Exploring Possibilities, Reaching New Heights

Graduate Programmes

School of Electrical & Electronic Engineering

A School of the College of Engineering
Contents

About the School of Electrical and Electronic Engineering 01

Coursework Programme:
Ministry of Education (MOE) subsidised Master of Science Programmes

Joint NTU-TUM Master of Science (Self-Financed Programmes)

Green Electronics 06
Integrated Circuit Design 08
Programme Structure 09
Programme Overview 10
Application Details/Programme Fees 11

Scholarships 11

Research Programme

Degrees By Research - Doctor of Philosophy and Master of Engineering

Programme Overview 12
Programme Structure 13
Period of Candidature 14
Admission Requirements 14
Programme Fees 15
Scholarships 15

Testimonials 16
Young and research-intensive, Nanyang Technological University (NTU Singapore) is the fastest-rising university in the world’s Top 50 and ranked 39th globally. NTU is also placed 1st amongst the world’s best young universities. NTU’s School of Electrical and Electronic Engineering (EEE) has groomed the nation’s finest crop of engineers, equipping them with a well-rounded education and instilling in them sound research capabilities. The School counts amongst its ranks a top notch full-time faculty of 180 professors, who not only have a love for teaching but also an aptitude for research work. Our faculty members actively work in tandem with renowned overseas universities, research institutes and multinational companies to spearhead trailblazing R&D projects. Boasting state-of-the-art amenities, the School is well-positioned to offer a wide range of post-graduate programmes that cover a broad spectrum of Electrical and Electronic Engineering.

Our programmes, benchmarked against those offered by the world’s top universities, prepare graduate students for employment in the dynamic engineering industry. The programmes aim to develop technically competent graduates who are also well-equipped to assume leadership positions in the industry. For those who have excelled in their Master of Science/Master of Engineering studies, the School offers the opportunity for greater intellectual challenges via our Doctor of Philosophy (Ph.D.) programme.

We welcome you to be a part of our intellectually thriving community, here at the School of Electrical and Electronic Engineering.
Master of Science Programme
Communications Engineering

Website: http://www.ee.ntu.edu.sg/Programmes/ProspectiveStudents/Graduate/MOE_sub_MSc/MSc_CME/Pages/MScCME.aspx

The world runs on an intricate network of communication. As such, there is always a demand for Electrical and Electronic Engineers and Information Technologists who understand the principles of a solid communication infrastructure.

Programme Overview
An in-depth study into the broad area of communications engineering, this curriculum is a springboard for engineers to delve into the ever-evolving telecommunications and information industries. Buoyed also by the teaching staff’s valuable research experience, this programme will groom practising engineers into high calibre R&D and design engineers, arming them with an array of specialist skills.

Career Prospects
Adequately trained and well educated, a majority of our graduates are placed in local communication R&D industries. Opportunities are plentiful as they get to collaborate with local universities and undertake research projects as project officers/research associates. The Ph.D. programme also offers a robust framework for those keen on pursuing higher order research.

Master of Science Programme
Computer Control and Automation

Website: http://www.ee.ntu.edu.sg/Programmes/ProspectiveStudents/Graduate/MOE_sub_MSc/MSc_CCA/Pages/MSc_CCA.aspx

Anchoring Singapore’s economic competitiveness is the manufacturing industry, which accounts for about a quarter of Singapore Gross Domestic Product. The manufacturing industry is where the expertise of Computer Control and Automation (CCA) specialists is critical and most often needed.

Programme Overview
This comprehensive study will hone the skills of electrical engineers in the field of development, integration and operation of multi-disciplinary computer-based control and automation systems.

Career Prospects
Graduates can expect to land job offers in the broad manufacturing industries. Possessing distinguished academic qualifications, they enter the workforce as confident engineers and go on to become respected industry leaders.
Engaging with the Statina Touch project – a novel technology that will convert an ordinary flat surface into a touch screen interface

Master of Science Programme
Electronics

Website: http://www.eee.ntu.edu.sg/Programmes/ProspectiveStudents/Graduate/MOE_sub_MSc/MScEL/Pages/MScEL.aspx

Electronics is the backbone of innovation, enabling technology and furthering groundbreaking work. According to Factsheet 2012 published by the Economic Development Board, Singapore, the electronics industry accounted for Singapore's economy, contributing an output to the tune of S$78.1 billion. The 2012 investment projects are expected to contribute S$2 billion in VA per annum to Singapore's GDP.

