



NUS

National University
of Singapore

CEG Handbook *for Class of 2017*

Compliments from: Joint Academic Committee
Computer Engineering

Dear Freshmen,

Welcome to the Computer Engineering (CEG) programme at the National University of Singapore. This guide has been carefully prepared to help you navigate through the various requirements and processes which you will encounter. We hope it will help you understand the CEG programme and the environment soonest possible so that you can focus quickly on all the exciting activities which you can look forward to. This guide covers areas in the list below.

We hope you will have an enjoyable and meaningful learning journey with us.

From: Joint Academic Committee, CEG programme

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NUS Honour Code

As a student of the National University of Singapore, I agree to abide by this Honour Code and undertake the following:

1. To comply with all the Statutes, regulations, rules, codes of conduct and procedures as may from time to time be prescribed by the University, and any conditions stipulated or undertakings made by me in connection with my admission to the University;
2. To maintain the highest standards of personal integrity and respect the rule of law, social order, and the rights of others as are expected of all members of the University, both within and outside the University; and
3. To uphold and maintain absolute academic honesty and integrity at all times. This duty extends beyond my own behaviour and actions to include the responsibility to uphold standards in the University community and report academic dishonesty. I understand that the forms of academic dishonesty include but are not limited to cheating, giving or receiving any unauthorised aid, fabrication, plagiarism or engaging in any act that compromises the integrity of the academic standards of the University.

I consent to the exercise of disciplinary powers by the University against me even when I cease to be a student of the University in relation to offences committed by me while being a student of the University. I further accept that disciplinary actions may include the deprivation of any degree, diploma, certificate or other academic distinction conferred upon me.

CEG Class of 2017

Name and Signature of Student

Academic Culture

Academic culture is the way of life of every student in the University. It concerns how one conducts himself / herself as a student on campus. It encompasses academic honesty and integrity, righteous behaviours in the pursuit of knowledge and skills. It sets the expectation on students' and teachers' attitudes and behaviours toward the teaching-learning process in a way that enriches and supports students' learning.

In the pursuit of knowledge, a student is expected to take ownership of their learning. This requires inculcation of habits of constantly reflecting on lesson deliveries in classrooms, engaging in activities in and beyond classrooms in search of deeper knowledge and appreciation of lessons learnt, partaking in extra-curricular activities to develop social skills leading to new friendships and experiencing a diversity of socio-cultural contexts which is so much a part of the NUS campus. Through constant immersion in the intellectual and social activities, a student's life on campus is more colourful and enjoyable. In the process, it develops a fuller and more mature character in the student.

Translated simply, an academic culture is one where a student is diligent in attending lectures, tutorials and laboratories, complete assignments on time, pursues knowledge (with the help of teachers) to develop deeper insights, has a strong sense of curiosity to pursue one's own interests, conducts oneself honestly at all times and in all activities, behaves cordially toward fellow students and have deep respect for all. The student also actively participates in extra-curricular activities, making the most of opportunities available on campus. A student who practices academic culture is more likely to be a happy positive student, who will succeed in all his / her academic pursuits.

The ECE Department believes strongly that every faculty member and student adopt the core values of Excellence, Integrity and Commitment which are the virtues of this academic culture. It is our hope that all students practise these core values in our academically vibrant culture. For a more detailed exposition of the NUS academic culture, you may visit the following website: <http://emodule.nus.edu.sg/ac/>.

