NANYANG TECHNOLOGICAL UNIVERSITY

School of Electrical & Electronic Engineering

Bachelor of Engineering

(Electrical & Electronic Engineering)

A School of the College of Engineering


www

CONTENTS

ONE DEGREE, MANY OPPORTUNITIES

NTU's School of Electrical and Electronic Engineering (EEE) aims to bring out the best in its students by immersing them in a multifaceted curriculum combining engineering with cross-disciplinary courses in arts, business and humanities. This moulds our students into dynamic engineers and drives NTU to continue to produce the most sought-after graduates worldwide.

Whether one aspires to be at the forefront of technology, forging new grounds as a technopreneur or even inventor, the holistic education that students receive at EEE will equip them with the skills needed for an exciting and rewarding future ahead.

TRADITION OF EXCELLENCE

The School of EEE is recognised for its history of excellence. Besides winning a record number of awards and accolades, it is also known for its extensive depth in research, and for producing a good number of outstanding alumni. The current undergraduate enrolment at 3,000 makes the School one of the most prominent EEE schools worldwide.

WORLD-CLASS FACULTY

Coming from different countries with diverse backgrounds, our faculty members bring with them a vast repertoire of skills and knowledge. Besides nurturing and equipping students with a wide range of skill set (from technological concepts to mathematical science and technical skills), they also aim to fuel your passion for the world of modern science and engineering.

STATE-OF-THE-ART FACILITIES

Our campus is equipped with state-of-the-art technology, research laboratories, and the most comprehensive teaching facilities to provide a great learning environment for students. It encourages them to interact, learn and become well rounded individuals capable of taking on global challenges.

WELL-ROUNDED EDUCATION

The School of EEE offers two 4-year Direct Honours degree programmes – (i) Bachelor of Engineering in Electrical & Electronic Engineering and (ii) Bachelor of Engineering in Information Engineering and Media. Your first year will encompass the fundamental aspects of your education: Mathematics, Physics, Materials for Electronics and Computing. This is followed by the introduction of electrical and electronic concepts and principles in your second year. In your third and final year, you will take up more advanced modules and a mandatory Final Year Project. Through immersion in intensive group projects and coursework, as well as the option to participate in local or international competitions, you will have the opportunity to develop to your full potential.

ACCREDITATION

Our Bachelor of Engineering in Electrical & Electronic Engineering degree is recognised worldwide. It is also accredited by The Engineering Accreditation Board (EAB) of the Institution of Engineers Singapore (IES) – an eminent member of the reputable Washington Accord (WA). This means that the degree from the School of EEE is recognised by all the signatory countries of the WA.

THE B. ENG (EEE) CURRICULUM

KEY HIGHLIGHTS

- 4 year Direct Honours (or 3.5 year Accelerated) Bachelor's Degree
- Flexible curriculum for broad-based EEE education or enhanced EEE specialisations
- Major in EEE with a minor from one of the more than 20 disciplines available, such as Public Administration, Business and Entrepreneurship. Further information on minor programmes is available at *http://www.ntu.edu.sg/collegesandprogrammes/Pages/MinorProgramme.aspx*

FIRST YEAR

- Mathematics I
- Mathematics II
- Physics
- Physics Foundation for Electrical & Electronic Engineering
- Computing
- Introduction to Materials for Electronics
- Introduction to Engineering & Practices
- Effective Communication
- English Proficiency*

** Students who have at least C6 in GCE A Level General Paper and those who pass the Qualifying English Test are exempted.*

SECOND YEAR

- Circuit Analysis
- Analog Electronics
- Digital Electronics
- Semiconductor Fundamentals
- Engineering Mathematics I
- Engineering Mathematics II
- Signals and Systems
- Data Structures & Algorithms
- Introduction to EEE Design & Project
- Laboratory 2A & 2B
- Technical Communication

Polytechnic Diploma holders who are directly admitted to the second year of the programme can take up two modules - Mathematics A and Physics A - to strengthen their foundation for a smooth integration into the degree programme.

THIRD YEAR

- Engineering Electromagnetics
- Microprocessors
- Design & Innovation Project
- IO/IA/EIA/IRA*

** Students may opt for 10-week Industrial Orientation (IO), 20-week Industrial Attachment (IA), 30-week Enhanced IA (EIA) or 30-week Industrial Research Attachment (IRA). Placements will be sourced by students or the Career & Attachment Office. Further information is available at http://www.ntu.edu.sg/cao.*

Depending on the specialisation, students may choose two courses from the following list:

- Electrical Devices & Machines
- Modelling & Control
- Power Systems & Conversion
- Integrated Electronics
- Introduction to Photonics
- Semiconductor Devices & Processing
- Communication Principles
- Computer Communications
- Digital Signal Processing

