Theme: One Choice, Infinite Opportunities
The educational experience at the NUS Faculty of Engineering is multi-faceted. From the moment students choose to join the Faculty, they step into a world of opportunities that will contribute to their personal growth in a very special way. They glean from its globally-oriented and diverse programmes, and rich and vibrant student life, and learn to thrive in a challenging and stimulating environment that encourages innovation, excellence and enterprise. They rise to their fullest potential and are given a head start to pursue their dreams as engineer-leaders in the making. When they graduate as an engineer from the Faculty, they enter a world of even greater possibilities. A degree from the Faculty is the launch pad for a great career. With our mission to nurture engineer-leaders, every graduate is well-equipped to embrace and negotiate the demands of an increasingly knowledge- and innovation-driven society and an industry that demands skills that go beyond mere technical aptitude. Our engineers are groomed to rise and succeed in the corporate world. Given our flexible curriculum that nonetheless pivots on an engineering focus, graduates can also embark on careers that go beyond the traditional field of engineering and make their mark in research, education, finance, information technology, business and community service. Engineering at NUS is just one choice among many, but it certainly is a promising path that leads to an infinite set of opportunities.

Vision
To be a globally-distinguished engineering school

Mission
To nurture engineer-leaders with a global outlook and to provide technological leadership through high-impact research
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Dean’s Message

The theme of this year’s annual report is “One Choice, Infinite Opportunities”. It captures the essence of what the NUS Faculty of Engineering offers to its students, graduates and faculty members—helping them develop to their fullest potential, while transforming and encouraging them to reach beyond themselves. The future holds boundless possibilities. There are infinite opportunities in diverse areas—leadership development, career choice and prospects, research breakthroughs, business opportunities and industry potential, and service to society and the nation.

To meet the challenges of today’s world and that of the future, a new breed of engineers is needed. These engineers will develop knowledge and deliver affordable solutions to many of society’s challenges. To prepare our graduates, the curriculum is closely linked to research and development (R&D) trends, in response to the needs of industry. Programmes have been developed not only to give students a strong foundation in the sciences and engineering, but also to imbue them with multi-disciplinary skills and knowledge. We have also adopted a design-centric curriculum and our students are increasingly undertaking industry-sponsored design projects in order to gain exposure to the full cycle of real-life design. NUS engineering graduates are thus well-equipped to pursue a wide spectrum of careers in fields as diverse as management and finance, logistics, and biomedical sciences.

The PhD programme, which is the prime focus of our research degree programmes, is designed to stimulate creative activity and original research, in preparation for a career in academia, research or industry. To ensure that its courses stay current and relevant, the Faculty maintains strong links with industry, through constant dialogue and feedback.

The Faculty has recently moved up to 8th place among the top 10 engineering schools in the world in a ranking by the Times of London. In research, the Faculty constantly strives for global excellence, through forging research partnerships and publishing high-impact papers. Our partnership with GE Water & Process Technologies on the establishment of Singapore’s first “Global Hydrohub” is one such example.

We also aim to continue to engage in R&D in areas which are strategically important at the national level, grow our research funding, and increase technology transfer. This is in line with the government’s initiative to boost the R&D sector as part of its national effort to transform Singapore into a knowledge-based economy.

With our commitment to innovation and excellence in research and education, we strive to raise a new generation of engineers who will make a difference in the world. With the support of an outstanding team, alumni, donors and stakeholders, the Faculty of Engineering will continue to take NUS and Singapore to new frontiers of engineering achievement.

Professor Seeram Ramakrishna
Dean, NUS Faculty of Engineering
Overview

DEAN'S ADVISORY BOARD

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Prof CHAN Eng Soon
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Prof YEO Swee Ping
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Prof ANG Beng Wah
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Department of Mechanical Engineering

Prof CHOW Gan-Moog
Head
Department of Materials Science & Engineering

Prof Colin SHEPPARD
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Division of Bioengineering

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Prof CHOW Gan-Moog
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Department of Materials Science & Engineering

Prof Colin SHEPPARD
Head
Division of Bioengineering

Prof J N REDDY
Head
Engineering Science Programme
Mr Liew Mun Leong
President and Chief Executive Officer
CapitaLand Group
Civil Engineering Alumnus

“Engineering gave me a strong foundation in analytical, numerical, problem-solving and people management skills. Engineers are trained to think logically and systematically and to be good project managers. These skills are useful for life.”

Mr Liew Mun Leong, in mind and at heart, is an engineer. A civil engineer by training with more than three decades of experience in engineering, construction and real estate, the man participated in the construction of Changi Airport since the beginning in 1975. Today, he is the Chairman of the Civil Aviation Authority of Singapore.

After years as an engineer, Mr Liew has since put away his hard hat and heavy boots to assume executive positions with leadership roles. He was the Chief Executive of the Singapore Institute of Standards and Research and President of the International Organisation for Standardisation. In his current capacity as President and CEO of CapitaLand Group, Mr Liew was named the “Outstanding CEO of the Year” in the Singapore Business Awards 2006. This award is a testament to his visionary leadership in transforming CapitaLand from a Singapore-centric property company into an international real estate and hospitality group. He was also accorded the Public Service Administration Medal in 1979 and the NUS Distinguished Engineering Alumnus Award in 1991.

Mr Liew believes that his training as an engineer has been instrumental in giving him the necessary skills to excel in his career.

“Engineering gave me a strong foundation in analytical, numerical, problem-solving and people management skills. Engineers are trained to think logically and systematically and to be good project managers. They have to work with people to find answers and to deliver results. These skills are useful for life. As I moved up in my career, I slowly got less involved in the technical aspects of engineering as I engaged in more managerial and leadership roles. However, I still apply the same analytical, people management and problem-solving skills in my position today. I still think like an engineer and like to use visuals and numbers to illustrate concepts and ideas. Even though I am no longer a practising engineer, I enjoy design reviews and engaging in the technical aspects of our real estate business. But managing people is still the most enjoyable and important part of my job.”

So does engineering open the doors to success? Mr Liew affirms that the particular skill sets acquired by engineers will put them in good stead to succeed in whatever task they embark on. These thinking skills are also highly versatile and can be relevant to careers in business, finance, banking, administration, human resource and even in understanding law. But he cautions, “To succeed in life, one needs more than just the appropriate skills. More importantly, one must possess the right core values and principles. It is your character and value system that determine how high your ceiling is for growth.”

He adds, “Getting a degree is just a first step to a career. After graduation, there are no short cuts to success. You have to perform, work hard, exert and deliver. If you concentrate on stretching to the best of your ability, and possess the right value system, you can go far. Never be position- or status-driven; but rather be performance- and character-driven. I never planned to be a CEO. I just did my work and the position came as part of the process and rewards. My advice to all students is – don’t plan your career according to the status you want to achieve. Concentrate on performing well, developing yourself and ask how you can be a better manager or contributor to the company. Never say ‘no’ to more work even when the work is beyond your stated responsibility. The more you can demonstrate you can carry, the more you will develop. Only then will you be able to really succeed in what you do.”
Mr Kwa Chong Seng
Chairman and Managing Director
ExxonMobil Asia Pacific Pte Ltd
Mechanical Engineering Alumnus

“I believe that whatever you do and wherever you go, it’s important to enjoy your work. I started as a raw recruit many years ago, but I enjoyed what I did and kept on learning and improving. Your engineering degree is really a stepping stone to help you live life to your fullest and contribute to society. There are infinite opportunities to grow!”

When Mr Kwa Chong Seng graduated from the University of Singapore in 1969 with a mechanical engineering degree, Singapore was going through a phase of rapid industrialisation and engineers were in great demand. Today, almost 40 years later, in an environment that is driven by a knowledge-based economy, engineers are still highly sought-after. Mr Kwa firmly believes that, “The world will always need engineers; as they continue to develop and harness technologies which touch our lives every day, the role of engineers in our society can only become more significant.”

Mr Kwa’s engineering degree paved the way for a job at Esso Singapore, where he played an active part in its refinery operations. This first job marked the beginning of an illustrious career which was to span the next 37 years (nine of which were spent abroad). Currently, ExxonMobil is the single largest foreign investor in Singapore. As the Lead Country Manager for ExxonMobil in Singapore, Mr Kwa heads an organisation which has about 2,000 employees. He also oversees the company’s Fuels Marketing in the Asia Pacific region, comprising Japan, Australia, New Zealand and the Pacific Islands. Outside ExxonMobil, he holds a series of key appointments. He is concurrently the Deputy Chairman of Temasek Holdings Pte Ltd and Director of DBS Group Holdings Ltd. He also serves on the Public Service Commission and the Legal Service Commission. In fact, for his outstanding contributions and service to the country, he was awarded the Public Service Star in 2005. The NUS also conferred him the Distinguished Engineering Alumni Award in 1994.

Mr Kwa recollects, “When I was an engineering student at the University of Singapore, there was no such thing as personal computers or even electronic calculators. We had to learn how to use and master slide rules and log tables - these were our tools for engineering and maths calculations. Today, with better technology, engineers have the resources to delve much further and deeper into their various disciplines. With advances in technology, we are able to find more elegant and simpler solutions to complex engineering problems. I also remember that life at campus was quite mundane because there were no women engineering students at all! It’s so different from engineering education today, where many women engineers excel.”

While times have changed, some fundamentals remain the same. For one, an engineering education is always a firm foundation that one can always rely on for the rest of one’s life. Mr Kwa says, “Engineering trains you to be analytical. With good analytical skills, you are able to grasp a topic or situation better, and therefore, make better fact-based decisions. Engineers are also process-driven. Many large global companies today run on processes. These systems ensure that a company continues to operate and thrive even in unpredictable circumstances. Engineers tend to organise their work around processes and this is a distinct advantage.”

He adds, “At ExxonMobil, more than 50% of our recruits are engineers, but many of them move into other areas such as marketing, brand management and even advertising. While we appreciate the strengths that an engineering training carries, we treat this qualification as a base from which we develop our people. An engineering degree is the foundation on which we build upon.”

Especially for our engineering students, he shares, “I believe that whatever you do and wherever you go, it’s important to enjoy your work. I started as a raw recruit many years ago, but I enjoyed what I did and kept on learning and improving. Your engineering degree is really a stepping stone to help you live life to your fullest and contribute to society. There are infinite opportunities to grow!”
Mr Lim Soon Hock
Managing Director, PLAN-B ICAG Pte Ltd
Electrical Engineering Alumnus

“One engineer leader is one who has the outlook of a leader and the spirit of an engineer.”

As a science student from Raffles Institution in the 1960s, Mr Lim Soon Hock had good reasons to pursue engineering at the University of Singapore. Besides having a profound interest in maths and science and a strong desire to get a professional qualification, he saw that the engineering course gave him “unrivalled versatility” which would lead to “infinite opportunities”.

Mr Lim’s analysis could not have been more correct. Engineering has not only opened the doors for him to experience many opportunities of success, but it has also given him the chance to make an impact in society in various positions of leadership.

He shares his experience, “When I first started work, I was a practising engineer. I then moved into sales and marketing management in the hi-tech industry and general management in Digital Equipment, culminating in the position of Vice President and Managing Director of Compaq Computer Asia Pacific. I was also a member of the company’s worldwide management team, one of the few Singaporeans to have attained that kind of elevated position at that time. Along the way, I honed in on various facets of general management from finance to human resource management to strategic planning, all of which were critical to effective corporate leadership. It was an easy transition, primarily because of the training I received as an engineer.”

“Today I feel fulfilled with what I have done and achieved, and the time has come for me to help others for the betterment of the community. In addition to my corporate advisory practice, I sit on the boards of several public-listed companies, government agencies and civic organisations. I am applying my more than 25 years of leadership experience as a board member, chief executive officer and technopreneur in diverse industries ranging from IT, telecommunications, air transport, education, defence and health industries to the community, as Chairman of the National Family Council, Chairman of the Centre for Fathering and Chairman of the Committee on Healthy Lifestyle, among others.”

He adds, “My training as an engineer challenged my way of thinking and taught me not to succumb to intellectual laziness. I have learnt that with the right input, the results are often predictable and unless we try, we will never know the outcome. This has prepared me well to take on assignments and challenges, which initially seemed daunting. When I was appointed Head of Compaq Computer for Asia, I thought I was set up for failure. Compaq was the under-dog and latecomer in Asia, way behind entrenched competition like IBM, Apple and AST. The odds were stacked against Compaq. In my seven years with the company, I took Compaq from under S$60 million to S$2 billion, and to become the number one PC vendor in Asia Pacific in 1994, one year ahead of the corporate goal.”

Mr Lim also strongly believes that engineering and leadership go hand in hand.

“There are many common traits between an engineer and a leader. Both must be able to think critically, analyse, understand a problem, define outcomes or goals, and then design practical solutions to problems, challenges or ideas. Just as an engineer is also an agent of change - be it a new invention or a spectacular monument - so is a leader, who is often required to make changes to a business strategy or an organisation. An engineer-leader is one who has the outlook of a leader and the spirit of an engineer. He is someone who is able to apply his training to a leadership role and make it effective, and be an inspiration to others, while demonstrating communication, inter-personal, decision-making and leadership skills.”

He shares these words of wisdom for all engineering students today, “Engineers are trained to innovate, invent and improve – what I call the 3Is - for the betterment of society. I will encourage all students to use these 3Is to make a difference to how we live, work and play. Everything is possible if we allow the fire of the engineering spirit within each of us to remain lit, to guide us in our multifarious pursuits and endeavours.

“No matter how difficult a challenge is, or how daunting it seems, when you set your mind and heart to it, and stay focused, success is often within reach.

“Being successful is knowing that you have conducted yourself professionally and with integrity. It is the knowledge of having created and seized the opportunities that have come your way. It is also about being grateful and recognising that we are sometimes lucky that things come together.