Glossary

BEng (CEG)	Bachelor of Engineering (Computer Engineering)
CAP	Cumulative Average Point
CEG	Computer Engineering
DDP	Double Degree Programme
CEG	Computer Engineering
FDDP	French Double Degree Programme
IA	Industrial Attachment
IC	Incomplete
IVLE	Integrated Virtual Learning Environment
MC	Modular Credit
NOC	NUS Overseas College
PG	Postgraduate
SAP	Semester Average Point
SEP	Student Exchange Programme
S/U	Satisfactory / Unsatisfactory
TE	Technical Elective
UG	Undergraduate
UROP	Undergraduate Research Opportunity Programme

(A) Quick Facts & Figures about the ECE Department

Approximate Enrolment Figures		
BEng (Computer Engineering)	Approx. 120 per year	
BEng (Electrical Engineering)	Approx. 250 per year	
BTech (Electronics)	Approx. 150 per year – 2 intakes per year	
Duration of degree programmes	4 years for each programme	
Key Academic & Administrative Staff		
	Name	Phone / Email
Department Head	Prof Chua Kee Chaing	62108 / eleckc
Deputy Head (Administration)	A/Prof Chor Eng Fong	62294 / elecef
Deputy Head (External Relations & Outreach)	A/Prof Tham Chen Khong	67959 / eletck
Deputy Head (Research & Graduate Programmes)	A/Prof John Thong	66236 / elettl
Deputy Head (Undergraduate Programmes & Student Life)	A/Prof Loh Ai Poh	62292 / elelohap
Associate Heads		
Undergraduate Programmes	A/Prof Tan Woei Wan	68323 / eletanww
Student Life	A/Prof Vivian Ng	62573 / elengv
Research	A/Prof Tan Kay Chen	62127 / eletankc
Graduate Programmes	A/Prof Mansoor Jalil	62125 / elembaj

CEG is jointly offered by Department of Computer Science (CS) at the School of Computing (SoC) and Department of Electrical & Computer Engineering (ECE) at the Faculty of Engineering (FoE).

The Joint Academic Committee (JAC) was set up to oversee the CEG programme:

Joint Academic Committee (JAC)		
Chairman	A/Prof Tan Woei Wan	eletanww@nus.edu.sg
	A/Prof Loh Ai Poh	elelohap@nus.edu.sg
	A/Prof Tulika Mitra	tulika@comp.nus.edu.sg
	A/Prof Wong Weng Fai	wongwfw@comp.nus.edu.sg
Year 1 Coordinator	Dr Colin Tan Keng Yan	colintan@nus.edu.sg
Year 2 & 3 Coordinator	A/Prof Bharadwaj Veeravalli	elebv@nus.edu.sg
Year 4 Coordinator		
FYP Coordinator (CS projects)	A/Prof Chan Mun Choon	chanmc@comp.nus.edu.sg
FYP Coordinator (ECE projects)	A/Prof Yan Shuicheng	eleyans@nus.edu.sg
IA Coordinator	Dr Ha Yajun	elehy@nus.edu.sg
Administrative Officers		
CEG3 & CEG4 matters	Ms Winnie Chua	cegcnw@nus.edu.sg
CEG1 & CEG2 matters	Mr Low Mun Bak	comlowmb@nus.edu.sg

(B) CEG Programme Educational Objectives

The educational objectives of the B.Eng. (Computer Engineering) programme is to graduate students who, 5 years after their graduation,

1. are technically competent to solve complex problems in computer engineering and can adapt effectively in a fast changing environment (Technical skills),
2. are able to critically think, analyse and make decisions that give due consideration to global issues in business, ethics, society and the environment (Thinking skills and judgment),
3. are able to communicate effectively, act with integrity, and have the inter-personal skills needed to engage in, lead, and nurture diverse teams (Leadership, team building),
4. are committed to lifelong learning, resourceful and embrace global challenges and opportunities to make a positive impact in society (Attitude).