FINAL YEAR

- Engineers & Society
- Professional Communication
- Final Year Project (carried out over two semesters)
- Design Elective 1
- Design Elective 2
- Technical Elective 1
- Technical Elective 2
- Technical Elective 3

Students must opt for elective courses in one of the following option groups:

- Electrical Engineering
- Electronic Engineering
- Infocommunication Engineering

Alternatively, students can also choose to specialise in one of following areas:

- Biomedical Electronics
- Communication Engineering
- Computer Engineering
- Digital Media Processing
- Integrated Circuit Design
- Intelligent Systems & Control Engineering
- Microelectronics
- Photonics
- Power & Clean Energy

Besides offering core foundation and specialised education for undergraduates, the School of EEE also offers two research programmes, namely the Undergraduate Research Experience on Campus (URECA) and Undergraduate Research Opportunities Programme (UROP). These programmes allow students to pursue an independent research project under the supervision of a professor, giving them an opportunity for a first-hand research experience. Students will also have the opportunity to undertake a research project on attachment, under the International Research Attachment (IRA) scheme with a renowned overseas research institute.

(Note: Curriculum is subject to change)

For more information on the curriculum, please visit
http://www.eee.ntu.edu.sg/BEngFTCurriculum

GLOBAL PROGRAMMES

For a unique overseas exchange experience, apply for the:

- GEM Discoverer
- GEM Explorer
- Overseas Attachment Programme

Further information can be found at *http://global.ntu.edu.sg/global/*

COURSE EXEMPTIONS

"A" LEVEL STUDENTS

A-level students with academic records of high merit may be exempted from a maximum of three courses, which may include Mathematics and Physics. Exemption will be granted on a case-by-case basis.

POLYTECHNIC STUDENTS

Direct entry polytechnic students with academic records of high merit may be exempted from a maximum of three courses, which include Circuit Analysis, Mathematics A, Digital Electronics, or Analog Electronics.

For more information, please visit *http://www.eee.ntu.edu.sg/BEngFTCourseExemption*

PART-TIME PROGRAMME
IN BACHELOR OF ENGINEERING (EEE)

This programme caters specially to those who have diplomas from polytechnics or equivalent qualifications. Key highlights of the programme are as follows:

- Similar to the full-time programme except that it ranges over a period of 4 - 8 years
- Classes are conducted in the evenings
- Possibility of conversion to the full-time programme

Application for part-time programme opens from December to January. For details, please visit *http://admissions.ntu.edu.sg/UndergraduateAdmissions/Pages/PTimeEng.aspx.*

DOUBLE-DEGREE PROGRAMME
IN BACHELOR OF ENGINEERING (EEE) AND BACHELOR OF ARTS (HONOURS) IN ECONOMICS

This double-degree programme in Engineering and Economics aims to equip students with the in-depth knowledge and expertise needed to succeed in the modern digital economy. The multi disciplinary approach will train students to be strategic thinkers and build upon relevant soft skills to prepare them for a dynamic and ever-changing technological environment. Jointly offered by the School of EEE and the School of Humanities and Social Sciences, this programme gives students a strong foundation in Engineering principles and knowledge of Economics, professional development and rigorous training in analytical, verbal and written communication skills. Students enrolled in this programme can earn two degrees in 5 to 5½ years.

NTU-GEORGIA TECH INTEGRATED PROGRAMME

The School of EEE in collaboration with Georgia Institute of Technology, a top US University, offers an integrated *Bachelor of Engineering (EEE)* and *Master of Science (Electrical and Computer Engineering)* programme. This programme is tailor-made for students who wish to pursue careers in the infocommunications industry, or in the fields of telecommunications and computer engineering. Students enrolled in this programme can earn two degrees within just 4 years instead of the usual 5 to 5½ years.

Students will spend three years in NTU majoring in Information and Communications, and the next one to one-and-a-half years in Georgia Tech specialising in Computer Engineering and Telecommunications. Those admitted into this programme are eligible to apply for *Infocomm Development Authority of Singapore (IDA)*'s National Infocomm Scholarship. For details, please visit *http://www.eee.ntu.edu.sg/ProspectiveStudents/NTU-GT/Pages/Home.aspx*

SCHOLARSHIPS

NTU offers a number of scholarships to new and existing students pursuing full-time undergraduate studies. Scholarships are awarded based on academic merit and outstanding co-curricular records. The list of scholarships for new undergraduates is available at *http://admissions.ntu.edu.sg/UndergraduateAdmissions/Pages/Scholarships.aspx*

NATIONAL INFOCOMM SCHOLARSHIP (NIS)

The National Infocomm Scholarship (NIS) offered by the IDA aims to enhance the talent pool of infocomm professionals, and prepare them for leadership positions in this industry. NIS provides one with both the prestige of a government scholarship and valuable work exposure through partnerships with top names in the industry. Students with outstanding academic results and leadership qualities are strongly encouraged to apply at *http://www.infocommtalent.sg/nis.aspx*

SPECIALIST MANPOWER PROGRAMME (SMP) SCHOLARSHIPS

Co-funded by the EDB and the industry, the SMP Scholarships are meant for undergraduates who specialise in Integrated Circuit (IC) Design or Microelectronics. Successful recipients of the scholarship will be offered an industrial attachment with a sponsoring company, hence giving them the essential work experience needed for a good head start in the industry. The scholarships are offered to third or final year students of the School.