Programme Overview

With a focus on the electronics and optoelectronics industry, this programme takes students into the exciting world of design, fabrication and manufacturing. It offers not only the core courses covering the entire scope from IC design, microelectronics to photonics, but also a wide choice of elective courses, catering to the global demands of qualified high level engineers, leaders and researchers.

Career Prospects

Already home to over 80,000 workers, the electronics industry will open its door and welcome over 2,600 engineers in the next few years. Our well-trained graduates will find their footing in this high-performing industry.
Working on the
blind wireless receiver,
a gadget capable of
automatically demodulating
different transmission
formats and determining
different unknown radio
parameters.

Blind wireless
receiver
Master of Science Programme
An Enriching Experience

Coursework Programme
Ministry of Education (MOE) subsidised
Master of Science Programmes

Each course consists of 39 hours of lectures and is assigned 3 Academic Units (AUs). Classes are held once a week for 3 hours and examinations are conducted during office hours at the end of each semester. Students can choose from 2 types of study options to complete their programmes:

<table>
<thead>
<tr>
<th>Programmes</th>
<th>Type of study option</th>
<th>No. of AUs to graduate</th>
<th>No. of Core Courses to complete</th>
<th>No. of Prescribed Elective Courses to complete</th>
<th>No. of General Elective Courses to complete</th>
<th>Dissertation</th>
<th>Minimum CGPA required to graduate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communications Engineering/Signal Processing</td>
<td>Coursework+Dissertation</td>
<td>30 AUs</td>
<td>6 courses (18 AUs)</td>
<td>1 (3 AUs)</td>
<td>1 (6 AUs)</td>
<td>≥ 2.5</td>
<td></td>
</tr>
<tr>
<td>Computer Control and Automation/Electronics/Power Engineering</td>
<td>Coursework+Dissertation</td>
<td>30 AUs</td>
<td>5 courses (≥15 AUs)</td>
<td>1 (≥3 AUs)</td>
<td>2 (≤6 AUs)</td>
<td>1 (6 AUs)</td>
<td>≥ 2.5</td>
</tr>
<tr>
<td></td>
<td>Coursework</td>
<td>30 AUs</td>
<td>6 courses (18 AUs)</td>
<td>2 (6 AUs)</td>
<td>2 (6 AUs)</td>
<td></td>
<td>≥ 2.5</td>
</tr>
</tbody>
</table>

Type of Coursework Programme

<table>
<thead>
<tr>
<th>Programme</th>
<th>Candidature</th>
<th>Semester Structure:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minimum</td>
<td>Maximum</td>
</tr>
<tr>
<td>Master of Science (Full-Time)</td>
<td>1 year</td>
<td>3 years</td>
</tr>
<tr>
<td>Master of Science (Part-Time)</td>
<td>2 years</td>
<td>4 years</td>
</tr>
</tbody>
</table>

Semester Structure:
- Semester 1 (Aug – Dec)
- Semester 2 (Jan – May)

Weeks 1 – 14*  | Weeks 15-17  | Others

Lectures  | Examinations  | Vacation

* Including 1 recess week

Admission Requirements

- A good relevant Bachelor's degree
- Relevant practical/working experience is an advantage
- TOEFL or equivalent is required for graduates from universities with non-English medium of instruction

Scholarship

ASEAN Graduate Scholarship

Website: http://admissions.ntu.edu.sg/graduate/scholarships/Pages/default.aspx

Programme Fees

Website: http://admissions.ntu.edu.sg/graduate/coursework/BeforeApplying/Pages/ChoosetheRightProgramme.aspx

Admission Details

(For full-time or part-time Master of Science Programmes)

Applications for admission are normally invited through the press and announced at the Student and Academic Services Department (SASD) – OAS (Graduate Education) website. Students must submit their applications electronically via the SASD-OAS(GE) website, followed by the hardcopy submission of supporting documents.