All the above programme educational objectives will be attained if a student has achieved the following abilities (which are also referred to as student learning outcomes):

- (a) apply knowledge of mathematics, science and engineering to the solution of complex engineering problems
- (b) design and conduct experiments, analyse, interpret data and synthesise valid conclusions
- (c) design a system, component, or process, and synthesise solutions to achieve desired needs
- (d) identify, formulate, research through relevant literature review, and solve engineering problems reaching substantiated conclusions
- (e) use the techniques, skills, and modern engineering tools necessary for engineering practice with appropriate considerations for public health and safety, cultural, societal, and environmental constraints
- (f) communicate effectively
- (g) recognize the need for, and have the ability to engage in life-long learning
- (h) understand the impact of engineering solutions in a societal context and to be able to respond effectively to the needs for sustainable development
- (i) function effectively within multi-disciplinary teams and understand the fundamental precepts of effective project management
- (j) understand professional, ethical and moral responsibility
- (k) a good understanding of the principles and applications of advanced mathematics, including probability and statistics, differential and integral calculus, and discrete mathematics

Throughout the four years of study, students should constantly strive to fulfil the learning outcomes above in order to acquire the necessary knowledge, skills and attitudes to practice as a professional engineer after graduation.

(C) NUS Academic Calendar

Academic Calendar for 2013/2014		
Semester 1	Mon 5 Aug – Sat 7 Dec 2013	18 weeks
Orientation Week:	Mon 5 Aug – Sat 10 Aug 2013	8 & 9 Aug – public holiday
Week 1	Mon 12 Aug – Fri 16 Aug 2013	
Week 2	Mon 19 Aug – Fri 23 Aug 2013	
Week 3	Mon 26 Aug – Fri 30 Aug 2013	
Week 4	Mon 2 Sep – Fri 6 Sep 2013	
Week 5	Mon 9 Sep – Fri 13 Sep 2013	
Week 6	Mon 16 Sep – Fri 20 Sep 2013	
Recess Week:	Sat 21 Sep – Sun 29 Sep 2013	1 week
Week 7	Mon 30 Sep – Fri 4 Oct 2013	
Week 8	Mon 7 Oct – Fri 11 Oct 2013	
Week 9	Mon 14 Oct – Fri 18 Oct 2013	15 Oct – public holiday
Week 10	Mon 21 Oct – Fri 25 Oct 2013	
Week 11	Mon 28 Oct – Fri 1 Nov 2013	
Week 12	Mon 4 Nov – Fri 8 Nov 2013	
Week 13	Mon 11 Nov – Fri 15 Nov 2013	
Reading Week:	Sat 16 Nov – Fri 22 Nov 2013	1 week
Examination:	Sat 23 Nov – Sat 7 Dec 2013	2 weeks
Vacation:	Sun 8 Dec 2013 – Sun 12 Jan 2014	5 weeks
Semester 2	Mon 13 Jan – Sat 10 May 2014	17 weeks
Week 1	Mon 13 Jan – Fri 17 Jan 2014	
Week 2	Mon 20 Jan – Fri 24 Jan 2014	
Week 3	Mon 27 Jan – Fri 31 Jan 2014	31 Jan – public holiday
Week 4	Mon 3 Feb – Fri 7 Feb 2014	
Week 5	Mon 10 Feb – Fri 14 Feb 2014	
Week 6	Mon 17 Feb – Fri 21 Feb 2014	
Recess Week:	Sat 22 Feb – Sun 2 Mar 2014	1 week
Week 7	Mon 3 Mar – Fri 7 Mar 2014	
Week 8	Mon 10 Mar – Fri 14 Mar 2014	
Week 9	Mon 17 Mar – Fri 21 Mar 2014	
Week 10	Mon 24 Mar – Fri 28 Mar 2014	
Week 11	Mon 31 Mar – Fri 4 Apr 2014	
Week 12	Mon 7 Apr – Fri 11 Apr 2014	
Week 13	Mon 14 Apr – Fri 18 Apr 2014	18 Apr - public holiday
Reading Week:	Sat 19 Apr – Fri 25 Apr 2014	1 week
Examination:	Sat 26 Apr – Sat 10 May 2014	2 weeks
Vacation:	Sun 11 May – Sun 3 Aug 2014	12 weeks
Special Term	Mon 12 May – Sat 21 Jun 2014	6 weeks
	Mon 23 Jun – Sat 2 Aug 2014	6 weeks

(D) Overview of the Academic System

In the ECE Department, lectures start in Week 1 of each semester while tutorials and laboratory sessions (if any) will commence only from Week 2 or 3 onwards. Module lecturers will inform individual classes about the exact commencement of tutorials and lab sessions. Hence it is important that you attend classes and read your emails regularly in order not to miss any important announcements. Do use your NUSNET email account for official correspondences.