“Finally, it is all about being humble, realising that often, you would not have been successful without the involvement of other people helping you reach your goal, thereby making you the person you are today.”
Ms Aw Kah Peng
Director, Chemicals Cluster
Economic Development Board
Chemical Engineering Alumna

“Chemical Engineering was a tough and gruelling course, but the experience really disciplined and trained my mind. It set an excellent foundation and prepared me well for my career.”

As a child, Ms Aw Kah Peng was always curious about how things worked and how things were created. Becoming an engineer was a straightforward choice. She owes her decision to her father, who encouraged her to study engineering, despite the fact that it was primarily a male-dominated field. Little did she know that her choice to pursue a degree in Chemical Engineering locally at NUS would lead to global opportunities in her career. Today, as Director of the Chemicals Cluster at the Singapore Economic Development Board (EDB), she is responsible for promoting and developing investments in Singapore’s growing oil and chemicals industry. Ms Aw was previously based in London as EDB’s Regional Director for Europe where she oversaw its operations in five countries. She has also served as Regional Director for Central US, based in Chicago, where she was in charge of 15 states. She is a Fellow of the Sloan School of Management and holds an MBA from the Massachusetts Institute of Technology.

She recalls, “Chemical Engineering was a tough and gruelling course, but the experience really disciplined and trained my mind. It set an excellent foundation and prepared me well for my career. In my job, I work with a wide range of people in the oil and chemicals industry - this includes everyone from the CEO of the company to the finance manager, and to the technology manager. Having an understanding of unit operations or organic chemistry is useful as it helps me to talk the language of the industry. But what I value most is my capacity to constantly learn and integrate new knowledge. This is the best thing that I gained in my training to become an engineer. With this ability, I am able to pursue anything that I set my mind to.”

She adds, “In fact, despite the difficulty of the course, I have some fond memories. Once my lab group (there were three of us) decided that we wanted a break from the long lab sessions. So, we set up an experiment as instructed and sneaked out for a movie. Unfortunately, we left a water tap on and our part of the lab got flooded! Life as an engineering student at NUS can be exciting!”

What about life in the corporate world? Ms Aw believes one of the keys to succeed is to have passion and to care for those around you. She says, “You have to be interested in what you do and you must have fun doing it. I often tell my team that if they are not enjoying themselves at work, there is a problem. We have either put them in the wrong job or in the wrong organisation. It is also important to be interested in those who work with you. As a team, you can achieve a lot more and often, you need to be with others to have fun.”

And to encourage our female engineers, she shares, “There will always be gender differences in the workplace, but they will get in the way only if we let them. Just be professional. Combine the right attitude with passion for the job and care for others, and you will do well.”
The quality of educational programmes and enriching educational experience at the NUS Faculty of Engineering is instrumental in establishing us as a globally-distinguished engineering school. The Faculty equips and nurtures engineers who are able to lead and manage teams, apply knowledge creatively and practically, contribute effectively and significantly to society, and play leading roles in industry. We strive to ensure that our programmes are well-recognised and sought-after by students for the enriching educational experience, and by industry for the quality of our graduates.

In response to the needs of industry and in line with our mission to nurture engineer-leaders with a global outlook, we constantly review our curriculum to keep ahead of global industrial, economic, and social trends. Our programmes ensure that students develop a holistic systems perspective and gain hands-on, real-world experience through an integrated design-centric curriculum. In order to attract outstanding students, the Faculty will also continue to develop cutting-edge programmes such as the multi-disciplinary Engineering Science Programme, as well as relevant double degree and double major programmes. Such programmes will allow students to develop complementary areas of proficiency and have an edge in the job market. The new double major offerings planned for Academic Year 2007-2008 would allow students to finish two majors in four years of full-time study. Most importantly, our students will be offered unparalleled globally-oriented educational opportunities that not only enrich them personally, but also prepare them well for professional and other challenges in life.
Joint Degree Programme with University of Melbourne

The NUS-University of Melbourne Civil Engineering Joint Degree Programme was introduced in February 2006. Three NUS students from the first cohort share their thoughts of an overseas education:

“I have always wanted to study overseas but an overseas education seemed impractical, with the associated high costs involved. Besides, I know that NUS offers courses of world-class standards. When the opportunity of the Joint Degree Programme came along, it promised an education both locally and overseas. The Programme offered such an excellent opportunity to not only study in two world-class universities, but also interact with people of a different culture. With the degree, and the experience and knowledge gained from NUS and University of Melbourne, I believe I will be in good stead to gain employment in the civil engineering field.”
Mr Pui Kangrui

“My country Vietnam is developing very rapidly and civil engineers will play a very important role in the construction and renovation of old infrastructure and transportation. The Joint Degree Programme can help me become a good engineer, since it provides me with knowledge and technologies from both the NUS Faculty of Engineering – ranked 8th in the world - and University of Melbourne, which has one of the top Civil Engineering departments in Australia. With such strong qualifications, I hope to really be able to contribute to the development of my country.”
Mr Nguyen Tan Thai Hung

“The NUS Civil Engineering Joint Degree Programme with the University of Melbourne is a wonderful opportunity for me to experience what it’s like to study in one of the best universities in Australia. I look forward to experiencing a new culture and meeting different kinds of people. I believe that a certification by two top universities will also put me in good stead when I enter the highly-competitive working environment. But more importantly, I know I will gain tremendously as a person from the experience of living and studying abroad.”
Mr Ferry Khie

From left to right (top row)
Mr Pui Kangrui, Mr Tran Vu Quoc, Mr Nguyen Tan Thai Hung

Bottom row
Mr Ferry Khie
The NUS Faculty of Engineering offers students a diverse curriculum that lays a strong foundation for them to succeed in their careers. In the new and global economy, besides possessing technical knowledge, these engineer-leaders will need to muster knowledge from various disciplines to help them thrive in the global marketplace.

In the past year, several new programmes were launched. These include the Double Honours Degree in Engineering and Economics, and the Double Honours Degree Programme in Engineering and Business Administration. Students from these programmes will graduate fully-equipped to be engineers and economists, or engineers and business managers. The Engineering Science Programme (ESP) is another cutting-edge programme that allows students to develop complementary areas of proficiencies in Engineering and Science. It matriculated its inaugural batch of 46 students in August 2006. This programme will produce graduates for markets that require inter-disciplinary and multi-disciplinary backgrounds to develop and design novel engineering systems, including starting technology-based new ventures, and contribute to the world’s technological growth and sustenance. The ESP is headed by world-renowned scientist and academic, Prof J N Reddy.

In Graduate Education, the Department of Civil Engineering launched the Master of Science in Geotechnical Engineering. This programme provides the comprehensive in-depth specialist training necessary for engineers to take on high-level geotechnical engineering consultancy jobs using advanced and up-to-date techniques.

The Faculty’s Master of Science in IP Management is another comprehensive inter-disciplinary postgraduate programme in Intellectual Property Management which bridges law, engineering and management. This programme, the first of its kind in Asia, will enable mid-to senior management professionals with a background in science, technology or engineering to specialise in the management of IP in technology-related businesses.

Finally, the Master of Science (Systems Design & Management) Programme serves graduates who aspire to accelerate their careers by consolidating and validating their project management experience through key engineering systems concepts and methodology.
The Singapore-MIT Alliance (SMA) launched its new Chemical and Pharmaceutical Engineering Programme (CPE) in July 2006. The programme is part of SMA-2's plans to train 260 Masters and 180 PhD degree holders in its five programmes over 10 years. The CPE degree programme offers a modern curriculum in the fields of molecular engineering and process science focused on the pharmaceutical industry. It offers a unique opportunity to obtain either dual Masters degrees, one from NUS and the other from MIT; Master-PhD degree, the first from MIT and the second from NUS or NTU; or a direct PhD degree from NUS or NTU. The MIT degree is awarded by the Chemical Engineering Practice Programme of the Chemical Engineering Department at MIT.

The SMA programme in CPE provides graduate students the opportunity to pursue careers in pharmaceutical and fine chemical technologies. While every effort has been taken to carry out instruction to customers satisfaction no responsibility liability will be accepted for errors. Customers are therefore urged to check thoroughly before authorising print runs.

The Council for Chemical Research (CCR) is an organisation based in Washington, DC, whose membership represents industry, academia, and government. CCR, formed in 1979, promotes co-operation in basic research and encourages high-quality education in chemical sciences and engineering to benefit society by advancing research in chemistry, chemical engineering, and related disciplines through leadership collaboration across disciplines, institutions, and sector boundaries. CCR's membership represents most of the US chemical research enterprises, currently comprising more than 200 companies, universities, and government laboratories with a combined research and development budget of more than US$7 billion. The Department of Chemical & Biomolecular Engineering is the only non-US academic institution with membership in CCR.

The SMA programme in CPE provides graduate students the opportunity to pursue careers in pharmaceutical and fine chemical technologies. Students will work with some of the most technologically-advanced companies in the world through specific industry projects. Through a combination of cutting-edge research and advanced coursework in molecular engineering sciences, graduates will be prepared to accept high-level professional or research positions in thriving industries, start-up companies, academic institutions, and research centres.
The multi-faceted education at the NUS Faculty of Engineering offers enriching opportunities that students will cherish for life. These experiences broaden perspectives, develop character and give students the skills to succeed wherever they go. Through mentor-relationships with teachers, real-world projects, and leadership opportunities that make a difference, the educational experience at the Faculty marks the beginning of our students’ journey to realise their highest potential.

Dr Lakshminarayanan Samavedham of the Department of Chemical & Biomolecular Engineering is a winner of the NUS Outstanding Educator Award 2006. He is known for his excellent teaching techniques that inculcate an attitude of life-long learning in his students. He shares: “I want to impart life-long skills such as multi-dimensional thinking, independent study, and computer-based problem-solving strategies to my students.”

He is known for his excellent teaching techniques that inculcate an attitude of life-long learning in his students. He shares: “I want to impart life-long skills such as multi-dimensional thinking, independent study, and computer-based problem-solving strategies to my students. Such skills will always be relevant irrespective of the career paths they may choose. My methods include utilising tools and technology in order to give students a ‘hands-on’ experience. Through team-based project work and assignments, I endeavour to reinforce their theoretical understanding of the subject by getting them to ‘do it’ on real or virtual processes and get a better understanding of the concepts. As far as possible, I like to avoid pen-and-paper rote learning. The project work enables students to appreciate the dynamics of group work, plan experiments, and deal with uncertainties, for example. The emphasis is not only on technical details but also on soft skills which are necessary for success in the workplace. I seek to provide strong synergy between classroom learning and professional practice.”

Dr Samavedham’s innovative and inspiring teaching materials have been used at the University of Wisconsin, University of Alberta and the Indian Institute of Technology, Bombay. His aspiration in teaching and research is to create an environment that gets young minds to question, analyse, debate, decide and act.
The Department of Mechanical Engineering (ME) launched a new Design Programme in Academic Year 2005-2006. In this programme, 90 third-year undergraduates participated in design projects initiated by an industry partner, APL (a subsidiary of Neptune Orient Lines) to fulfil actual needs faced in their operations. The projects were funded by the Maritime and Port Authority of Singapore. This initiative enabled students to tackle real-life design problems and gain first-hand experience in dealing with design and engineering constraints. A number of solutions proposed by students will be considered by APL for further development or commercialisation. Mr Christopher Lee, APL’s Director of Equipment Management, shared, “APL was very impressed by the design ideas and knowledge of the ME students. Some of these ideas are very good and it is worthwhile to explore them further.”

As a result of the success of this pioneering initiative, more companies from the offshore oil and gas industry, such as Keppel Offshore and Marine, Schlumberger and Salamander Energy, have joined the Design Programme. These opportunities enable ME students to formulate solutions to real-life problems, thereby enriching their learning experience.
The Bachelor of Technology (B Tech) programme is a self-financed initiative of the NUS Faculty of Engineering to meet the aspirations and needs of polytechnic graduates working in local industry to upgrade themselves to better meet the challenges of a knowledge-based economy. It provides an affordable opportunity for them, and those with equivalent academic preparations, to attain a high-quality engineering degree without having to leave their families and their jobs.

More than 2,000 have enrolled in the BTech programme since its inception in 1995 and over 1,000 have since graduated with their BTech degrees. The programme opens up exciting career paths and greater prospects for all its graduates. In exit surveys conducted for BTech graduates, all the respondents indicated that the programme has helped them significantly in their work. 100% of the graduates were promoted to take on higher-level jobs.

“I did some research on the course structure, duration and mode of learning of the many degree programmes available, including both overseas and local universities, and decided on the BTech Programme at the NUS Faculty of Engineering. The modular system allows us to study at our own pace and the lecturers were always on hand to render help whenever we needed it. After I graduated in 2004, I was promoted to the position of an engineer with a higher salary.”

Mr Ng Wei Kia, 2004 BTech (Electronics Engineering) graduate with 1st Class honours

“I believe that having an education in a reputable university like the NUS Faculty of Engineering will heighten my career opportunities. My efforts paid off when, upon completion of my BTech degree, I was promoted to an engineer in the Public Utilities Board and awarded a scholarship to pursue a Masters degree in Environmental Science and Engineering under the Singapore-Stanford Partnership Programme.”

Mr Toh Kah Poh, 2005 BTech (Mechanical Engineering) graduate with 1st Class honours

“Good course, well-executed, serving a real need, in short... excellent.”

“They (the students) felt the course had been very worthwhile and were now looking forward to moving to better paid jobs.”

“…the graduates deserve greater respect for having achieved the same academic level (as an engineering undergraduate), whilst holding down a full-time job.”

Prof John Midwinter
Former Vice-Provost at Imperial College
External Examiner
Journey to Success

“The Department of Chemical & Biomolecular Engineering helped create a time table specifically for polytechnic graduates.”