For administrative enquiry, please email: eee_msc@ntu.edu.sg or call (65) 6790 4322
Joint NTU-TUM Master of Science in Green Electronics

Website: http://www.eee.ntu.edu.sg/Programmes/ProspectiveStudents/Graduate/Joint-MScProgrammes/GreenElectronics/Pages/Home.aspx

The joint Master of Science degree programme in Green Electronics is a new highly specialized programme offered on a full-time basis for training semiconductor researchers and engineers to work in the areas of novel electronic/optoelectronic devices and systems, with particular focus on the energy, sensing/monitoring and semiconductor manufacturing fields. This joint Master of Science degree programme in Green Electronics is conducted by faculty from both EEE NTU and the Technical University of Munich.

Coursework Programme

Joint NTU-TUM Master of Science (Self-Financed Programmes)

Programme Overview

The duration of the joint Master of Science (Green Electronics) is 20 months. In the first 11 months, students will need to complete 8 core courses (24 AUs) and 4 elective courses (12 AUs). The core courses include: Microfabrication Technology, Materials for Electronic Devices, Bioelectronics, Nanotechnology for Energy Systems, Microstructured Devices and Systems for Green Electronics, Laboratory 1: Semiconductor Process and Device Simulation, Laboratory 2: Design and Modeling of Nanodevices. The elective courses include: Low Power Displays and Solid State Lighting, Nanophotovoltaics, Green Nanotechnology, Introduction to Power System, Polymer Electronics, Semiconductor Power Devices and Advanced MOSFET & Novel Devices. In addition, students are required to take a compulsory English module and 5 cross disciplinary modules to broaden their professional knowledge.
After completion of coursework, all students need to undertake 3 months of internship in industry and a further 6 months of independent research leading to a M.Sc. dissertation. The internship and dissertation research can be carried out in different organizations or the same organization in Singapore or in Europe. (Students are free to choose where to complete the internship and dissertation requirements.) For NTU, the minimum cumulative grade point average (CGPA) for graduation from the Master of Science (Green Electronics) is 2.5.

**Career Prospects**

The specialized but broad based curriculum of the Master of Science (Green Electronics) equips graduates with the technical and professional skills needed for successful careers in the semiconductor and information displays and photonics industry. In addition, graduates can seek employment in the clean energy technology fields such as photovoltaics (inorganic and organic), energy harvesting and power semiconductors. Opportunities also exist for graduates in bioelectronics and sensing. Finally, graduates can also pursue doctoral research in any of the above fields at NTU, TUM or other universities.

**Coursework Programme**

Joint NTU-TUM Master of Science (Self-Financed Programmes)
The breakthroughs in technology as witnessed in the last decade have brought about the invention of a gamut of portable computers, communications, audio and video products. Pivotal to these accelerated developments are engineers specialising in the field of Integrated Circuit Design. Widely touted as technology enablers, their skills and expertise are highly sought after in the industry.

Programme Overview

Offered in tandem with Technische Universität München (TUM), this joint programme aims to nurture competent engineers and leaders for the semiconductor industry. It addresses digital and analogue/mixed integrated circuit (IC) design over architectural concepts to design methodology/automation for IC. This course also touches on the fundamental concepts in signal processing as well as offers cross-discipline modules such as intellectual property law and business management.

Career Prospects

Graduates will kick-start their careers working as design engineers, before progressing to take on leadership positions such as technical experts and/or engineering managers. Backed by multifaceted education, graduates who possess business acumen will also branch out to marketing/sales and eventually into corporate management.

Examining the directional loudspeaker which is part of the next generation audio system for gamers