All module materials (lectures, tutorial, lab manuals) are available in the workbins of the respective modules at the Integrated Virtual Learning Environment ([IVLE](#)). You should download the learning materials (lectures, tutorials and lab manuals) from the IVLE and participate in the discussion forums in order to benefit fully from the module.

Each semester passes by very quickly. It is not uncommon that students are “lost” by the middle of each semester. Some tips to help you manage your studies include the following:

- Manage your time wisely from day one.
- Re-prioritize your activities - reduce your extra-curricular activities, if they are excessive.
- Seek clarifications from lecturers and tutors in topics in the lectures where you have encountered problems.
- Keep up with assignments, tutorials and laboratory sessions ensuring that you attempt all the tasks given.
- Be aware of the requirements for continuous assessments (CA). They are checkpoints for feedback about your academic progress – ensure that you attend or submit all CAs.
- Form networks of friends with whom you can study and play together.
- Ensure that you have a healthy dose of fresh air and exercise to keep fit.
- If you encounter issues, please consult your Academic Advisor (AA) who will be able to provide some guidance and advice. Your AA should be an important person in your 4 years in the Department. You should get to know him/her well because you will need him/her for a reference when you seek a job after you graduate.

Exams are conducted over a two-week period following the reading week. You need to read your exam timetable carefully, as missing exams due to a mis-reading of the timetable constitutes a failure in most cases. If you fall ill during the exam period, you should seek special consideration for the exam which you have missed. If you were unwell during the writing of the exam, you may also seek special consideration. You may seek special consideration by going to a doctor and having the doctor fill out a special consideration form which is available [here](#). If special consideration is granted, your exam grades may be reverted to “Incomplete (IC)” or you may be given an option to retain the grade you have attained. If a core module has been given an IC grade, that module has to be repeated in the semester when it is next available. If it is an elective, you are not required to repeat that module.

The maximum candidature for BEng (CEG) with Honours degree programme, with a minimum 160 MCs requirement, is 5 years. Beyond the period of candidature, students will no longer enjoy tuition fee subsidies which means that full tuition fees will be payable.

(E) Overview of Services within the Department and on Campus

In the ECE Department, the Office of Undergraduate Studies & Student Life oversees the teaching processes for the CEG programmes. This Office runs two portfolios:

- (i) Undergraduate Academic Programmes
All academic related matters are handled under this portfolio. This means that module registration, applications for Leave of Absence, examination-related processes, timetabling, etc are dealt with under this portfolio. The key point of contact is the Associate Head A/Prof Tan WW or the Deputy Head A/Prof Loh AP. There is a team of year coordinators who provides additional support.
- (ii) Student Life
The objective of Student Life is to promote greater interaction and engagement between students and staff, in addition to organizing freshmen orientation for incoming students. We recognized that a vibrant and healthy student life is an important part of life in the University. Hence it is our objective to provide the best support we can for our students so that their learning journey is as hassle-free as possible.

The campus is a melting pot of many cultures coming to study within one big campus. There are many activities which a student can participate in. There are many people with whom students can interact with. In particular, connections with faculty members (academic staff) are integral to a student's academic pursuits. They are a good resource for students to get academic advice and guidance on career planning, or to find out more about research topics that are of mutual interest. A student's academic advisor (AA) is perhaps the single most important person that a student should get to know. Each student will be assigned an academic advisor, who will be able to offer academic advice and counsel to students.

Details of your respective academic advisor can be found at <http://www.ece.nus.edu.sg/intranet/advisor/> (available from 12 Aug). Students are also encouraged to upload your biodata to allow your academic advisor to know you better.