“As a polytechnic graduate who entered the NUS Faculty of Engineering, I felt really well taken care of. The Department of Chemical & Biomolecular Engineering helped create a time table specifically for polytechnic graduates and I enjoyed modular exemptions which helped tremendously. The Department also arranged a get-together session with mentors in my first year. My mentor, Dr Tong Yen Wah, provided me with guidance and support whenever I needed it. His mentorship was instrumental in helping me to accomplish the course.

“I am now working as a production engineer with GlaxoSmithKline Pte Ltd, the pharmaceutical giant. At the NUS Faculty of Engineering, I was given the chance to take a pharmaceutical-related module as an elective in my final year. This module gave me a good overview and understanding of the pharmaceutical industry. In addition, the training and knowledge I gained have given me the skills and capacity to perform my work efficiently and effectively.”

Mr Rusli
Alumnus
Department of Chemical & Biomolecular Engineering

Reaching Out to the Less-Fortunate

“I experienced the joy of helping the lessfortunate, and learnt to appreciate the comfortable living conditions I had in Singapore.”

“The Asian tsunami in December 2004 inspired me to be part of Operation Orion, an annual overseas community service project organised by the Civil Engineering (CE) Club at the NUS Faculty of Engineering. Operation Orion 2005 embarked on an expedition to Sri Lanka to give aid to tsunami victims. During the trip, I experienced the joy of helping the less-fortunate, and learnt to appreciate the comfortable living conditions I had in Singapore. This trip motivated me to take on the role of team-leader for Operation Orion 2006. I had to really learn on-the-job and through the unwavering support of the Faculty and the Department of Civil Engineering, I was able to achieve my personal goals, and at the same time experience a fulfilling and educational journey. I want to specially thank Dr Chew Soon Hoe, Staff Advisor of the CE Club, for his guidance and encouragement, which really helped Operation Orion to be a success since its inception.”

Ms Liu Qiu Lin
Department of Civil Engineering
Leadership is a buzz word at the NUS Faculty of Engineering. With the mission to nurture engineer-leaders, our students are encouraged to develop skills and qualities that go beyond knowledge gained in the classroom. At NUS, one will find engineering students holding leadership positions in sports and other co-curricular activities. Our students participate actively and passionately in campus life. In fact, out of the six Halls of Residence at NUS, three are led by engineering students. One of them shares his experience:

“I believe that education should not be just about academics. It should be enhanced with co-curricular activities that enable us to learn other skills. Getting the best at NUS is not just about gaining knowledge in a field of study, but also gaining experience in other aspects like leadership, management, social skills, and of course, enjoying sports, culture and adventure. As the Junior Common Room Committee President of Temasek Hall, I was exposed to the various workings of the NUS student system. Working with the NUS administration was also a good exposure for me. I learnt a lot about people management, planning ahead and getting organised. I now know what it is like to lead and organise a team and to take responsibility for decisions made. These skills will come in useful when I graduate!”

Mr Ewen Teo
Department of Civil Engineering
President of Temasek Hall
Academic Year 2005-2006
Mr Chua Chun Kiat, from the Department of Electrical & Computer Engineering, was the President of the 28th Management Committee of the NUS Students’ Engineering Club. He shares how his experience in this position of leadership has enriched his education and prepared him to become an engineer-leader in the future.

Q: How has your role as President of the NUS Students’ Engineering Club enhanced your educational experience at NUS?
As the President of the student population at the NUS Faculty of Engineering, I had the chance to interact with senior university and faculty administrators. Through these meetings, I saw how they made decisions and understood the complexities involved in implementing various policies. Overall, I gained leadership skills that will last me a lifetime.

Q: Why did you take up this position and what did you learn most?
When I first stepped into the Faculty and took part in Orientation Week, I was very impressed by the Club’s effort and commitment to promote the welfare of students in the Faculty. This mission inspired me so much that I stood for elections and was selected to be in the Management Committee. Now, I experience a great sense of fulfilment whenever I see students benefiting from the changes my team and I have made.

What I really learnt most is the importance of being able to adapt quickly to changing situations. Some events did not turn out as expected despite how well they were planned. Now I know that the most important thing is to keep calm, analyse the situation and ensure that no one is adversely affected by this turn of events. I also learnt time management skills, having to juggle my studies and my responsibilities as President of the Club.

Q: How do you think your experience has prepared you to face the workforce when you graduate?
As the President of the Engineering Club, I often had to give presentations on behalf of the Club to a large group of students in a lecture theatre. I used to be very afraid of public speaking, but through this experience, I overcame my fear. Furthermore, managing a team to meet objectives, and learning the process of handling and solving problems are life skills that will certainly help me in the corporate world.

Q: Why do you like engineering and what do you hope to do when you graduate?
Engineers improve the quality of life for people. They constantly examine and explore how they can make life better for others. I did an internship at MICRON Semiconductor Asia and thoroughly enjoyed it. I gained invaluable knowledge about the engineering industry. When I graduate, I hope to start as an engineer and eventually become a manager leading engineering teams. My dream is to be involved in a major world-renowned project one day.

Q: Do you believe that engineering is truly one choice that leads to infinite opportunities?
Certainly! Many engineers are sought-after by other industries such as banking and finance. I believe that the NUS Faculty of Engineering prepares us well for leadership positions in many fields. Our analytical skills and ability to meet very tight deadlines are some of the highly sought-after skills required in today’s industries.
A Roaring Success

Roaring to a stunning finish at the May 2006 Formula Society of Automotive Engineers (FSAE) 140-team international competition, our locally-designed, built and track-tested NUS FSAE Race Car, named Centennial II, emerged:

- 9th in Engineering Design
- 27th in Overall Performance
- Only one out of more than 10 Asian cars to enter the semi-finals
- Only participating team from South-East Asia

Ever since its inception in 2001, the NUS FSAE Race Car project has been producing not only student-designed-and-built race cars for participation in the annual FSAE competition in the US, but also students who are competent in engineering design and hands-on engineering. This annual competition is the toughest and largest-scale international intervarsity competition of its kind. Without the funds to engage foreign talent to teach them race car technology, our students have to do a lot of self-study. What they lack in local resources and facilities, they make up for with their passion and perseverance.

Four generations of team members have graduated after building and competing with their respective race cars. Now a new team has designed and built a fifth car which will participate in the May 2007 FSAE competition.
“Our students are endowed with a strong foundation in the fundamentals of engineering, which in turn equips them with the skills to turn those principles into reality. Their ability and achievements have now been recognised internationally at this annual event.”

Prof Lim Seh Chun
Head, Department of Mechanical Engineering

Our Secret Weapon

No university project can succeed without a dedicated professor teaching and guiding the team. Since its inception in 2001, the NUS FSAE project has enjoyed the round-the-clock supervision of Assoc Prof Seah Kar Heng from the Department of Mechanical Engineering. His enthusiasm seems to heighten with each passing year. Read what he says about the project:

“Supervising this FSAE project gives me immense satisfaction, as it involves every aspect of mechanical engineering. Here, education goes beyond the confines of a classroom. Each year, I am faced with a new team whose insatiable hunger for knowledge kindles my desire to teach. Every car we design and build presents a new set of problems which we need to solve in time for the competition. There is little room for error, since any miscalculation could result in disaster on the track. This project not only trains my students in engineering, but also tests my own technical proficiency. I am learning together with them and having fun at the same time.”
The NUS Faculty of Engineering believes in nurturing students who are engineer-leaders with a global outlook. To achieve this goal, it has implemented programmes that will increase the global exposure of all its graduates. Through Student Exchange Programmes, Summer Programmes, Overseas Industrial Attachment Programmes, NUS Overseas Colleges, and special attachment/exchange programmes with renowned institutions and corporations, students are given the chance to broaden their horizon and gain a global perspective to education. Currently, about 30% of the students in the Faculty participate in overseas programmes.
A Korean Summer

"The six weeks I spent immersed in the Summer Programme at Korea University was really very enriching. Through the friendships I made, I was exposed to true Korean culture. I also developed strong bonds with the rest of the 12 NUS students who were part of the programme.

"The greatest fulfilment I gained was from my Human Resource Management course project, where I had the opportunity to interview a chemical engineer from SK Corp, the largest oil company in Korea. This meeting gave me a more in-depth understanding about the working lifestyle of a chemical engineer in Korea.

"I highly recommend this programme to all juniors. Not only do you get to take up interesting courses and collect a few more credits, you also gain valuable experience and friendships. Such an opportunity is priceless!"

Ms Chen Wei
Department of Chemical & Biomolecular Engineering

The Australian Connection

"I was given the opportunity to work in Sydney and the inland city of Wagga Wagga in Australia. During the Overseas Industrial Attachment (OIA) programme, I was exposed to different aspects of an airline company, from getting my hands dirty while maintaining aircrafts in the hangar to drafting engineering drawings in the office.

This exposure has given me insights into how an airline company really operates. The overseas experience, living and travelling independently, as well as immersing in the Australian culture, was also an eye-opener! I believe that my stint in the OIA programme was instrumental in helping me to succeed in getting my current job as a mechanical design engineer at Nokia Japan. Indeed, the NUS Faculty of Engineering has given me a good head start to my career!"

Mr Foo Kok Yang
Alumnus
Department of Mechanical Engineering

"The summer exchange to Korea University will always be my most memorable event as an undergraduate at the NUS Faculty of Engineering. I really learnt a lot from this cultural immersion and my social circle has widened to include friends from all over the world. I am really thankful that the Department of Electrical & Computer Engineering has given me the privilege to enjoy this once-in-a-lifetime experience. Through this opportunity, I realise that I can pursue my dreams and achieve them."

Ms Cheung Pei Qiong
Department of Electrical & Computer Engineering
A German Affair

“I did my Student Exchange Programme (SEP) in the Technical University of Munich (TUM) in my third year in the Department of Electrical & Computer Engineering. It was an enriching experience which helped me to understand more about tertiary education in a top university in Europe. The courses I took in TUM broadened my mind and consolidated my fundamental electrical engineering concepts. I also had the opportunity to interact with students from all over the world and learn from them. TUM has many excellent professors who have a wealth of experience in the industry. I really gained from their practical knowledge.

“SEP is not just all about studies - in fact, studies should not be the first priority. I took the chance to immerse in a new culture and interact with the locals. As a result, I made many friends, not only from Germany, but also from many other countries.

“I was also privileged to have the opportunity to do an Overseas Industrial Attachment (OIA). I did my OIA in Infineon Munich, and it was truly a worthwhile learning experience. I tasted what it was like to work and live as a design engineer for six months. It was truly an eye-opener for me!

“I have benefited tremendously from both the SEP and OIA Programmes. They have truly enriched my experience as a student at the NUS Faculty of Engineering.”

Mr Xu Xiao
Department of Electrical & Computer Engineering

A Dream Come True in Japan

“My dream has always been to work in a foreign land and experience a different culture and lifestyle. This dream came true when, through the NUS Faculty of Engineering, I secured a Software Engineer position at Nokia Japan in Tokyo, Japan for my Vacation Internship Programme (July – October 2006) and joined the Student Exchange Programme in Tohoku University in Sendai, Japan after that.

“For my internship, I was placed in the Audio/Video team of the Multimedia Computers Business Unit of Nokia Japan. The main task of the team was to improve the performance and functionalities of the multimedia software capabilities in Nokia handsets. Despite my lack of experience, I was put to work from the very start of the programme. My on-the-job training came in the form of assignments which contributed to the overall progress of the team’s current project. The open and non-hierarchical atmosphere of the team allowed me to engage in debates on problems at hand with team leaders and fellow teammates who were highly-experienced engineers. I gained a lot of insight into the industry and even got a sponsored ticket to attend the Wireless Japan 2006 Exhibition at the Tokyo Big Site Convention Centre as part of the internship.

“This internship has shown me the kind of work I want to do in future. It has strengthened my resolve to become a competent engineer in this field. Being located in my dream tour destination, Japan, was merely the icing on the cake to make the experience all the more enjoyable. This internship is truly one of the best opportunities that I have ever had in my life!”

Mr Lee Yongzhong
Department of Electrical & Computer Engineering
Nurturing Global Entrepreneurs

The Technopreneurship Incubation Programme prepares our students to be global entrepreneurs. Through biannual overseas business trips, engineering students get the opportunity to meet top business leaders and entrepreneurs, and learn the local business culture from them. A Memorandum of Understanding (MOU) on incubation exchange was signed between the NUS Faculty of Engineering’s Technopreneurship Incubation Centre and the National Science Park of South China University of Technology (SCUT) – the first of its kind for the Faculty. With this MOU, entrepreneurial students from both universities can incubate their respective start-ups in each other’s facilities, thus reducing the cost of growing their businesses overseas.

Chance of a Lifetime

Civil engineering student Mr. Yeo Zhi Aik’s experience at the NUS Overseas College (NOC) in Shanghai changed his life and opened up opportunities for him to enter the world of finance. As a fund manager with Inventis Investment Holdings, a Shanghai-based investment firm where he did his internship, he was involved in managing a private equity fund of US$800 million. He had the chance to travel, negotiate and network with Chinese business leaders from different industries all over China. This experience has given him a deeper understanding of the China market and its business environment.

“My education at the NUS Faculty of Engineering provided me with the problem-solving and analytical skills to sieve out the good opportunities from the bad ones and to analyse situations in a systematic manner. My background in Civil Engineering has also given me a good technical foundation to analyse investment deals in the energy, property, logistics, and infrastructure sectors. When I met up with the Chinese representatives of the companies belonging to these sectors, I had a good grasp of their concerns. The technical knowledge I gained at the Faculty became my ‘everyday’ tools which I used in business.

