters before admission, completed three years.
ME 6002: Graduate Seminar	1. Seminar Topics in the Field 2. Professional Subjects in the Field 3. Outgoing Experience in the Field	ME 6002: Graduate Seminar ME 6003: Graduate Seminar ME 6004: Graduate Seminar ME 6005: Graduate Seminar ME 6006: Graduate Seminar ME 6007: Graduate Seminar ME 6008: Graduate Seminar ME 6009: Graduate Seminar ME 6010: Graduate Seminar	ME 6001: Graduate Seminar
ME 6003: Graduate Seminar	1. Seminar Topics in the Field 2. Professional Subjects in the Field 3. Outgoing Experience in the Field	ME 6003: Graduate Seminar ME 6004: Graduate Seminar ME 6005: Graduate Seminar ME 6006: Graduate Seminar ME 6007: Graduate Seminar ME 6008: Graduate Seminar ME 6009: Graduate Seminar ME 6010: Graduate Seminar	ME 6001: Graduate Seminar ME 6002: Graduate Seminar
ME 6004: Graduate Seminar	1. Seminar Topics in the Field 2. Professional Subjects in the Field 3. Outgoing Experience in the Field	ME 6004: Graduate Seminar ME 6005: Graduate Seminar ME 6006: Graduate Seminar ME 6007: Graduate Seminar ME 6008: Graduate Seminar ME 6009: Graduate Seminar ME 6010: Graduate Seminar	ME 6001: Graduate Seminar ME 6002: Graduate Seminar ME 6003: Graduate Seminar
ME 6005: Graduate Seminar	1. Seminar Topics in the Field 2. Professional Subjects in the Field 3. Outgoing Experience in the Field	ME 6005: Graduate Seminar ME 6006: Graduate Seminar ME 6007: Graduate Seminar ME 6008: Graduate Seminar ME 6009: Graduate Seminar ME 6010: Graduate Seminar	ME 6001: Graduate Seminar ME 6002: Graduate Seminar ME 6003: Graduate Seminar ME 6004: Graduate Seminar
ME 6006: Graduate Seminar	1. Seminar Topics in the Field 2. Professional Subjects in the Field 3. Outgoing Experience in the Field	ME 6006: Graduate Seminar ME 6007: Graduate Seminar ME 6008: Graduate Seminar ME 6009: Graduate Seminar ME 6010: Graduate Seminar	ME 6001: Graduate Seminar ME 6002: Graduate Seminar ME 6003: Graduate Seminar ME 6004: Graduate Seminar ME 6005: Graduate Seminar
ME 6007: Graduate Seminar	1. Seminar Topics in the Field 2. Professional Subjects in the Field 3. Outgoing Experience in the Field	ME 6007: Graduate Seminar ME 6008: Graduate Seminar ME 6009: Graduate Seminar ME 6010: Graduate Seminar	ME 6001: Graduate Seminar ME 6002: Graduate Seminar ME 6003: Graduate Seminar ME 6004: Graduate Seminar ME 6005: Graduate Seminar ME 6006: Graduate Seminar
ME 6008: Graduate Seminar	1. Seminar Topics in the Field 2. Professional Subjects in the Field 3. Outgoing Experience in the Field	ME 6008: Graduate Seminar ME 6009: Graduate Seminar ME 6010: Graduate Seminar	ME 6001: Graduate Seminar ME 6002: Graduate Seminar ME 6003: Graduate Seminar ME 6004: Graduate Seminar ME 6005: Graduate Seminar ME 6006: Graduate Seminar ME 6007: Graduate Seminar
ME 6009: Graduate Seminar	1. Seminar Topics in the Field 2. Professional Subjects in the Field 3. Outgoing Experience in the Field	ME 6009: Graduate Seminar ME 6010: Graduate Seminar	ME 6001: Graduate Seminar ME 6002: Graduate Seminar ME 6003: Graduate Seminar ME 6004: Graduate Seminar ME 6005: Graduate Seminar ME 6006: Graduate Seminar ME 6007: Graduate Seminar ME 6008: Graduate Seminar
ME 6010: Graduate Seminar	1. Seminar Topics in the Field 2. Professional Subjects in the Field 3. Outgoing Experience in the Field	ME 6010: Graduate Seminar	ME 6001: Graduate Seminar ME 6002: Graduate Seminar ME 6003: Graduate Seminar ME 6004: Graduate Seminar ME 6005: Graduate Seminar ME 6006: Graduate Seminar ME 6007: Graduate Seminar ME 6008: Graduate Seminar ME 6009: Graduate Seminar