Immersive Soundscape
### Coursework Programme

**Joint NTU-TUM Master of Science**  
(Self-Financed Programmes)

### Joint NTU-TUM Programme Structure

**A Robust Framework**

<table>
<thead>
<tr>
<th>Type of Coursework Programme</th>
<th>Type of study option</th>
<th>No. of Core Courses to complete</th>
<th>No. of Elective Courses to complete</th>
<th>English Module (Compulsory)</th>
<th>Internship for 3 months</th>
<th>Dissertation for 6 months</th>
<th>Cross-Discipline Modules</th>
<th>Min. NTU CGPA required to graduate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green Electronics/Integrated Circuit Design</td>
<td>41</td>
<td>8 courses (24 AUs)</td>
<td>4 courses (12 AUs)</td>
<td>1 (5 AUs)</td>
<td>Compulsory</td>
<td>Compulsory</td>
<td>5 modules</td>
<td>≥ 2.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of Coursework Programme</th>
<th>Candidature</th>
<th>Programme runs over 18 months (3 semesters)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minimum</td>
<td>Maximum</td>
</tr>
<tr>
<td>Green Electronics/Integrated Circuit Design</td>
<td>1.5 years</td>
<td>3 years</td>
</tr>
</tbody>
</table>
Admission Requirements

MSc in Green Electronics
- Hold a minimum 3-year bachelor degree in Science, Electrical, Electronics Engineering, or equivalent degree in other relevant disciplines. A basic understanding of semiconductor physics, electromagnetics and organic chemistry (or electrochemistry) is strongly recommended.

- TOEFL*, IELTS** or equivalent is required for graduates from universities with non-English medium of instruction.
  *(TOEFL score should be minimum of 605 for paper-based test or 234 for the computer-based test or 88 for the internet-based test)
  **(Overall IELTS results of at least 6.5)

Akademische Prüfstelle (APS) certificate is required for applicants with education qualifications from China, Vietnam and Mongolia.

MSc in Integrated Circuit Design
- Hold a minimum 3-year bachelor degree in Electrical, Electronics Engineering, or equivalent degree in other relevant disciplines.

- TOEFL*, IELTS** or equivalent is required for graduates from universities with non-English medium of instruction.
  *(TOEFL score should be minimum of 605 for paper-based test or 234 for the computer-based test or 88 for the internet-based test)
  **(Overall IELTS results of at least 6.5)

Akademische Prüfstelle (APS) certificate is required for applicants with education qualifications from China, Vietnam and Mongolia.

Application Details

<table>
<thead>
<tr>
<th>Type of Coursework Programme</th>
<th>Application Period</th>
<th>Class Commencement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green Electronics/Integrated Circuit Design</td>
<td>Please check online via <a href="http://tum-asia.edu.sg">http://tum-asia.edu.sg</a></td>
<td>August</td>
</tr>
</tbody>
</table>

Please submit your application via the following link:
http://tum-asia.edu.sg/admissions/graduate/application-process/
Coursework Programme
Joint NTU-TUM Master of Science
(Self-Financed Programmes)

<table>
<thead>
<tr>
<th>Type of Coursework Program</th>
<th>Please visit the following links for information on the programme fees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green Electronics/Integrated Circuit Design</td>
<td><a href="http://tum-asia.edu.sg/admissions/graduate/tuition-fees">http://tum-asia.edu.sg/admissions/graduate/tuition-fees</a></td>
</tr>
</tbody>
</table>

Please submit your application via the following link:
http://tum-asia.edu.sg/admissions/graduate/application-process/

Scholarships

Three types of scholarship schemes are available for students with good academic results and moral character. They are:

1. Industrial scholarships from our renowned partners and organisations that cover full or partial tuition fees and offer stipend.
2. TUM Asia scholarships that offer reduction in tuition fees ranging from 20% to 50%.
3. DAAD scholarships which support students’ tuition fees and stipends (if applicable) for one semester.

Please refer to http://tum-asia.edu.sg/admissions/scholarships

For details and application matters, please contact:
German Institute of Science and Technology – TUM Asia Pte. Ltd.
SIT@SP Building
(Singapore Institute of Technology @ Singapore Polytechnic)
Candidates applying for graduate programmes by research may be admitted on a full-time or part-time basis. NTU awards research scholarships to candidates with outstanding academic records to enable them to pursue a Doctor of Philosophy (Ph.D.) programme on a full-time basis.

The research scholarship award will cover a monthly stipend and the annual research fee. Financial top-ups (for selected industrial projects only) are also available to outstanding candidates.