“Furthermore, the NOC programme is structured in such a way that we get real-life working experience while taking courses to learn about entrepreneurship. The courses I took at Fudan University in Shanghai have given me a better appreciation and greater insight into businesses in China. I also found the interactions I had with my Chinese peers very enriching.”
The NUS Faculty of Engineering recognises that life-long learning is instrumental in meeting the challenges of a knowledge-based global marketplace. With NUS ranked as one of the best universities in the world, students pursue their graduate studies alongside the best. They learn from some of the finest academics, with infinite opportunities for personal growth and fulfilment.

The Faculty offers a wide range of choices benefitting students in a rich and multi-faceted way. There are numerous graduate programmes ranging from traditional programmes to multi-disciplinary programmes; to research- or coursework-based programmes. Alternatively, students may also embark on joint programmes with top universities overseas to broaden their educational experience, gain exposure to a foreign culture, as well as to network with their best students. At the Faculty, graduate training education is broad enough to equip students for career changes and yet specialised enough to support key niche areas.

In the past year, the Faculty took another leap forward in establishing joint doctoral degree programmes with the Indian Institute of Technology, Bombay (IITB) and Australian National University (ANU). In August 2006, the Faculty also introduced two multi-disciplinary programmes, namely the Master of Science in Intellectual Property Management and Master of Science in Systems Design & Management. A specialised Master of Science in Geotechnical Engineering was also introduced.

Our graduate programmes and students are highly sought-after by industry in Singapore, the region and beyond. For Academic Year 2006-2007, there are more than 2,500 graduate engineering students of which almost 60% are pursuing their research degrees. Students enjoy an active and vibrant research community actively engaged at the forefront of ideas. The doctoral programme is the prime focus of our research degree programmes. Doctoral students account for 77% of the total research students. The blazing pursuit in research is evident in the six-fold increase in PhD students from 186 a decade ago to about 1,130 in this academic year. The University’s reputation as a research hub also accounts for a significant number of international students in our graduate population. International students from the US, France, China, India, New Zealand and the ASEAN countries form almost half of the graduate enrolment at the Faculty. In addition, the Faculty offers several scholarship opportunities for students. These include the Lee Kong Chian Graduate Scholarships, NUS Research Scholarships and A*STAR Research Scholarships.

Today, many of our graduates hold leadership positions in key industries. This illustrates our ability to help students realise their full potential by preparing them well to embrace the global economy of the future.
The Joint PhD Programme between the NUS Faculty of Engineering’s Department of Electrical & Computer Engineering (ECE) and École Supérieure d’Électricité (Supélec), one of the prestigious Grandes Ecoles of France, was launched in August 2004. This joint programme brings together two excellent study programmes that aim to attract high-calibre students to engage in research in the following five key areas of Control, Infocomm, Microwaves and RF, Microelectronics and Power Systems. Students will also be prepared to take on leadership positions in research and development.

Currently, there are four ECE students in the programme. Mr Darwin Chia, one of the students, reveals how he found the programme:

“Such work has been largely confined to a straight vertical lightning channel and I attempted to study the significance of employing a tortuous channel instead.

“My collaboration with ONERA greatly facilitated the progress of my work. I had access to a proprietary software and data on an actual rocket launch pad which formed part of my study. Coupled with the guidance and assistance of my co-supervisor and other staff members at Supélec, this stint benefited my research tremendously.

“Apart from work, this programme also served as my gateway to Europe. I interacted with people from all over Europe within the close-knit campus environment and also had the opportunity to visit a number of countries. I am truly privileged to have taken part in this programme!”

Mr Darwin Chia
Department of Electrical & Computer Engineering
Mr Vinit Nagarajan, an NUS scholar, graduated from the Department of Electrical & Computer Engineering in 2005. He recently completed a Masters degree in Finance at Cambridge University, where he was a recipient of the prestigious Gates Cambridge Scholarship. He shares how his experience as an undergraduate at the NUS Faculty of Engineering led him to a different path:

“One of the main reasons which influenced me to choose engineering as my field of study was its versatile nature. I realised that the knowledge and skills that I would gain from studying engineering would be easily transferable across industries.”

“The Faculty really instils a global outlook among the students. In my first and fourth year, I attended the International Students Conference at the University of St Gallen in Switzerland. This is an annual conference that brings together students from around the world with leaders from business, industry and politics for a series of workshops on themes centering on leadership in a dynamic world. It was an excellent opportunity to interact with like-minded students from across the globe and people who were passionate about making a difference in society.

“During my third year at University, I did an internship at Barclays Capital in Singapore. I enjoyed the stint very much and this inspired me to seriously consider working in the financial services industry. I was confident that the numerical aptitude that I picked up as an engineering student would put me in good stead in the world of finance.

“The paradigm of education at the NUS Faculty of Engineering is truly that of giving students infinite opportunities. My experience at the Faculty opened the doors for me to walk a different path. I firmly believe that it’s entirely up to students to make use of this freedom and the opportunities available through NUS’ global reach and strong reputation, to derive a meaningful and satisfying experience during their time at the University.”

Mr Vinit Nagarajan (seated left) at the International Students Conference at the University of St Gallen in Switzerland
Mr Peter Ho was team-leader and part of the pioneering team of the NUS Formula Society of Automotive Engineers (FSAE) from 2001-2003 at the Department of Mechanical Engineering. After graduating in 2003, he realised his dream to pursue professional motorsports by securing a job at the British Touring Car Championship with Team Petronas. After a year’s stint in the UK with the team, he returned to Asia as Chief Engineer to their Asian Touring Car Championship campaign. In 2006, Mr Ho set up HOPE Technik in Singapore together with Mr Michael Leong, team-leader of the NUS FSAE from 2003-2004. The company specialises in high-performance engineering ranging from medical tools to pest management equipment, in addition to prototype engines for the Singapore military.

Mr Peter Ho (extreme left) with peers in Team Petronas

President S R Nathan viewing the first student-designed-and-built NUS FSAE race car at the NUS Open House, March 2003

“I am glad for the opportunities in Engineering both as a course of study and a career.”

Mr Peter Ho
Alumnus
Department of Mechanical Engineering

Top image

Bottom image

“Engineered to Perfection”

Cut from a Different Cloth

“My experience at the NUS Faculty of Engineering launched my career at the Defence Science & Technology Agency (DSTA). At DSTA, I am currently deployed in the Land Platforms Division and deal with the army’s vehicles’ evaluation, acquisition, development and modification issues on a day-to-day basis. My experience with the NUS FSAE race car project and its associated automotive/mechanical-related issues helped me to appreciate and anticipate the practical problems faced in the projects that I deal with now."

“The Faculty also fully supported and encouraged my participation in the University Scholars Programme (USP), which is an undergraduate programme at NUS designed to develop the intellectual, leadership and personal potential of promising students. Through the USP, I experienced a rigorous multi-disciplinary curriculum and beyond-the-classroom learning opportunities. As a result, I have truly gained a broad-based university education which has enabled me to develop to the fullest.”

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Mr Ng Kiang Loong
Alumnus
Department of Mechanical Engineering
Ms Mabelle Lin is one of the first graduates from the Bioengineering programme. She is currently working as a Biotech Patent Analyst with Shusaku Yamamoto in Osaka. She shares how her choice to pursue bioengineering at the NUS Faculty of Engineering has opened up infinite opportunities for her:

"Being trained as a bioengineer means that I have the ability to integrate the essence of both biology and engineering. Throughout the entire course, I was exposed to different aspects of biotechnology such as tissue engineering, bio-computation, and biomechanics. I believe possessing such a wide breadth of knowledge has given me an advantage - I am different from other engineers who are trained in a single field. Bioengineering has also opened up many diverse job opportunities for me - for example in research and development or in a medical-related field. I can also take up jobs that are indirectly related to bioengineering such as teaching and in the legal field, which is what I have chosen. My biotechnical knowledge enables me to contribute effectively in all these fields."

Mr Lin Qinghui, from the first cohort of graduates from the Division of Bioengineering, shares how his experience at the NUS Faculty of Engineering has enriched him and enabled him to achieve excellence both academically and in the field of sports. Mr Lin is one of the key fencers in Singapore's Fencing Team. He displayed his prowess and grit by winning two gold medals (for individual and team events) at the South-East Asian Fencing Championship in May 2006, despite having just recovered from a knee surgery in February.

"I truly had an all-rounded education at NUS. Pursuing my sporting dreams would not have been possible without the support of my professors and friends. Their support and belief in what I was doing made a tremendous difference and enabled me to balance sports and schoolwork."

"Being part of the first batch of bioengineering graduates has opened up great opportunities for me. I was nominated for a fellowship at the California Institute of Technology and participated in the CALTECH-NUS Summer Undergraduate Research Fellowship Programme. This overseas exposure enriched me very much. Besides going overseas for research, I also had the chance to meet foreign dignitaries who visited NUS, as I was a student representative. All these experiences have given me a broad perspective to life and education. In fact, shortly after I graduated, I succeeded in getting a job as a policy analyst at the Ministry of Finance. I believe that my well-rounded education and achievements as an athlete, student and researcher helped me to clinch this job."
Mr Amlan Saha graduated from the Department of Electrical Engineering in 1998. He is currently a Master of Arts in Law and Diplomacy student at the renowned Fletcher School of Law and Diplomacy in Massachusetts, USA. His focus of study is in public policy and international security and he is scheduled to graduate in 2007. Prior to this, he obtained his MBA from the HEC Grande Ecole in France.

Amlan is an example of an engineering student who pursues his passions and lives his dreams. Before going to graduate school, he did volunteer work in Romania, Egypt and Nepal, and backpacked over 30 countries.

He shares, “Although my work and travels in these countries were extremely gratifying and allowed me to experience first-hand very different and diverse cultures, I realised that if I wanted to get involved in real problem-solving, I needed to be at the policy-making level. This desire sent me packing to graduate school - I wanted to gain a deeper understanding of some of the issues affecting the world!"

“My wish came true when last summer, as part of my internship at a Geneva-based consulting firm, I was an observer at a number of sessions at the United Nations Secretariat. And then this summer, I was attached to one of the largest security firms in the world, working on projects for Suvarnabhumi Airport, the new international airport in Bangkok, Thailand. Such exposure has certainly helped me fulfill my dream of making a difference in the world.

“I am very glad that I chose engineering as my first degree. Engineering provided me with a strong foundation and training in analytical and problem-solving skills. This will always be valuable in life. In fact, to solve the most vexing issues in today’s world, one requires not just a soft heart, but a hard mind as well. I believe that my training as an engineer has given me the ability to create and implement solutions that will make an impact in today’s world. Truly, my first choice has led to infinite opportunities!”

Dr Steven Zhou
Department of Electrical & Computer Engineering

“I chose to pursue my PhD at the NUS Faculty of Engineering because of its prestigious reputation and high ranking as one of the top universities in the world. More importantly, NUS has strong connections with other top universities, and a very strong faculty team.

“I was also interested to work on the exciting research project on mixed reality with Assoc Prof Adrian David Cheok. This was really the best decision because the projects that I was working on have led to many publications, patents, and several spin-off companies. The research area, Interactive & Digital Media, has now become one of the key research areas in Singapore.

“The Faculty gives a lot of support to graduate students. For example, its financial support allows every graduate student to attend at least one international conference. I still remember the first time I presented my work internationally in Tokyo in 2001. It was a great chance for me to view and experience how other international researchers were doing and presenting their research. I also had the opportunity to meet a world-class professor whose work has substantially inspired and influenced my PhD research.

“The Faculty also provides tremendous entrepreneurship opportunity. We have so many spin-off companies that commercialise the research results from the labs. Instead of just dreaming, you can make your projects into a reality. In fact, I am realising my dreams step-by-step. One of them was to join the Faculty and that has come to pass!”

Dr Steven Zhou with Dr Alan Kay, father of modern software development, at Hollywood, Los Angeles, USA. Dr Zhou is now sponsored by the ECE Department to work at the University of Southern California School of Cinema and Television as a visiting scholar.
In the past year, the Outreach Office has initiated several programmes to nurture pre-university students' interest in engineering. These programmes aim to give students an insight into the diverse disciplines of engineering and the numerous opportunities available in a career in engineering.

Its flagship event, “Engineering Quest”, is a day camp where, through seminars, demonstrations and hands-on experiments, students learn how engineering principles can be innovatively applied to solve real world problems.

Since its inauguration in 2005, the NUS Faculty of Engineering’s Outreach Office has been actively promoting engineering education to pre-university students both on the local and international front.

At the Quest held in November 2006, engineering came alive for 105 students. Over the course of two days, they learnt about electrostatic and electromagnetic effects, aerodynamics, supply chain management, molecule properties and bridge design. More than 60% of the participants said the Quest had increased their interest in the field and a majority of them would consider pursuing a course in engineering.

The annual Faculty Open House is another key event organised by the Outreach Office. This two-day event gives potential students a glimpse into the exciting world of engineering at NUS through contests, games, talks and exhibitions by the various departments.

A new event was introduced this year. The MOE-NUS Amazing Lab Race, jointly organised with the Ministry of Education, saw 54 students race around the Faculty, attempting to finish all lab challenges in the shortest time possible. Working in teams of five, the Lab Race offered the students a fun and educational opportunity to learn more about engineering.

The Outreach Office also runs several research attachment programmes, such as the Junior Talent Development Programme. In this programme, students have the opportunity to apply basic principles and theories to engineering problems under the guidance of faculty members.

Above all this, it regularly conducts talks and career fairs at secondary schools, junior colleges and polytechnics, which introduce younger students to engineering and what the NUS Faculty of Engineering offers.

On a national level, the Outreach Office is working closely with various government agencies, educational and professional institutions to promote engineering nationwide. Besides these local outreach efforts, it also actively participates in overseas fairs to help spread the Faculty’s wings abroad.
NUS-Yishun Junior College Research Projects Win Awards in Elementz Research Conference & Exhibition 2006

The efforts of the NUS Faculty of Engineering’s Outreach Office in raising awareness for the Faculty proved successful at the North Zone 7th Elementz Research Conference & Exhibition 2006 held on 5 April 2006.