## APPENDIX I: SUMMARY OF POSTGRADUATE PROGRAMMES IN NTU

Course Title	Course Structure	Subjects		Duration	Admission Requirement
		Core	Optional		
<u>Master of Science:</u> Airport Engineering	5 Modules: Modules I to IV are on course work and Module V on project work.	<b>Module I</b> <ul style="list-style-type: none"> <li>Airport System &amp; Planning</li> </ul> <b>Module II</b> <ul style="list-style-type: none"> <li>Airport Design &amp; Construction</li> </ul> <b>Module III</b> <ul style="list-style-type: none"> <li>Airport Maintenance</li> </ul>	<ul style="list-style-type: none"> <li>Feasibility Analysis of Transport Systems</li> <li>Statistical Methods in Transportation Engineering</li> <li>Operations Research Methods in Transportation</li> <li>Airport Management and Operations</li> <li>Computer Modelling in Air Transportation</li> </ul>	Coursework extends over a period of nine months.  Project work under Module V covers a minimum period of four months.	Candidate must be a graduate of NTU or other University as approved by Academic Board. In addition, must obtain a Bachelor's Degree in Engineering.
Communications and Computer Networking	4 Core Subjects in 1st Year  2 Optional Subjects in 2nd Year	<ul style="list-style-type: none"> <li>Digital Communication Systems</li> <li>Computer Networks</li> <li>Network and Communication Software</li> <li>Network Performance Analysis</li> </ul>	<ul style="list-style-type: none"> <li>Advanced RF and Microwave Circuit Engineering</li> <li>Optical Fibre Communications</li> <li>Speech and Image Coding</li> <li>Satellite, Fixed and Mobile Radio Systems</li> </ul>	This is a 2-year part-time course.	Applicants must possess a good Bachelor's Degree in Electrical, Electronic or Computer Engineering.  Candidates should preferably have a minimum of two years of relevant working experience after obtaining their first degree.

Course Title	Course Structure	Subjects		Duration	Admission Requirement
		Core	Optional		
Computer Integrated Manufacturing	4 Core Subject in 1st Year 3 Optional Subjects in 2nd Year 1 Project	<ul style="list-style-type: none"> <li>Management Aspects of CIM</li> <li>Computer Aided Design Systems Design</li> <li>Modeling Simulation and Control</li> </ul>	<ul style="list-style-type: none"> <li>Electronic Design Automation</li> <li>Electronic Manufacturing Automation</li> <li>Computer Networks</li> <li>Computer Aided Manufacturing and Automation</li> <li>Product Design and Process Planning</li> <li>Intelligent Knowledge Based Systems</li> </ul>	Two-semester basis, maximum completion time-5 years.	Candidate must be a graduate of NTU or other University as approved by Academic Board. In addition, must obtain a Bachelor's Degree in Mechanical and Electrical or Electronic Engineering or Applied Science and have a period of relevant practical experience after obtaining his first degree.
Geotechnical Engineering	8 Subjects 1 Project	<ul style="list-style-type: none"> <li>Advanced Soil Mechanics</li> <li>Applied Soil Mechanics</li> <li>Deep Foundations</li> <li>Excavations &amp; Earth Retaining Structures</li> <li>Field &amp; Laboratory Investigations</li> <li>Ground Modification &amp; Reclamation</li> <li>Numerical Methods in Geotechnical Engineering</li> <li>Special Topics</li> </ul>		The coursework extends over twelve months.	Candidate must be a graduate of NTU or other University, as approved by Academic Board. In addition have obtained a Bachelor's Degree in Engineering