Students may pursue their research programme in one of the following areas:

- Clean and Renewable Energy Systems
- Efficient Energy Conversion and Utilisation
- Energy Storage Systems
- Intelligent Energy Distribution
- Power Systems and Power Electronics
- Autonomous Robots and Intelligent Systems
- Biomedical Imaging and Signal Processing
- Control Systems Technologies
- Machine Vision and Computational Intelligence
- Process Instrumentation
- 3D Packaging, System on Package and Printable Electronics
- Bio-inspired Integrated Circuits and Systems
- Energy Harvesting and Green Integrated Circuits and Systems
- High Speed Signal Integrity Electromagnetic Compatibility and Reliability
- Mm-wave and Terahertz CMOS IC
- Smart Sensors and Advanced Sensing
- Lightwave Communication and Photonics
- Microwave Circuits, Radar, Antennas and Propagation
- Modulation, Coding and Signal Processing
- Secure Communication and Networks
- Wireless Networks, Positioning and RFID
- Space Technology
- Advanced Sensing
- Digital Media Processing and Applications
- Intelligent Computing and Information Security
- Internet of Things
- Pervasive Media and Interface
- Signal Processing Theory and Systems
- Big Data and Video Analytic
- Biomedical Devices
- Biophotonics/Nanophotonics
- Compound Semiconductor
- Nanoelectronics and Nanotechnology
- Display & Solid State Lightings
- MEMS and Smart Materials
- Silicon/Carbon/Oxide Nanoelectronics
- Green Electronics and Photonics
- Specialty Optical Fibre

**Investigating the effects of subliminal priming on the consumer’s perception of commercial advertisements through event-related brain potentials and eye movements**

**Neurophysiological Study of Subliminal Priming**
All successful candidates are admitted as Research Students in the first instance with the students expected to be confirmed as Ph.D. candidates or Master candidates after a confirmation exercise. That is, a candidate admitted as a Research Student pursuing his Ph.D. is expected to be confirmed as a Ph.D. candidate. A candidate admitted as a Research Student pursuing his M.Eng. will be confirmed as a M.Eng. candidate. A candidate with a Bachelor’s degree can be admitted as a Research Student pursuing his Ph.D. in the first instance with the student expected to be confirmed as a Ph.D. candidate.

Under the M.Eng./Ph.D. programmes, candidates pursue an independent but supervised research in an approved field of advanced study based on which a thesis must be submitted. Candidates are also required to attend classes and pass the examinations to meet the coursework requirements (such as Academic Units [AU] requirement and CGPA requirement). Candidates are required to earn at least 9 AUs (e.g., three 3 AUs courses) and 18 AUs (e.g., six 3 AUS courses) in M.Eng. and Ph.D. study respectively. Full-time Ph.D. candidates are required to complete two additional courses, namely (1) Graduate English and (2) University Teaching For Teaching Assistants on top of the 18 AUs course requirements. All candidates are required to complete all courses and undergo a Qualifying Examination cum Confirmation Exercise (QE) within the period stipulated. Upon completion of the research, the candidate is required to submit a thesis on research for examination. For the degree of Doctor of Philosophy, there is also an oral examination on the subject matter of his thesis and other related subjects.

### Period of Candidature

The minimum and maximum periods of candidature for Ph.D. and M.Eng. candidates are as follows:

<table>
<thead>
<tr>
<th>Programmes</th>
<th>Full-Time</th>
<th>Part-time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minimum</td>
<td>Maximum</td>
</tr>
<tr>
<td>Ph.D.</td>
<td>2 years</td>
<td>5 years</td>
</tr>
<tr>
<td>M.Eng.</td>
<td>1 year</td>
<td>3 years</td>
</tr>
</tbody>
</table>

**Reverberation Chamber for radiated immunity test involving high power fields, radiated emission and shielding effectiveness testing**
Admission Requirements

The applicant must have a Bachelor’s degree with minimum Second Class Honours, Upper Division, or its equivalent as well as the ability to pursue research in his proposed field of advanced study. A good Graduate Record Examination (GRE) score is required for international applicants. Applicants from India may use the Graduate Aptitude Test in Engineering (GATE) score in place of GRE; it must be a score of at least 90%. For applicants whose native language is not English, a good Test of English as a Foreign Language (TOEFL) score is required. TOEFL test dates must be within 2 years or less from the date of the application. International English Language Testing System (IELTS) score can also be used in place of TOEFL.