This annual event organised by North Zone schools and junior colleges aims to promote a passion for science in students. This year, there was a total of 22 submissions, including that of three junior colleges. Yishun Junior College (YJC) submitted three NUS-YJC collaborated research project groups under the Faculty’s Junior Talent Development Programme scheme. Through the dedicated mentorship of our professors, all participating groups walked home with top awards.

Gold Award:
Deployable and Foldable Space Frame Structure
Mentor: Assoc Prof Richard Liew Jat Yuen, Department of Civil Engineering

Bronze Award:
Earthquake Effect
Mentor: Assoc Prof Lee Fook Hou, Department of Civil Engineering

Bronze Award:
Very Large Floating Structure
Mentor: Prof Wang Chien Ming, Engineering Science Programme
In line with national priorities and key global political, social, economic and environmental trends, the Faculty has focused on several strategic research thrusts, including Environmental and Water Technologies, Nanotechnology, Interactive and Digital Media, Biomedical Materials and Systems, Logistics, and Offshore Engineering.

In our drive to be at the frontier of research innovation and be highly-regarded by peers internationally, we will continue to strive for excellence in research through publishing high-impact papers; encouraging research output in top-tier journal papers, international presentations, editorial memberships, awards and patents; global research collaborations with leading institutions like Massachusetts Institute of Technology (MIT); as well as intellectual property creation and commercialisation.

The Faculty has also done well in terms of journal papers published and citations received internationally. Based on the widely-used ISI Essential Science Indicators (January 2007), the Faculty is ranked 10th in the number of papers and 20th in citations in the world.

Another key emphasis is to further enhance our strong relationships with government agencies and industry for the purposes of research collaboration, technology transfer and securing competitive funds. We will continue to actively promote industry participation in our multi-disciplinary research activities, engage in consultancy services to industry, and establish new partnerships so that we can reach a place of global excellence, relevance and recognition.

The Faculty received a total research funding of approximately S$52,803,699 in Fiscal Year 2006 (as at 30 November 2006), out of which S$34,679,077 was from research grants and research budget, and S$18,124,622 from research scholarships. As the government plans to double public research funding in the next five years, unprecedented opportunities for inter-disciplinary and multi-disciplinary research will propel our research achievements to even greater heights.
The NUS Faculty of Engineering will host GE’s first world-scale Water & Process Technologies Global R&D Centre in Singapore. On 21 September 2006, Prof Shih Choon Fong, NUS President, and Mr Jeff Garwood, President and CEO of GE Water & Process Technologies, signed a Memorandum of Understanding to establish the R&D Centre. The occasion was witnessed by Mr Teo Ming Kian, the then Chairman of the Economic Development Board.

Targeted for start-up in 2007, the Centre will conduct research aimed at alleviating pressing water issues related to the quality, availability and affordability of safe and usable water supplies. Specific areas of research include water treatment and systems integration, fundamental chemical and membrane applications and ion-exchange technology.

This strategic partnership adds a new dimension to integrating basic and applied research with commercial application for NUS and Singapore, while leveraging on the University’s comprehensive research infrastructure in engineering, science and medicine. The new Centre will promote the growth of an environment and water technology ecosystem spanning the entire value chain.

Both NUS and GE have a long history of proven research capabilities and technology development. NUS’ research strengths in membranes, biological processes, nanomaterials, catalysis and sensors related to water security will complement GE’s technical expertise and industry experience in water and process technologies. The partnership with GE is part of its commitment to realising Singapore’s aspiration of becoming a “Global Hydrohub”.

Comprising five Centres of Excellence, the R&D Centre is expected to employ 100 top-tier researchers who will build up a full range of research and development capabilities and transform innovative concepts into products and solutions that will address real world demands.

“Today GE Water & Process Technologies joins forces with one of the most reputable universities in the world - the National University of Singapore.”

Mr Jeff Garwood
President & CEO
GE Water & Process Technologies
In the next five years, Singapore targets to place greater focus on clinical sciences and translational medicine. This field is about translating discoveries in our laboratories into clinical and commercial applications (also known as “from bench to bedside” or “from bench to industry”). To achieve this aim, the NUS Faculty of Engineering has been working closely with researchers from other departments in the Faculty of Science, Medicine and Dentistry, and the Office of Life Sciences in the area of Biomedical Materials & Systems. It will develop novel therapeutic and diagnostic methodologies as well as clinically-relevant and commercially-viable applications and technological know-how for the early detection, diagnosis and treatment of diseases such as cancer, vascular diseases, infectious diseases and aging. Some examples include nanobiomaterials for regenerative medicine, drug encapsulated nanoparticles for controlled drug delivery, micro- and nanofluidic devices for diagnostic kits, quantum dots for biosensors and functionalised nanoparticles and microbeads as smart probes for disease detection.
The scale and complexity of environmental problems have grown substantially in the past few decades, and will continue to do so in the near future. This is a result of rapid industrialisation and urbanisation on a global scale, where many of the environmental issues go beyond single disciplinary education and research frameworks. Consequently, there is a critical need for an inter-disciplinary and more holistic approach to environmental education and research.

In order to meet the needs of the profession and the demands of the industry, the Division of Environmental Science & Engineering (ESE) was established in the NUS Faculty of Engineering in April 2005. The Division offers both undergraduate and postgraduate educational programmes, with a strong focus on research. The innovative new BEng and postgraduate (MEng and PhD) curriculum in ESE prepares future environmental professionals by immersing them in a holistic teaching and research framework in order to address and solve multi-faceted environmental challenges.

The formation of the Division was timely, as the government has identified Environmental and Water Technologies (EWT) as a core growth area for the national economy. Amid rising opportunities in China, India and other nations, Singapore has established the National Research Foundation (NRF) and plans to invest $5 billion into strategic research and development (R&D) efforts, including EWT. The goal is to double the current number of jobs in this sector by 2015. The Memorandum of Understanding between GE Water & Process Technologies of the United States and NUS to set up a world-class R&D Centre in water is another key milestone. GE will invest $130 million over the next 10 years in the Centre, which will be housed at the NUS Faculty of Engineering.

Our faculty members were particularly busy during 2006, establishing collaborations with government authorities and industry partners to jointly apply for NRF funding, as administered by the newly-established Environment and Water Industry Development Council. With an initial focus on water-related R&D activities, later NRF funding will cover other research areas including alternative energy, waste management and air pollution control. As the world acknowledges the growing threats to the global environment, the NUS Faculty of Engineering is strategically placed to make a strong contribution to emerging technologies for a sustainable future. Dr F. Michael Saunders, a world-renowned Professor, joined the Faculty as Head of the Division of ESE in January 2007.

Dr Yaacob Ibrahim, Minister for the Environment and Water Resources, shared his views on how engineers have contributed to the development of Singapore at the 40th Annual Dinner and Dance of the Institution of Engineers, Singapore on 27 October 2006.

“Ultimately, engineering is about the application of scientific principles to practical ends, so as to improve our lives and living standards. As the minister who oversees our environment and water resources and an engineer by training, I am proud to note how, over the years, engineering solutions have contributed towards building a nation, specifically in tackling long-term issues of a robust water supply and environmental sustainability.

“Engineers bring with them expertise in a wide range of areas. These include traditional disciplines such as civil and mechanical engineering, as well as newer ones like bioengineering. Traditional or new, all engineering disciplines are vital to Singapore’s development as a nation. As we move towards a more knowledge-based economy, engineers too will move beyond being technically equipped, towards obtaining an even wider range of expertise, such as in research and development, consulting, regulatory knowledge, and so on.

“The engineering mind is not one that will rest on its laurels. I am therefore confident that current and future generations of engineers in Singapore, just like the previous generation, will continue to work together to anticipate and address issues that impact upon our well-being. I am confident our engineers will help Singapore rise to greater heights in our quality of life – in both developmental and environmental terms.”
NUS has established its first overseas Interactive & Digital Media research lab in the USA. The ground-breaking NUS Hollywood Lab in Los Angeles, California aims to foster international research and development (R&D) collaboration and technology commercialisation for interactive and digital media. In addition to serving as a research outpost for NUS, the Lab will bring together the best minds and talent from Singapore and the US, and combine resources from academia and industry to create synergy.

The Lab, which shares a new facility with the University of Southern California School of Cinema and Television, will work closely with major Hollywood movie studios, universities and entertainment companies in North America. Besides international R&D collaborations and business ventures between Singapore and the US, it will also focus on student exchange and visiting professorship programmes.

NUS graduate students will have opportunities to work on R&D projects with world-renowned entertainment companies such as Disney, NBC Universal, Sesame Workshop and the American Film Institute. The projects may include computer games, 3D animation, home entertainment, digital cinema, interactive TV, and theme park rides. The students will also have a chance to work with computer pioneer Dr Alan Kay on his visionary research projects.

The NUS Hollywood Lab is an initiative by Dr Newton Lee, an international guru in interactive and digital media research with over 20 years of international R&D experience; Assoc Prof Adrian David Cheok of the Department of Electrical & Computer Engineering, who is also Director of the NUS Mixed Reality Lab; and Prof Hang Chang Chieh, Director of the Centre for Management of Science & Technology.
In the past year, one of the key research highlights at the NUS Nanoscience and Nanotechnology Initiative (NUSNNI) was the Defence Science & Technology Agency-funded electrospun polymer nanofibre filters project. This work involves the use of nanofibrous materials in the protection against chemical warfare agents. The research has been published in the Nanotechnology Journal (Vol 17, 2006) and has been submitted for Singapore and US patent applications.

NUSNNI has also established partnerships that enable us to tap into the expertise of high-calibre academics from top universities and research institutes worldwide. We are currently collaborating in research with Prof Subra Suresh (MIT), Prof Richard Friend (Cambridge) and Prof G Milon (Institut Pasteur), among others. These researchers are widely-cited in the literature in their respective fields.

Locally, NUSNNI members have also achieved excellence in their fields. Prof Chua Soo Jin, Assoc Prof Wu Yihong and Assoc Prof Adekunle Olusola Adeyeye won the top three prizes in the MRS-S National Conference in Advanced Materials 2006.


From left (clockwise)
Prof Richard Friend, Assoc Prof Wu Yihong,
Prof Chua Soo Jin, Assoc Prof Adekunle Olusola Adeyeye,
Prof G Milon and Prof Subra Suresh

Faculty members and students of the Silicon Nano Device Laboratory (SNDEL) have made far-reaching contributions to semiconductor device technology for the future. Over the past four years, their contributions have been highly recognised all over the world through a high number of papers at premier conferences such as the International Electron Devices Meeting and Very Large Scale Integration (VLSI) Symposium, and in premier journal IEEE EDL. Six SNDEL students received prestigious awards such as the “IEEE EDS Student Fellowship” and “Best Paper” awards. SNDEL faculty members delivered over 20 invited talks at international conferences. Their research tackles the hottest topics in complementary metal oxide semiconductor (CMOS) technology, including advanced gate stack, high-speed channel engineering, non-volatile memories, and nanowire devices, all of which have a high impact on both academic society and industries. Such research directions and their visibility in achievements have enabled SNDEL to attract substantial research funding of S$28.6 million since 2000 from both the government and industries.
CORE - National Node for Offshore R&D

The Centre for Offshore Research & Engineering (CORE) has been identified as a national focal point for offshore research and development (R&D) by the Agency for Science, Technology and Research (A*STAR), Economic Development Board and Maritime and Port Authority of Singapore (MPA). CORE is finalising arrangements with A*STAR and MPA for a S$10 million seed funding for R&D programmes which will garner the expertise from NUS, tertiary institutions and A*STAR research institutes to enhance competitiveness of the industry in Singapore. The R&D will be carried out through thematic and multi-disciplinary programmes within the context of identified systems, in particular, structural systems, subsea systems, and seabed/substrata surveying systems.

The Department of Civil Engineering worked closely with CORE to launch the Master of Science Specialisation in Offshore Engineering in August 2006 with good response and support from the industry. Two international experts, Prof Andrew Palmer and Dr John Halkyard, conducted two of the new courses in Offshore Pipelines and Floating Structures, with site visits to broaden students’ exposure.

CORE also organised professional short courses delivered by international experts. The successful Deepwater Development Workshop in October brought in speakers from Technip, Shell, Houston Offshore Engineering, Genesis Oil & Gas, Keppel Offshore & Marine, and SBM.

On 16 November 2006, CORE hosted the Keppel Technology Advisory Panel (KTAP) members at NUS University Hall. The KTAP meeting, including laboratory tours, yielded excellent technical exchanges, and CORE will continue to work closely with Keppel to identify new collaborative R&D projects.

The 4th Keppel Offshore & Marine Lecture was delivered by Prof Torgeir Moan, Keppel Professor at the Department of Civil Engineering, on the same day. The Lecture, which focused on floating production systems for oil and gas in harsh environments, was attended by more than 350 people.

On 10 March 2006, the Director (Research) of CORE, Assoc Prof Choo Yoo Sang, was awarded the Stanley Gray Medal from the President of The Institute of Marine Engineering Science & Technology in London for the best paper presented to the Institute’s East Asia Division in 2005.
The Economic Development Board has identified Logistics and Supply Chain Management as one of the key areas that will contribute to Singapore’s growth as a vibrant global hub of knowledge-driven industries.