Student Life office has also introduced a voluntary Buddy System to help freshmen ease into their University lives quickly and smoothly. A freshman who signed up will be paired with a senior buddy from a similar background. The senior buddy will act as a link or resource person whom the freshman can go to for valuable advice. Students are highly encouraged to sign up for the buddy system, https://docs.google.com/forms/d/1McpZjJg4huvct4yQWyYXGN5sMXJ381OGj6MdS2_K_pE/viewform

Occasionally, the Student Life office will also organize activities for students to get to know their fellow students or the faculty members better. We would like to encourage all students to participate in such activities. Sometimes we also require volunteers to run certain programmes. Volunteering is another healthy way to get engaged with the Department.

Other platforms to stay connected to the ECE Community will include:

- ECE Blog (<http://blog.nus.edu.sg/ecenus/>)
- Facebook for Freshmen 2013: (<https://www.facebook.com/groups/NUSECFreshmen2013/>)

At the University level, there are services such as the [University Health Centre](#) (UHC) and the [Office of Student Affairs](#) (OSA) which are two of the main offices for students.

(iii) [University Health Centre](#)

The UHC offers 3 services: health clinics, wellness programmes and counselling & psychological services. There may be times when a student faces difficulties in coping with studies or newfound relationships which may require more professional counselling. At the Department, the Student Life office is the first point of contact for such students. However, the student may be referred to UHC for further review and professional advice.

(iv) [Office of Student Affairs](#)

This is the office which has overall responsibility for student welfare and student life on campus. This is the office you go to if you want to book sporting facilities, look for temporary jobs, accommodation, career advice, services for international students, printing of results slips or transcripts, etc. The faculty understand that students may experience anxiety, stress, etc at some point of their study. The Student Support Office provides counselling services for students in need. The student support manager, Mr Martin Nonis can be contacted via

Email: engnmm@nus.edu.sg

Phone Number: 6516 7612

Another important office is the [Office of Undergraduate Programme](#) (OUP) at the Faculty of Engineering. At the University level, important offices include the [Registrar's Office](#), [Office of Financial Services](#), [Office of Admissions](#), etc which deal with policy-related matters. You should check out their websites if you wish to learn more about their functions and roles.

(F) Academic Fulfilment – Important for Completion of the BEng

For successful completion of the BEng programme, every CEG student is required to pass all modules which are prescribed and satisfy all requirements that are imposed at the University level. The academic components consist of:

- CEG programme requirements
- University level requirements – usually abbreviated as ULR
- Unrestricted elective requirements – usually abbreviated as UEM ('M' for modules)

The total number of modular credits (MCs) required to complete the BEng is a minimum of 160 MCs. A student may read more than 160 MCs as long as all the programme requirements, ULR and UEMs are satisfied. Programme requirements take up about 75% of curriculum time while ULR and UEM share the remaining 25%. Details of the full requirements can be found [here](#).

In the first two years of study, students will read fundamentals in Mathematics, Computing, Circuits, Signals, Electronics and Physics. In years 3 and 4, there will be major project modules and students will also read elective modules which contribute to specialization.

Students complete the 160 MCs over 8 semesters (4 years). The recommended study schedule can be obtained [here](#). Students need not follow the recommended schedules strictly but are advised to consider and plan carefully should you deviate from the recommended schedules. The structure of the overall curriculum is given in [Section G](#).

For freshmen who join the CEG programme from the Polytechnics, exemptions of varying degrees are given, depending on which Polytechnic and which Diploma programme he/she comes from. Details of the exemptions can be found [here](#). Exemptions vary between 31 to 35 MCs. Poly students generally complete their graduation requirements of 129 to 133 MCs in 6 semesters (3 years). For students who wish to proceed cautiously especially in the first 2 semesters, you may refer to the recommended schedule and plan accordingly to complete the graduation requirements in 7 semesters.