Interested candidates can email:

- Dr Vincent Ong at vo@pmail.ntu.edu.sg (IC Design SMP)
- A/Prof DS Ang at edsang@ntu.edu.sg (Wafer Fabrication SMP)

CAREER PROSPECTS

From aviation electronics to industrial robot control systems and infocommunication, there is a wide scope of career options for graduates of the School of EEE.

Some of the top organisations that you can explore career options with are Thomson Multimedia, Agilent Technologies, Lucent Technologies, Siemens, Hewlett-Packard, OKI, Sony, Matsushita, Philips and Panasonic Audio/Video Research Labs.

Take a look at the opportunities that await you:

BIOMEDICAL ELECTRONICS

You will have the opportunity to work for hospitals and medical equipment manufacturers as a biomedical electronic engineer or electronics and equipment engineer. Other job areas include research and development in academic institutions, policy making and administration in government agencies, and sales and marketing of medical instruments and products.

COMPUTER ENGINEERING

Employment opportunities await you as a computer engineer, computer scientist, operations research analyst, computer support specialist, system architect, system analyst, database administrator or computer programmer. You can also choose to take on the more ambitious route in digital technology by setting up your own company and establishing yourself as a technopreneur.

DIGITAL MEDIA PROCESSING

You can work in sectors such as service creation for mobile networks (CSIT, Nokia, Siemens), development of interactive digital media systems (Studio, Broadcasting, Media Creation, MDA), industrial electronics (Texas Instruments, Analog Devices, Xilinx), health and medical industries (hearing aids, ultrasound, NMRI), off-shore industries (Thales, BP, Shell) and R&D (universities and research institutions such as IHPC, I2R, DSO).

INTELLIGENT SYSTEMS & CONTROL ENGINEERING

In Singapore and elsewhere in the world, graduates in intelligent systems and control engineering are in great demand. You can expect employment opportunities in sectors such as aerospace, defence, industrial automation, control systems, software engineering, internet businesses, mobile communications, games development, robotic systems and satellite-tracking stations.

MICROELECTRONICS

Graduates can look forward to careers in device and process engineering, field applications, design automation, fabrication and signal processing. Some of the established organisations in the microelectronic sector include the Institute of Microelectronics, GLOBALFOUNDRIES and STMicroelectronics.

POWER AND CLEAN ENERGY

Alumni of the school have obtained employment in organisations such as Singapore Power, MINDEF, SMRT, PSA, JTC, CAAS, LTA, power equipment manufacturers and consulting firms. You can expect career opportunities as environmental or biological system engineers, green building architects, solar energy engineers, environmental and renewable energy consultants, etc.

COMMUNICATION ENGINEERING

Options are open for you in various sectors such as internet and computing technologies, networking and telecommunications, radio and government/ statutory boards/ research institutes (MRTC, PSA, HDB, Singapore Power, Spring, I2R, DSTA, IME, Ericsson Cyberlab, MINDEF, DSO National Laboratories and associated companies). Some of the careers available include positions such as IT consultants, IT project managers, actuaries, technical writers, network engineers, web developers and communications specialists.

INTEGRATED CIRCUIT (IC) DESIGN

The IC design industry is becoming a major employer in Singapore and this will likely continue in the next decade. As a graduate, you can look forward to exciting careers in multi-national corporations which have design centre operations in Singapore. Examples include Mediatek, Broadcom, Marvell, Xilinx, Altera, Microchip Technology, Renesas Technology, Philips, Silicon Labs, Infineon, STMicroelectronics, Linear Technology, O2Micro, Texas Instruments and Panasonic. Jobs such as IC design consultants, analog/mixed signal design engineers, layout designers and digital IC designers are available.

PHOTONICS

The world of photonics is rapidly expanding. As graduates in photonics from the School of EEE, you can look forward to careers in industries such as optical fiber communications, optoelectronics, optical instrumentation and systems and R&D in positions including optics/ laser manufacturing engineers, fiber optic packaging engineers, or those handling the design and running of laser light shows.

School of Electrical & Electronic Engineering
Nanyang Technological University
Block S1, 50 Nanyang Avenue
Singapore 639798
Tel : (65) 6790 6364/6014 Fax : (65) 6792 0415
http://www.eee.ntu.edu.sg

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