As an industry, Logistics accounts for more than 8% of Singapore’s GDP, and as an enabler, it provides a competitive edge to industry as a result of its excellent infrastructure and connectivity. In view of its increasing importance, the Department of Industrial & Systems Engineering (ISE) identified Logistics and Supply Chain Management as one of its research focuses. Its research competency lies in methodological and application issues relating to the management of cross-functional activities that support the flow of materials and products to customers. The research addresses issues of robustness and optimisation of resource utilisation within the entire supply value chain. Quantitative tools and innovative solutions based on operations research methods are developed to assist in managerial decision-making. Some specific research areas include maritime and air logistics, service-based supply chain systems, healthcare supply chain, supply chain modelling on inventory and transportation systems, military logistics, warehousing systems, factory physics including wafer fabrication scheduling, as well as scheduling and routing problems. Several research areas involve close collaborative work with industry and research institutes, namely the Maritime and Port Authority of Singapore, PSA Corp, Neptune Orient Lines, IBM, INTEL, National Healthcare Group, TECH Semiconductor, The Logistics Institute - Asia Pacific and SimTech. The establishment of the IBM-NUS On Demand Supply Chain Solutions Laboratory in 2005 at the ISE Department further enhances the strong ties between the Department and industry in carrying out cutting-edge research. In addition to research, the Department has also been producing quality graduates who join the fast-growing logistics industry each year.
Opportunities for Enterprise

Entrepreneur at 22

Mr Jeffrey Tiong had the opportunity to join the NUS Overseas College (NOC) programme as an undergraduate student in the Division of Bioengineering. While at the NOC in Bio Valley, USA, he co-founded OrthoLab Technologies Inc, a spin-off from his internship company, VascuLab Technologies. OrthoLab Technologies develops medical devices that aid spinal surgery. Its first product, the OrthoLab STR Interbody Fusion System, is a spinal implant that helps to fuse the upper and lower vertebral body. With this product, surgeons will just need one attempt to place a spinal implant compared to the current need to use several instruments. As a result, spinal surgery will become a simpler and less traumatic procedure.

Mr Tiong’s business plan for OrthoLab also won a place in the grand finals of the Wharton Business Plan competition. His team from NOC emerged as one of the eight teams in the finals out of a total of 120 competing teams.

Mr Darius Cheung, a graduate of the Department of Electrical & Computer Engineering, founded tenCube, an innovative mobile security company, with three fellow NUS alumni in 2005. Since then, the company has grown from strength to strength. Apart from being recognised as the Grand Champion of Startup@Singapore, tenCube’s anchor product, WaveSecure, has been rated by Frost & Sullivan, a leading market research and growth consultancy, as one of the “Top 10 Wireless Innovations in Asia Pacific”. WaveSecure is the world’s most comprehensive mobile phone security solution providing features such as Lock, Track, Backup & Wipeout to manage mobile device and data. WaveSecure is currently on trial with the Singapore Police Force, and is funded by The Enterprise Challenge grant. Recently, tenCube was also rated as one of the Hottest 100 Startups in Asia by Red Herring.

The spirit of enterprise is prevalent at the NUS Faculty of Engineering. The constant search for opportunities to translate knowledge and research into industrial and commercial application is part of our vision to be the technological leader in an ever-changing world.
Mr Eugene Low, an alumnus of the Department of Electrical & Computer Engineering, has a great reason to celebrate. His company, Hardware Zone, which he set up with a group of fellow students, including Mr Jackie Lee, in 2000 was sold for $7.1 million to Singapore Press Holdings in October 2006. This is one of Singapore’s largest deals involving a dot.com setup. Hardware Zone started out as an IT content provider, providing IT-related content via the Internet. As the company grew, it morphed into a media and publishing company, capitalising on the content it generated and the community that grew with the site. Mr Low shares how his experience at the NUS Faculty of Engineering opened opportunities for him to start up this company and become a true entrepreneur:

“University education helped to open my mind, and the systematic and logical training of the mind is definitely essential to help us succeed in anything that we do. We were able to find time outside of school to start and work on our company. The fact that NUS allowed us to do our internship in our own company really helped the growth and success of Hardware Zone. I believe that the top five qualities of an entrepreneur are PASSION, PATIENCE, HARDWORK, CREATIVITY and TEAMWORK. As an entrepreneur, it is often a long and hard road to take; without PASSION and PATIENCE, it is impossible to endure the long hours. HARDWORK goes without saying - this is definitely not a 9-5 job and not for the faint-hearted. CREATIVITY ranks high because this road requires one to adapt quickly to market forces and one needs to keep abreast with new ideas to keep up with current trends. And lastly, I believe that without TEAMWORK, Hardware Zone wouldn’t have been possible.”

Mr Vu Khac Kien set up VRich Technology as a student at the Department of Civil Engineering, with a vision to create something useful for society. His company makes rapidly-built shelters which can be erected up to 10 times faster than equivalent conventional shelters, while maintaining competitive structural effectiveness. As a result of the special speed of deployment and compact folded form (which is convenient for transportation), these deployable shelter products can be used for military or humanitarian purposes, exhibitions, and even serve as temporary meeting or recreational rooms.

Mr Vu shares how the Department helped him to achieve his dream:

“As a student at the Department of Civil Engineering, I realised that engineering should have practical use. With this belief in mind, I chose research topics relating to product and technology development which were very application-oriented. It occurred to me that to make this technology truly effective, I needed to put the products into the hands of users. I discussed such possibilities with my two supervisors, Assoc Prof Richard Liew Jat Yuen and Dr Krishnapillai Anandasivam. To my surprise, they were not only willing to support the start-up, but also introduced me to NUS facilities which could help to nurture the business in the early stage. The business office lease at NUS-Engineering Incubation Centre was instrumental in the success of this start-up. Its location was very convenient as all the team members were from the Faculty of Engineering and the School of Design and Environment. It also provided basic office facilities and equipment which we needed.

“Running a venture is a very interesting experience. You need a combination of skills, out of which I believe planning and persuasion are key. I gained these two skills as I pursued graduate studies. The preparation for my PhD proposal and presentations at conferences certainly honed such skills. In fact, we managed to enter the final round of the competitive Asia Pacific Rim University business plan challenge in July 2006 due to such advantages.”

Celebrating Success

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NUS researchers at the Department of Electrical & Computer Engineering have made a major breakthrough in the realisation of nanoscale transistors. Dr Yeo Yee Chia and his team of researchers have become the first in the world to incorporate strained-silicon using silicon-carbon materials for boosting the performance of sub-30 nanometre transistors.

Electronic products such as computers, mobile phones, MP3 players, thumb drives and digital cameras all employ transistors. Dr Yeo’s team has successfully made transistors as small as 25 nanometres (Singapore’s smallest). This is also about 4,000 times smaller than the diameter of the human hair and about four times smaller than an influenza virus. These tiny transistors are expected to be deployed in electronic products in future.

Dr Yeo’s team integrated a new material containing silicon and carbon which introduces strain for engineering the spacing between silicon atoms inside the transistors. By carefully altering the inter-atomic spacing in silicon, the team of researchers changed the conduction properties of silicon, which leads to a significant improvement in the speed of electronics.

The team also found new ways to boost the speed of computers or reduce the power consumption of mobile electronics. This effort is a significant contribution to global research efforts by the semiconductor industry to explore new ways of improving the performance of integrated circuit chips or electronics.

The team collaborated with the Institute of Microelectronics, and their research achievements were reported in two papers presented at the prominent Symposium on Very Large Scale Integration (VLSI) Technology in June 2006 in Honolulu, Hawaii, USA. They also unveiled new developments at the prestigious International Electron Device Meeting in December 2006 in San Francisco, USA.

Emerging Technology

Nanobiomechanics, the fusion of nanotechnology, cell and molecular biology and mechanics, has been identified by the Massachusetts Institute of Technology (MIT) Technology Review magazine as among the top 10 emerging technologies that would soon make a significant impact on human lives. The March/April 2006 issue of the magazine highlights that nanobiomechanics is making “increasing contributions” to the understanding and treatment of diseases and would have a “significant impact” on medicine.
Feature sizes in micron range produced by machining processes are important for automotive, aerospace and biomedical applications. The major challenge is the machining setup, which requires proper control and handling of the micro-tools and appropriate fixturing of the workpiece. This is especially so for features of less than 20 µm and accuracy of within 1 µm.

At the Micro Fabrication Laboratory at the NUS Faculty of Engineering, Prof Mustafizur Rahman, Assoc Prof Wong Yoke San, Mr Takeshi Masaki, Dr Lim Han Seok and Mr Abu Bakar Md Ali Asad have developed a process based on micro-EDM (micro electrical discharge machining), which enables the setup requirements of workpiece and tools to machine the micro-features to be performed only once using the multi-process Mikrotools DT-110 machine. This process not only avoids transfer and clamping error or damage, but also produces very tiny electrodes and associated micro-features on delicate and complicated workpieces. Their work has resulted in international recognition. The team clinched both the Ribbon Award (an outstanding paper award) and the Graduate Student Award (Gold) by the Materials Research Society in the US during the Fall Meeting in 2004 and 2005, respectively.

Zinc oxide (ZnO) is an important electronic and photonic material promising many new technologies such as UV laser for digital recording and solar cells for light energy harvest. Over the past several years, intense research has been devoted to ZnO in searching for newer synthetic methods and controlling product size and uniformity. Prof Zeng Hua Chun of the Department of Chemical & Biomolecular Engineering and his MEng graduate student, Mr Liu Bin, have developed a novel chemical approach which successfully produces large-scale uniform ZnO nanorods for the first time. Their paper Hydrothermal synthesis of ZnO nanorods in the diameter regime of 50 nm has been highly cited since its publication in 2003 in Journal of the American Chemical Society.

Assoc Prof Lim Chwee Teck of the Department of Mechanical Engineering and Division of Bioengineering, and Dr Kevin Tan Shyong Wei from the NUS Department of Microbiology, together with their counterparts at MIT and Institut Pasteur (France), have demonstrated how nanobiomechanics can be used to investigate the pathogenesis of a human disease – malaria in this instance. They have produced significant findings on the changes red blood cells undergo as the malaria parasite matures within its hosts, including the role specific proteins play in conferring rigidity to the infected cell membrane. Their work has resulted in international recognition. The team clinched both the Ribbon Award (an outstanding paper award) and the Graduate Student Award (Gold) by the Materials Research Society in the US during the Fall Meeting in 2004 and 2005, respectively.
Under the supervision of Assoc Prof Marcelo H Ang Jr and Dr Lim Ser Yong, Dr Xia Qing Hua and his team from the Department of Mechanical Engineering have created a prototype robot which can clean ventilation ducts three to four times more efficiently than existing ones in the market. These robots will be able to tackle the tedious and hazardous job of cleaning industrial air-conditioning ducts and enable companies to save cost, time and manpower.

Dr Xia and his team invented an "Omni Arm", a multi-purpose arm which can do the cleaning job, as well as help the robot climb steps - a movement which is required in the cleaning process. They are also developing modular robots to suit different-sized ducts. Their robot is designed with advanced "master-slave" technology, which allows for two-way communication, with feedback from the robot to the controller. With this communication in place, monitoring the robot’s progress is minimal - as the robot updates the controller on its progress and movements.

Dr Xia’s team was a finalist at the Association of Pacific Rim Universities (APRU) Doctoral Student Enterprise Business Plan Competition held in conjunction with the 7th APRU Doctoral Student Conference held at NUS. Dr Xia, together with his partner Mr. Hardy Lin, formed a company called Robotronics Land Pte Ltd in 2006. So far, business has been encouraging and Dr Xia and his team members are busy seeing clients in the region.
At the NUS Faculty of Engineering, faculty members and students embrace every opportunity to serve. Our engineer-leaders lend their expertise and make an impact in society. Through their accomplishments, they contribute to the welfare of Singapore, the region and the world.

Member of American Academy of Arts & Sciences

Prof Shih Choon Fong, NUS President, was elected as a Foreign Honorary Member of the American Academy of Arts & Sciences (AAAS) as a recognition of his pioneering work in nonlinear fracture mechanics and computational methods for fracture analyses. Prof Shih is the only Foreign Honorary Member in the category of Engineering Sciences and Technologies to be elected this year. The AAAS describes the election as “a highly-competitive selection process that recognises individuals who have made pre-eminent contributions (such as intellectual achievement, leadership and creativity) to all fields/disciplines and professions and society at large”. The selection of Foreign Honorary Members honours distinguished experts and intellectuals from outside the US. Prof Shih joins the ranks of some 4,000 American Fellows and 600 Foreign Honorary Members (including more than 170 Nobel Laureates and 50 Pulitzer Prize winners), which include leading scientists, scholars, artists, business people, public leaders and statesmen in the world.

Chairman Emeritus of APRU and Chair of Governing Board of AWI

At the Association of Pacific Rim Universities (APRU) 10th Annual Presidents Meeting, Prof Shih Choon Fong, NUS President, was appointed as Chairman Emeritus after completing two terms as APRU Chair. APRU is a consortium of 37 leading research universities along the Pacific Rim. Besides serving as Chairman Emeritus, Prof Shih was also appointed as Chair of the Governing Board of the APRU World Institute (AWI). AWI is an institute of advanced studies that aims to gather outstanding researchers from around the world to engage in multi-disciplinary research in globally-significant issues.
Founding Fellows of ASEAN Academy of Engineering & Technology

Prof Hang Chang Chieh, Director of Centre for Management of Science & Technology, and Prof Poo Aun Neow, Director of Bachelor of Technology Programme, were elected to be Founding Fellows of the ASEAN Academy of Engineering & Technology (AAET). The conferment ceremony was held in November 2006 in conjunction with an AAET energy conference. There are currently six engineers from Singapore within the exclusive 50 Founding Fellows of AAET.

Chair of SQC-PEO Committee

Prof Ang Beng Wah, Head of the Department of Industrial & Systems Engineering, was invited by SPRING Singapore (Standards, Productivity and Innovation Board) to chair the Singapore Quality Class for Private Education Organisations (SQC-PEO) Committee for two years from July 2006. The SQC-PEO scheme aims to assure that private education organisations have the capabilities to provide quality education.