Admission is held in August or January of each year. Applicants applying for admission with NTU research scholarships are encouraged to apply online by 31 January and 30 June for the August and January intakes respectively.

Please refer to the following websites for details:

(a) Administrative and application procedures for admission to the research programmes
   http://admissions.ntu.edu.sg/graduate/R-Programs/Pages/default.aspx

(b) School of Electrical & Electronic Engineering’s website for details on academic staff and their research areas
   http://www.eee.ntu.edu.sg/Programmes/ProspectiveStudents/Graduate/Pages/Graduate.aspx

(c) Programme Fees
   http://admissions.ntu.edu.sg/graduate/R-Programs/BeforeApplying-Research/Pages/Fees.aspx
Scholarships

There are various scholarship schemes available to candidates with outstanding academic records. These schemes enable them to pursue a Ph.D. programme on a full-time basis. Below lists some of these scholarship schemes.

**Detailed information on scholarships is available at**
http://admissions.ntu.edu.sg/graduate/scholarships/Pages/default.aspx

(1) **Nanyang President’s Graduate Scholarship (NPGS)**
   The NPGS is a prestigious scholarship scheme designed to help outstanding graduates or final year students embark on a leading research career. Ideal candidates should have a First Class Honours degree or equivalent at Bachelor’s level. The scholarship covers the full tuition fees with a monthly stipend ranging from S$3,000 to S$3,300.
   http://admissions.ntu.edu.sg/graduate/scholarships/Pages/NPGS.aspx

(2) **NTU Research Scholarship**
   A 4-year Ph.D. scholarship worth up to S$200,000, inclusive of tuition fees and monthly stipends ranging from S$2,000 to S$3,000.
   http://admissions.ntu.edu.sg/graduate/scholarships/Pages/ResearchScholarship.aspx

(3) **Singapore International Graduate Award (SINGA)**
   http://www.a-star.edu.sg/singa-award/

(4) **A*STAR Graduate Scholarship**
   http://www.a-star.edu.sg/Awards-Scholarship/Scholarships-Attachments/For-Graduate-PhD-Studies/A-STAR-Graduate-Scholarship-Singapore.aspx

Research Programme

Degrees By Research – Doctor of Philosophy and Master of Engineering
Testimonials

Aspiring High

Prof Ke Tang  
Professor, University of Science and Technology of China  
Ph.D., 2007

“I really enjoyed my life at NTU as a Ph.D. student. The excellent supervisors and modern facilities here provided me with the best environment to carry out scientific research. More important, the beautiful and quiet campus is a perfect place to think deeply about issues that are beyond research.”

Dr Selin Teo Hwee Gee  
Industry Development Manager, A*STAR Institute of Microelectronics (IME)  
Ph.D., 2008

“I have had an excellent postgraduate study experience at NTU. The university has an excellent faculty; research infrastructure; international research teams; stimulating technical events calendar; and also beautiful campus grounds. I fondly recall the adrenaline of making tough experiments work to demonstrate our innovations; the experience of representing Singapore in the World’s Young Lecturer Competition in London; and also the simple pleasure of interacting with the brightest minds in the world. Congratulations to NTU for being the first university in Asia to receive the maximum five stars under the QS Stars evaluation system. I look forward to NTU’s further growth, from strength to strength.”

Goh Chen Chuan  
System Engineer, Ministry of Home Affairs  
M.Sc. Graduate 2012

“The programme has provided me with a solid foundation in the area of signal processing and this knowledge is invaluable in my work. From the programme I have acquired in-depth theoretical knowledge in a range of specialised fields from respective lecturers, who undoubtedly are very experienced in their fields. Moreover, I have also acquired the practical and research skills needed to solve problems using different perspectives and this is more effective and efficient than the conventional approach.”

Do Aaron Vinh Thanh  
Senior Analogue Design Engineer, Marvell  
Ph.D., 2011

“NTU has everything you need to get a first-class education — and enjoy yourself at the same time! — including state-of-the-art instrumentation for conducting experiments, access to all of the necessary literature and excellent supervisors who know how to guide you to your own success.”
Embark on a journey exploring frontiers at the School of EEE.

Step into the forefront today, expand your network and widen your opportunities to reach new heights.