Course Title	Course Structure	Subjects		Duration	Admission Requirement
		Core	Optional		
International Construction Management	3 Modules : Modules I and II on coursework, Module III on project work.	<ul style="list-style-type: none"> <li>Construction Management</li> <li>Construction Technology</li> <li>Project Financing</li> <li>International Construction &amp; Marketing</li> <li>Techniques of Project Planning &amp; Control</li> <li>Information Technology in Construction</li> </ul>		<p>The coursework extends over a period of twelve months.</p> <p>Project work under Module III extends to a minimum of four months (full time) or eight months (part time).</p>	<p>Candidate must be a graduate of NTU or other University as approved by Academic Board. In addition a Bachelor's Degree in Engineering or Architecture or Building, or Estate Management, or Quantity Surveying.</p>
Information Studies	7 Core Subjects 1 Elective 1 Research Project	<ul style="list-style-type: none"> <li>The Information Society</li> <li>Applications of Information Technology</li> <li>Management of Information Agencies</li> <li>Organisation of Services to Users</li> <li>Research Methods in Information Studies</li> <li>Information Retrieval</li> </ul>	<ul style="list-style-type: none"> <li>Media Resources and Services</li> <li>Information Systems Design</li> <li>Information Sources and Systems</li> <li>Information Resources and Services for Special Groups</li> <li>Abstracting, Indexing and Thesaurus Construction</li> </ul>	<p>Part-time course extending two academic years.</p>	<p>A Bachelor's Degree in any discipline acceptable to the Academic Board; a minimum of one year practical experience in a library or information unit.</p>



Course Title	Course Structure	Subjects		Duration	Admission Requirement
		Core	Optional		
Mechanics and Processing of Materials	2 Core Subjects 4 Optional Subjects 1 Project	<ul style="list-style-type: none"> <li>• Engineering Measurements</li> <li>• Engineering Materials</li> </ul>	<ul style="list-style-type: none"> <li>• Quality Engineering</li> <li>• Materials Processing</li> <li>• Composite Materials and Structures</li> <li>• Transport Phenomena in Materials Processing</li> <li>• Fracture and Fatigue</li> <li>• Analysis and Design of Pressure Vessels and Piping</li> <li>• Computational &amp; Experimental Stress Analysis</li> </ul>	Part-time evening course, minimum two years.	Candidate must be a graduate of NTU or other University as approved by Academic Board. In addition must obtain a Bachelor's Degree in MPE, Materials Engineering, Applied Science or such qualifications and a period of relevant working experience.
<b>Postgraduate Diploma:</b> Airport Engineering	Comprises 3 Modules (each module consist of lectures, workshops, case studies and field visits).	<ul style="list-style-type: none"> <li>• Airport System and Planning</li> <li>• Airport Design and Construction</li> <li>• Airport Maintenance</li> </ul>		Full-time course of 11 weeks duration. Maximum period of candidature is forty-eight months.	Candidate must be an engineering graduate of NTU or other University as approved by Academic Board.
Construction Management	Comprises 2 Modules. 5 Subjects offered in Modules I and II	<ul style="list-style-type: none"> <li>• Construction Management</li> <li>• Construction Technology</li> <li>• Techniques of Project Planning and Control</li> <li>• Information Technology in Construction</li> <li>• Value Engineering and Managing Quality</li> </ul>		The coursework extends over a period of twelve months. Maximum period of candidature is thirty-six months.	Candidate must be a graduate of NTU or other University as approved by Academic Board or other University. In addition must obtain a Bachelor's Degree in Engineering, or Architecture, or Building, or Estate Management or Quantity Surveyor.

Course Title	Course Structure	Subjects		Duration	Admission Requirement
		Core	Optional		
MBA (Management of Technology)	9 MBA Core Subjects (compulsory) 3 MOT Core Subjects (compulsory) 4 MOT Elective Subjects	<b>MBA Subjects:</b> <ul style="list-style-type: none"> <li>Accounting</li> <li>Business Policy</li> <li>Economics</li> <li>Statistical and Research Methods</li> <li>Financial Management</li> <li>Human Resource Management</li> <li>Marketing Management</li> <li>Management Information Systems</li> <li>Decision Science</li> </ul>	<b>MOT Elective Subjects:</b> <ul style="list-style-type: none"> <li>Quality Management</li> <li>Management of R&amp;D</li> <li>Management of Product Development</li> <li>Manufacturing Policy</li> <li>Project Management</li> <li>Management of Innovation</li> <li>Management Aspects of CIM</li> <li>Logistics Management</li> </ul>	Minimum 2 years 8 months. Maximum 4 years.	Candidate must have <ul style="list-style-type: none"> <li>an accredited basic degree with engineering or science background or equivalent professional qualifications.</li> <li>at least two years' management professional or other relevant experience in industry.</li> <li>an acceptable score in the Graduate Management Admission Test (GMAT)</li> <li>an acceptable score in the Test of English as a Foreign Language (TOEFL)</li> </ul>