The SQC-PEO Committee, comprising six representatives from local and foreign academia, employers and SPRING Singapore, was appointed by SPRING Singapore to provide domain knowledge in various aspects of quality assurance in education.

Member of CIRP

Assoc Prof Ong Soh Khim of the Department of Mechanical Engineering was elected as a corresponding member of the International Academy for Production Engineering, CIRP - College International pour la Recherche en Productique. This international academy is one of the most exclusive associations for manufacturing researchers in the world. Prof Ong is the first woman in Asia Pacific to be elected a member. CIRP has about 500 members from 40 different countries. All members have been co-opted into the Academy after making significant contributions to production engineering research.
Chair of AUN/SEED-Net 11th Steering Committee Meeting

Prof Seeram Ramakrishna, Dean of the NUS Faculty of Engineering, received both the ASEAN Outstanding Engineering Achievement Award and the IES (The Institution of Engineers, Singapore) Prestigious Engineering Achievement Award 2006.

The ASEAN Outstanding Engineering Achievement Award recognises outstanding engineering achievements in ASEAN countries, while the IES Prestigious Engineering Achievement Award acknowledges great engineering accomplishments in Singapore. Both awards recognise achievements which demonstrate outstanding engineering skills that have made a significant contribution to engineering progress and the quality of life in ASEAN and in Singapore. They specially consider the contribution to the well-being of people and communities; resourcefulness in planning and in the solution of design problems, pioneering in the use of materials and methods, innovations in planning, design and construction, and unusual aspects and aesthetic values.
Excellence is our mantra at the NUS Faculty of Engineering. Our faculty members and students are given opportunities to break new ground and reach new heights in engineering education and research. We celebrate some of our significant achievements in the past year.

Opportunities to Excel

Dr Ng How Yong from the Division of Environmental Science & Engineering has won the prestigious International Water Association (IWA) Young Professionals Award. He was selected from a large pool of candidates from around the world. The award recognises individuals who make outstanding achievements in water science and technology and who will play influential roles in the future.

Dr Ng's research involves membrane processes for water and wastewater treatment. His work has resulted in the publication of more than 10 papers in international top-tiered journals and over 30 peer-reviewed international conference presentations. He also works closely with the Public Utilities Board on treatment processes improvement programmes and industry partners on water and wastewater treatment.

Internationally, Dr Ng contributes to the scientific community as an Associate Editor of the American Society of Civil Engineers’ Practice Periodical of Hazardous, Toxic, and Radioactive Waste Management, and the Secretary of the management committee of the IWA Specialist Group on Membrane Technology.

Prof Miranda Yap Gek Sim of the Department of Chemical & Biomolecular Engineering and Executive Director of A*STAR Bioprocessing Technology Institute was elected to the US National Academy of Engineering as a Foreign Associate. The election to the National Academy of Engineering is one of the highest professional distinctions accorded to an engineer. Prof Yap was recognised for “her outstanding achievements in education, research and management in the field of mammalian cell culture”. Her election as a Foreign Associate is the highest honour accorded by the Academy for distinguished contributions to engineering research, education and management by a non-US citizen.
Mr Luo Tao, a PhD student from the Department of Electrical & Computer Engineering, won the “Best Paper in Failure Analysis” at the International Symposium on the Physical and Failure Analysis of Integrated Circuits 2005, held in July 2006. His paper entitled Transmission EELS (Electron Energy Loss Spectroscopy) Attachment for SEM (Scanning Electron Microscope) was co-authored with Assoc Prof Anjam Khursheed. The paper presented a new method of aberration correction for miniaturised spectrometres.

Mr Qiu Chengwei, from the Department of Electrical & Computer Engineering, who is also on the NUS Faculty of Engineering Joint PhD Programme with Supélec, was awarded the “2006 IEEE Antennas and Propagation Society Graduate Fellowship” (US$2,500). This is the second award he received after he was given the “SUMMA Graduate Fellowship Award in Advanced Electromagnetics” for 2005. The SUMMA Graduate Fellowship is an annual monetary award given to only one graduate student from a worldwide selection. It is sponsored by SUMMA Foundation via IEEE Antennas and Propagation Society and recognises the recipient’s exceptional creativity and excellence in the research of Electromagnetic (EM) theory and its applications. Mr Qiu beat many other submissions from all over the world and was selected as the winner in 2005. His research interests include EM theory, advanced EM materials, and wave scattering in complex media.

Electrical Engineering graduate Mr Tan Ting Feng (left) and Computer Engineering graduate Mr Seah Yew Keng won the first prize of S$10,000 in the Philips Young Innovators Challenge 2005/2006. Using “Near Field Communication” (NFC) technology developed by Philips, they created an intelligent system which allows diabetic patients to effortlessly check their own blood sugar level and keep track of their medication and food intake to manage the illness themselves. With this system, the patient, after measuring his glucose level, can place the glucose meter close to his handheld computer to transfer information into it. The Philips Young Innovators Challenge is sponsored by Philips Electronics Singapore as part of its effort to encourage collaboration between students and private companies to further develop NFC technology.
FELLOWSHIP

Prof Chou Siaw Kiang, Vice-Dean for External & Industry Relations at the NUS Faculty of Engineering, was elevated to the grade of Fellow at the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) 2006 Winter Meeting. This honour is given to less than 1% of the 55,000 membership of ASHRAE worldwide.

The citation on the plaque reads, “Dr S K Chou has attained the unusual distinction in the arts and sciences of heating, refrigerating, air-conditioning or ventilation, and has made substantial contributions to these arts and sciences.”

Dr Yeo Yee Chia (third from left) of the Department of Electrical & Computer Engineering was conferred the 2006 Singapore Youth Award in the category of Science and Technology for his scientific excellence and dedication to inspire and empower youths. The Singapore Youth Award is the highest accolade given to people under 35 in Singapore. Dr Yeo has made significant contributions in the field of nanoelectronics, with more than 80 inventions, over 120 publications, and has given many invited talks in international conferences.

Prof Chou Siaw Kiang, Vice-Dean for External & Industry Relations at the NUS Faculty of Engineering, was elevated to the grade of Fellow at the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) 2006 Winter Meeting. This honour is given to less than 1% of the 55,000 membership of ASHRAE worldwide.

The citation on the plaque reads, “Dr S K Chou has attained the unusual distinction in the arts and sciences of heating, refrigerating, air-conditioning or ventilation, and has made substantial contributions to these arts and sciences.”

Prof Colm Sheppard, Head of the Division of Bioengineering, was awarded the Optics and Photonics Division Prize of the UK Institute of Physics (IoP) for 2006. This biennial prize is in recognition of exceptional contributions to the field of optics and/or photonics. The Optics and Photonics Division comprises the Optical Group (the largest group in IoP with 900 members); the Quantum Electronics and Photonics Group; the Quantum Information, Quantum Optics and Quantum Control Group; and the Computational Physics Group.

The prize, consisting of a glass trophy, a certificate and a cheque for £500, was awarded at Photon06, the biennial conference of the Optics and Photonics Division, at which Prof Sheppard also gave a plenary presentation, entitled The Optics of Microscopy. The Photon series of conferences has established itself as the leading conference in optics held in the UK and has a wide and increasing international attendance.

Prof Sheppard has received over 2,500 citations for his publications and is ranked 11th out of 75,000 authors for the number of papers published during the 1990s in the field of Optics and Photonics. He has also made very important contributions to enabling the more widespread use of microscopy through his leading role in developing the first commercial confocal microscope - a device later marketed by Biorad. Total sales of confocal microscopes have subsequently exceeded US$1 billion.
Assoc Prof Ong Soh Khim from the Department of Mechanical Engineering was awarded the honoree award for the Outstanding Young Persons of Singapore Award for her achievements in Scientific and/or Technological Development. As an honoree, Prof Ong stood a chance to be nominated for the Outstanding Young Persons of the World Awards, held in Seoul, South Korea, in November 2006. The Outstanding Young Persons (TOYP) of Singapore award is organised by the Orchid Jayceettes of Singapore, a lady-member organisation affiliated with the Junior Chamber International Singapore. The TOYP award is given to “an outstanding young person who not only possesses enthusiasm, positive thinking and physical fitness, but also the virtue of national consciousness and achievements that have contributed significantly to the development of the community”.

Assoc Prof Ashraf Kassim of the Department of Electrical & Computer Engineering, and his PhD student, Mr Yan Pingkun, developed novel methods based on modelling fluid flow via capillary action to accurately segment vasculature from three-dimensional magnetic resonance angiography images of the human brain. This work received an award when it was presented at the 8th International Conference on Medical Image Computing & Computer Assisted Intervention from 26-29 October 2005 in Palm Springs, California, USA.

Dr Ashwin M Khambadkone (right), of the Department of Electrical & Computer Engineering, and his student, Mr Amit K Gupta, won the second IPCC (Industrial Power Converters Committee) prize for the year 2005. The paper is titled “A Simple Space Vector PWM Scheme to Operate a Three-level NPC Inverter at High Modulation Index Including Over-modulation Region with Neutral Point Balancing.” The award was given at the IEEE Industry Application annual meeting in October 2006.
Ms Maureen Kwee, Senior Manager, Dean’s Office, was awarded the Pingat Kepujian (The Commendation Medal) by the President of the Republic of Singapore as part of the National Day Honours 2006. The Commendation Medal is given to individuals who have “distinguished themselves through commendable performance and conduct, or significant efficiency, competence and devotion to duty”.

The Centre for Protective Technology (CPT) won a Defence Technology Team Prize in the R&D category as a partner in the Defence Science & Technology Agency’s protective technology team. The Defence Technology Prize is awarded by the Ministry of Defence for excellence in technological contribution to national security and defence. CPT was given the prize primarily for its sustained contribution to the development and characterisation of protective materials and systems.

Over the years, CPT has generated a substantial body of work on steel-concrete composites, as well as fibre-reinforced polymers enhancement of masonry and brick structures. The work has resulted in highly ductile engineered cementitious composites, fragmentation and penetration-resistant concrete and light-weight infused ceramic armour.

The Ludwig Mond Prize 2005 was awarded to Prof Ng Kim Choon and Postdoctoral Fellow Dr Wang Xiaolin from the Department of Mechanical Engineering, for their paper entitled Thermodynamic Methods for Performance Analysis of Chillers. The award, given by the Process Industries Division of the Institution of Mechanical Engineers (UK), was announced on 17 July 2006.
Mr Zhang Zhishou, a part-time PhD student under the supervision of Prof Lawrence Wong Wai Choong from the Department of Electrical & Computer Engineering, clinched the “Best Paper Award” at the IEEE International Conference on Multimedia & Expo, held in July 2006 in Toronto, Canada. His paper titled A Content-Aware Stream Authentication Scheme Optimised for Distortion and Overhead was selected from a pool of over 500 papers. The other authors include Dr Qibin Sun (I2R), Prof Lawrence Wong Wai Choong (ECE), Dr John Apostolopoulos (HP Labs, USA) and Dr Susie Wee (HP Labs, USA).

Prof Liew Ah Choy (left) from the Department of Electrical & Computer Engineering received the Distinguished Award and Assoc Prof Reginald Tan Beng Hee from the Department of Chemical & Biomolecular Engineering received the Merit Award at the World Standards Day Awards Presentation 2005 organised by SPRING Singapore (Standards, Productivity and Innovation Board). These awards recognise individuals who have made significant contributions to the national standardisation programme managed by SPRING Singapore. They have invested time and services for the development and promotion of Singapore Standards to help local companies and industries become more competitive.

Prof Arun Sadashiv Mujumdar of the Engineering Science Programme was honoured with a Special Merit Award at the 15th International Drying Symposium (IDS2006), held in Budapest in August 2006. He received the award in recognition of his “distinguished contributions to basic and applied research in thermal drying processes and his exceptional dedicated service to the worldwide community of researchers in both academia and industry”. The IDS series of conferences attracts over 300 participants biennially from over 50 countries. Prof Mujumdar is credited with the establishment of thermal drying of solids as a multi-disciplinary area of research over the past three decades.