CEG students often embark on 3-month internships during the summer vacation or 6-month industrial attachment (IA) in semester 2 of the third year. Internships are given academic credits and form part of the UEM. There are many other opportunities under UEM. ULRs are modules which a student reads outside of their Faculty/School. They serve to broaden students' knowledge and views. Details of both the ULR and UEM requirements are available [here](#).

A student may fulfil some of the programme requirements while on student exchange in a partner university. Students generally go on student exchange during the second semester of the third year. This is achieved by mapping modules which are read in the Partner University, to the modules within the programme requirements. They are generally mapped back to the NUS modules with only pass/fail grades. Details of student exchange can be found [here](#).

Students enrolled in double degree programmes are required to fulfil both the engineering and non-engineering requirements. Details can be found [here](#).

NUS offers many minors and double majors programmes. The full list can be obtained [here](#). In general a minor is a 24-MC programme while a double major is a 48-MC programme. Up to 8 MCs of the minor or double major programme can be double counted towards the programme requirements. All minor and double major requirements can be counted towards either the ULR or UEM. Hence, with careful planning, a student may be able to complete a minor programme within 160 MCs and 8 semesters. A double major programme may take 9 semesters and more than 160 MCs to complete. You should explore these programmes early if you are interested. Also see [Section J](#) for other special programmes.

(G) CEG Curriculum Structure (AY2013/14 Intake onwards)

The CEG curriculum structure consists of the ULR, UEM and Programme requirements. The programme requirements are further categorized into:

- CEG core modules (78 MCs) – all compulsory
- CEG project modules (22 MCs) – all compulsory
- CEG technical electives (24 MCs) – students choose from a list of electives

Details of the CEG curriculum structure are given in the table below and also explained in greater depth in the next section.

Modular Requirements	MCs
I) University Level Requirements (ULR)	20
1 x Singapore Studies (SS) Module	4
2 x GEM (<u>at least one</u> from Humanities & Social Sciences)	8
2 x ULR Breadth Modules (outside FoE and SoC)	8
II) Programme Requirements	124
CEG Core Modules	78
CG1001 Introduction to Computer Engineering	2
CG1108 Electrical Engineering	4
CG2023 Signals & Systems	4
CG2271 Real-time Operating Systems	4

CG3207 Computer Architecture	4
CS1010 Programming Methodology	4
CS1020 Data Structures and Algorithms I	4
CS1231 Discrete Structures	4
CS2103T Software Engineering	4
EE2020 Digital Fundamentals	5
EE2021 Devices and Circuits	4
EE2024 Programming for Computer Interfaces	5
EE3204 Computer Communications Networks I	4
ES1531 Critical Thinking and Writing	4
EG2401 Engineering Professionalism	3
HR2002 Human Capital in Organizations	3
MA1505 Mathematics I	4
MA1506 Mathematics II	4
PC1432 Physics IIE	4
ST2334 Probability & Statistics	4
ES1000 Basic English and/or ES1102 English for Academic Purposes (for students who have not passed or not been exempted from the Qualifying English Test at the point of admission to the University)	-
CEG Project Modules	22
CG3002 Embedded Systems Design Project	6
EE3031 Innovation & Enterprise I	4
CG4001 B.Eng. Dissertation (over 2 semesters)	12
CEG Technical Electives	24
The rules are as follows: - To achieve depth, CEG students need to read a minimum of three depth electives. - All technical electives must add up to at least 24 MCs.	
III) Unrestricted Elective Modules (UEM)	16
Inclusive of CS2101 Effective Communication for Computing Professionals (on graded basis)	
TOTAL	160

Every Poly student will be given a set of exemptions which are determined based on the Diploma programmes they graduate from. These exemptions can be obtained from [here](#).

CEG Poly students are required to read MA1301 and PC1222 as part of bridging. They can be used to fulfill the ULR or UEM requirement. MA1301 may be exempted if a student has completed the Diploma Plus programme in Advanced Math at the Poly. All bridging modules and modules taken towards programme requirements have to be graded i.e. given a letter grade (A+ to F) and cannot be taken as pass/fail or S/U.