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Welcome Aboard

Karl Erik BIRGERSSON
PhD (Royal Institute of Technology, Sweden)
Assistant Professor, Engineering Science Programme/Department of Chemical & Biomolecular Engineering
Research areas: Fuel cells, smart materials, drying

Adrian David CHEOK
PhD (University of Adelaide, Australia)
Assistant Professor, Department of Electrical & Computer Engineering
Research areas: Interactive media, entertainment computing, digital arts

CHENG Jingsheng
PhD (Lanzhou University, China)
Assistant Professor, Department of Materials Science & Engineering
Research areas: Nanostructured materials, magnetic recording media

Aaron DANNER
PhD (University of Illinois, Urbana-Champaign, USA)
Assistant Professor, Department of Electrical & Computer Engineering
Research areas: Optoelectronics, nanoscale photonic devices, photonic crystals

Rudiyanto GUNAWAN
PhD (University of Illinois, Urbana-Champaign, USA)
Assistant Professor, Department of Chemical & Biomolecular Engineering
Research areas: Systems biology, process control

HO Ghim Wei
PhD (University of Cambridge, UK)
Assistant Professor, Engineering Science Programme/Department of Electrical & Computer Engineering
Research areas: Nanoscience, nanotechnology

Saif A KHAN
PhD (Massachusetts Institute of Technology, USA)
Assistant Professor, Department of Chemical & Biomolecular Engineering
Research areas: Microfluidics, microreactors, photonic nanomaterials

LE Minh Thinh
PhD (University of Ottawa and Carleton University, Canada)
Assistant Professor, Department of Electrical & Computer Engineering
Research areas: Biomedical imaging, embedded/pervasive computing systems
YAO Libin
PhD (Katholieke Universiteit Leuven, Belgium)
Assistant Professor, Department of Electrical & Computer Engineering
Research areas: Analog integrated circuit design

LI Zhi
Associate Professor, Department of Chemical & Biomolecular Engineering
Research areas: Biocatalysis, biomaterials, green chemistry

LIANG Gongchuan
PhD (Purdue University, USA)
Assistant Professor, Department of Electrical & Computer Engineering
Research areas: Nanoelectronics, molecular electronics, nanophotonics, device physics of nanotransistors

LIN Hai
PhD (University of Notre Dame, USA)
Assistant Professor, Department of Electrical & Computer Engineering
Research areas: Hybrid embedded systems, systems biology

Alexander NAREYEK
PhD (Technical University of Berlin, Germany)
Assistant Professor, Department of Electrical & Computer Engineering
Research areas: Artificial intelligence, electronic gaming

Ouyang Jianyong
PhD (Institute of Molecular Science, the Graduate University for Advanced Studies, Japan)
Assistant Professor, Department of Materials Science & Engineering
Research areas: Flexible electronics (materials and devices)

PANG Sze Dai
PhD (Northwestern University, USA)
Assistant Professor, Engineering Science Programme/Department of Civil Engineering
Research areas: Size effect, fracture mechanics

(Head of Engineering Science Programme, NUS) J N REDDY
PhD (University of Alabama in Huntsville, USA)
Professor, Engineering Science Programme/Department of Mechanical Engineering
Research areas: Applied mechanics and computational engineering science

TAO Meixia
PhD (Hong Kong University of Science & Technology, Hong Kong SAR)
Assistant Professor, Department of Electrical & Computer Engineering
Research areas: Wireless communication systems

LIANG Gongchuan
PhD (Purdue University, USA)
Assistant Professor, Department of Electrical & Computer Engineering
Research areas: Nanoelectronics, molecular electronics, nanophotonics, device physics of nanotransistors

Ouyang Jianyong
PhD (Institute of Molecular Science, the Graduate University for Advanced Studies, Japan)
Assistant Professor, Department of Materials Science & Engineering
Research areas: Flexible electronics (materials and devices)
**World’s Top 25 in Technology**

<table>
<thead>
<tr>
<th>Rank</th>
<th>Institution</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Massachusetts Institute of Technology</td>
<td>USA</td>
</tr>
<tr>
<td>2</td>
<td>University of California, Berkeley</td>
<td>USA</td>
</tr>
<tr>
<td>3</td>
<td>Indian Institute of Technology</td>
<td>India</td>
</tr>
<tr>
<td>4</td>
<td>Imperial College London</td>
<td>UK</td>
</tr>
<tr>
<td>5</td>
<td>Stanford University</td>
<td>USA</td>
</tr>
<tr>
<td>6</td>
<td>Cambridge University</td>
<td>UK</td>
</tr>
<tr>
<td>7</td>
<td>Tokyo University</td>
<td>Japan</td>
</tr>
<tr>
<td>8 <strong>(9)</strong></td>
<td>National University of Singapore</td>
<td>Singapore</td>
</tr>
<tr>
<td>9</td>
<td>California Institute of Technology</td>
<td>USA</td>
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<tr>
<td>10</td>
<td>Carnegie Mellon University</td>
<td>USA</td>
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<tr>
<td>11</td>
<td>Oxford University</td>
<td>UK</td>
</tr>
<tr>
<td>12</td>
<td>ETH Zurich</td>
<td>Switzerland</td>
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<tr>
<td>13</td>
<td>Delft University of Technology</td>
<td>Netherlands</td>
</tr>
<tr>
<td>14</td>
<td>Tsing Hua University</td>
<td>China</td>
</tr>
<tr>
<td>15</td>
<td>Nanyang Technological University</td>
<td>Singapore</td>
</tr>
<tr>
<td>16</td>
<td>Melbourne University</td>
<td>Australia</td>
</tr>
<tr>
<td>17</td>
<td>Hong Kong University of Science &amp; Technology</td>
<td>Hong Kong</td>
</tr>
<tr>
<td>18</td>
<td>Tokyo University of Technology</td>
<td>Japan</td>
</tr>
<tr>
<td>19</td>
<td>New South Wales University</td>
<td>Australia</td>
</tr>
<tr>
<td>20</td>
<td>Beijing University</td>
<td>China</td>
</tr>
<tr>
<td>21</td>
<td>Kyoto University</td>
<td>Japan</td>
</tr>
<tr>
<td>22</td>
<td>Georgia Institute of Technology</td>
<td>USA</td>
</tr>
<tr>
<td>23</td>
<td>Harvard University</td>
<td>USA</td>
</tr>
<tr>
<td>24</td>
<td>Australian National University</td>
<td>Australia</td>
</tr>
<tr>
<td>25</td>
<td>Sydney University</td>
<td>Australia</td>
</tr>
</tbody>
</table>

*Ranking based on last year’s results

**STAFF PROFILE**

(as at 30 November 2006)

<table>
<thead>
<tr>
<th>Full-Time faculty members</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professors</td>
</tr>
<tr>
<td>Associate Professors</td>
</tr>
<tr>
<td>Assistant Professors</td>
</tr>
<tr>
<td>Senior Lecturers</td>
</tr>
<tr>
<td>TOTAL</td>
</tr>
</tbody>
</table>

| Non-academic staff, 330 |
| Other teaching staff, 52 |
| Administrative staff, 57 |
| Full-time faculty members, 288 |
| Research staff, 280 |
| Adjunct staff, 79 |

*All full-time faculty members are PhD degree holders

**Space**

<table>
<thead>
<tr>
<th>Net Floor Area (NFA)</th>
<th>79,736 sq m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neutral Area</td>
<td>42,316</td>
</tr>
<tr>
<td>Gross Floor Area (GFA)</td>
<td>122,052</td>
</tr>
</tbody>
</table>

**OPERATING BUDGET - FY2006**

- Teaching-related Operating Budget
  - Expenditure on Manpower & Other Operating Budget - S$84.0 million
  - Renovation Budget - S$0.25 million
  - Furniture and Equipment Budget - S$4.5 million
  - Total: S$88.75 million (61.7%)
  
* Period reported: 1 April to 30 November 2006

Tuition and fees payable by students account for a projected S$41 million of funds received from the Ministry of Education for 2006

**MILESTONES**

- 1956: Postgraduate School of Engineering
- 1957: Department of Chemical Engineering (Che) transferred from the Faculty of Science
- 1965: Department of Chemical Engineering
- 1969: National University of Singapore
- 1969: Bachelor of Technology Programme (B Tech)
- 1972: Faculty of Engineering was constituted under the University of Singapore with three departments - Civil, Electrical and Mechanical
- 1979: First batch of Singapore Polytechnic graduates received the BEng degree from the University of Singapore
- 1980: Professional engineering education commenced at University of Malaya (UM) at Bukit Timah Campus
- 1980: EE renamed Department of Electrical & Computer Engineering (ECE), MPE renamed Department of Mechanical Engineering (ME)
- 2000: EE renamed Department of Chemical & Biomolecular Engineering (ChBE)
- 2000: Centre for Management of Science & Technology (CMOST)
- 2000: Department of Materials Science & Engineering (MSE)
- 2004: Engineering Science Programme (ESP)
- 2005: Engineering Systems Initiative (ESI)
- 2005: Division of Electrical & Computer Engineering (ECE), MPE renamed Department of Mechanical Engineering (ME)
- 2005: Division of Environmental Science & Engineering (ESE)
Undergraduate Education

Class of 2006

Undergraduate Student Population (as at 30 August 2006)

Graduate Diploma, 27
Graduate students (Coursework), 1,063
Graduate students (Research), 1,457
Undergraduates (Part-time BTech), 879
Undergraduates (Full-time), 5,624

Total Student Population 9,250
- Undergraduate students (including Part-time BTech) 6,703
- Graduate students 2,547

Undergraduate Education

All undergraduate programmes, other than new programmes such as Biomedical Engineering, Engineering Science and Materials Science & Engineering Programmes, are accredited by relevant UK professional accreditation bodies at the UK Master of Engineering level under SARTOR (Standards & Routes to Registration) and recognised internationally.

Graduate Education

Selectivity ratio* for:

- Undergraduate programmes 34%
- Postgraduate programmes 33%

* Selectivity ratio = number of offers / number of applicants

Graduate Student Population by Coursework (as at 30 August 2006)

Programmes Male Female Total
Grad.Dipl. Aviation Mgt. 13 5 18
Grad.Dipl. Maritime & Port Mgt. 8 1 9
Subtotal (Grad.Dipl.) 21 6 27
MSc (Chem.Eng.) 21 23 44
MSc (Civil Eng.) 66 33 99
MSc (Elect.Eng.) 148 64 212
MSc (Env.Eng.) 29 16 45
MSc (Geotech) 5 2 7
MSc (Ind. & Sys. Eng.) 150 59 209
MSc (IP Mgt) 12 5 17
MSc (Matl Sc. & Eng.) 40 20 60
MSc (Mech.Eng.) 78 10 88
MSc (Mechatronics) 42 14 56
MSc (MOT) 72 19 91
MSc (SDM) 10 1 11
MSc (SHE) 38 21 59
MSc (Transp.Sys.& Mgt.) 13 7 20
MTD (Embedded Systems) 18 4 22
MTD (Mechatronics) 9 1 10
MTD (Rapid Product Development) 7 3 10
NUS-UIUC MSc (Chem.Eng.) 1 2 3
Subtotal (MSc) 759 304 1,063
Total 780 310 1,090

Graduate Student Population by Research (as at 30 August 2006)

Programmes Male Female Total
MEng 252 79 331
NUS-Supélec Joint PhD 3 0 3
NUS-TU/e Joint PhD 15 5 20
NUS-UIUC Joint PhD 5 3 8
PhD 801 294 1,095
Total 1,076 381 1,457

Graduate Population (as at 30 August 2006)

Programmes (all) Male Female Total
By Coursework 780 310 1,090
By Research 1,076 381 1,457
Total 1,856 691 2,547

PhD students/total research student ratio - 0.7:1

17% of our engineering undergraduate students go into our doctoral programme.
RESEARCH

World's Top 25 Institutions in Engineering by Citations

<table>
<thead>
<tr>
<th>Institution</th>
<th>Total Citations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Univ Calif Berkeley</td>
<td>33,853</td>
</tr>
<tr>
<td>2 MIT</td>
<td>33,289</td>
</tr>
<tr>
<td>3 Univ Illinois</td>
<td>32,008</td>
</tr>
<tr>
<td>4 Stanford Univ</td>
<td>27,529</td>
</tr>
<tr>
<td>5 Univ Michigan</td>
<td>23,317</td>
</tr>
<tr>
<td>6 Univ Texas</td>
<td>21,867</td>
</tr>
<tr>
<td>7 NASA</td>
<td>21,501</td>
</tr>
<tr>
<td>8 Georgia Inst Technol</td>
<td>19,009</td>
</tr>
<tr>
<td>9 Univ Calif Los Angeles</td>
<td>18,106</td>
</tr>
<tr>
<td>10 CALTECH</td>
<td>18,006</td>
</tr>
<tr>
<td>11 Purdue Univ</td>
<td>17,151</td>
</tr>
<tr>
<td>12 Univ Tokyo</td>
<td>16,947</td>
</tr>
<tr>
<td>13 Univ London Imperial Coll Sci Technol &amp; Med</td>
<td>16,367</td>
</tr>
<tr>
<td>14 Russian Acad Sci</td>
<td>16,340</td>
</tr>
<tr>
<td>15 IBM Corp</td>
<td>15,705</td>
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<tr>
<td>16 Penn State Univ</td>
<td>15,179</td>
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<tr>
<td>17 Univ Wisconsin</td>
<td>14,950</td>
</tr>
<tr>
<td>18 ETH Zurich</td>
<td>14,896</td>
</tr>
<tr>
<td>19 Max Planck Society</td>
<td>14,885</td>
</tr>
<tr>
<td>20 Nati Univ Singapore</td>
<td>14,596</td>
</tr>
<tr>
<td>21 Texas A&amp;M Univ</td>
<td>14,642</td>
</tr>
<tr>
<td>22 Univ Cambridge</td>
<td>14,556</td>
</tr>
<tr>
<td>23 Cornell Univ</td>
<td>14,430</td>
</tr>
<tr>
<td>24 CNRS</td>
<td>14,376</td>
</tr>
<tr>
<td>25 Univ Calif San Diego</td>
<td>14,266</td>
</tr>
</tbody>
</table>

Extracted from the Essential Science Indicators on 1 January 2007, covering 1 January 1996 to 31 October 2006

Number of Citations (in 5-year intervals)

Entrepreneurial Activities at NUS Faculty of Engineering (as at 30 November 2006)

Total Research Grants Awarded in FY2006-2007

- External Grants: S$15,233,683.94 (37%)
- Research Funding Per Faculty Member: S$67,748.90 (37%)

Major Research Funding Received from External Sources

- Industry: S$1,290,114.22 (15%)
- Other Statutory Bodies: S$1,418,594.22 (7%)

Period reported for pie charts: 1 April to 30 November 2006
Provider of Choice. Partner in Solutions.

SERVICE
Superior products and services on time, on budget

SOLUTIONS
Innovative design and customisation to your specific needs

Technology is Key to Keppel FELS’ success.

Keppel FELS is the world leader in the design and construction of mobile offshore drilling units, having delivered the most number of newbuild units in the last decade.

Its R&D initiatives are spearheaded by two sister companies - The Offshore Technology Development & The Deepwater Technology Group.

These R&D units leverage strategic partnerships with trend-setting customers, designers and vendors to develop optimal solutions for the challenging demands of offshore oil and gas drilling and production in deeper waters under varying operational conditions.

They also co-operate with and support local and overseas academic as well as research institutions in furthering the cause of the offshore oil and gas industry.

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