It is important to note that a student cannot read more than 60 MCs of level 1000 modules. Any MCs over and above the 60 MCs will not be counted towards programme requirements.

All graded modules, even those beyond the 160 MCs for graduation will be included in the computation of the cumulative average point or CAP. Grading policies can be found [here](#).

(H) University Level Requirements and Unrestricted Elective Modules

H.1 University Level Requirements (ULR)

These requirements aim to broaden students' intellectual horizons, develop critical and creative thinking skills and promote spoken and written articulacy. The ULR requirement is presented in the following table.

UNIVERSITY LEVEL REQUIREMENTS (ULR)		MCs
A	Singapore Studies (SS) Module	4
B	GEM (<u>at least one</u> from Humanities & Social Sciences)	8
C	ULR Breadth Modules (outside student's home faculty)	8

Please check out <http://www.nus.edu.sg/registrar/edu/UG/curriculum.html> for SS modules.

Please check out <http://www.nus.edu.sg/gem/> for GEM modules.

In order to facilitate broadening, students should not select GEMs that are **cross-listed** with their declared major/minor areas. For example, when students read major/minor modules with codes EExxxx, if there is a GEM that is cross-listed with this module, they are not allowed to take this module to fulfill the GEM requirement. In addition, students are not allowed to read any GEM which has **preclusions** that prevent them from reading it, nor are they allowed to read any GEM for which they do not satisfy the **pre-requisites**. For example, *GEK1500 Inside Your Personal Computer* has a preclusion that specifies that Computer Engineering, Electrical Engineering & SoC students are not allowed to read this GEM.

At least 1 GEM module must be from Group B: Humanities and Social Science.

Poly students are exempted from 1 GEM module under Group B: Humanities and Social Sciences. Hence, the other 1 GEM module they are required to take can be from either Group A or Group B.

CEG Poly students are required to take MA1301 and PC1222 as bridging, and these can be used to fulfill their ULR requirement/UEM. Poly students with advanced Math certificates from the Poly may be exempted from MA1301.

In order to complement the engineering discipline, students are **strongly encouraged** to read at least 1 business/management module from the School of Business. Such modules include:

MNO1001 Management & Organisation
BH1002E/FNA1002 Financial Accounting
MKT1003 Marketing or TR2201 Entrepreneurial Marketing
BSP1004 Legal Environment of Business
BSP1005 Managerial Economics or EC1301 Principles of Economics
MNO2311 Leadership in Organisation (pre-requisite: BH1001)
SC1101E Making Sense of Society

Refer to the [NUS Bulletin](#) for the description of these modules and other similar ones.

H.2 Unrestricted Elective Modules (UEM)

These are any kind of modules for which you satisfy their pre-requisites. They may be the technical electives offered by CS/ECE Department or literally, it can be any other module outside the home departments. They can be used to fulfill minor and double major programmes. Students can read them as long as the pre-requisites have been satisfied.

CS2101 Effective Communication for Computing Professionals must be read on graded basis, as a UEM. As such, Poly students without the relevant Diploma Plus certificate will graduate with minimum 164 MCs.

(I) CEG Technical Electives

CEG students are encouraged to specialise in one of the concentrations of Communications & Networking, Embedded Computing, Large-Scale Computing, Intelligent Systems, Interactive Digital Media and System-on-a-Chip Design by taking the electives in these concentrations.

The modules in each concentration are categorised as Breadth or Depth modules. A breadth module enables students to achieve a broad understanding of concepts in the particular concentration. A depth module is a higher level module that provides greater depth and coverage in the particular concentration.

The rules are as follows: To achieve depth, CEG students need to read a minimum of three depth electives. Students may read breadth electives to achieve exposure to various facets of CEG. All technical electives must add up to at least 24 MCs. These modules may come from any of the concentrations. While there is no necessity, students may opt to specialise in a particular concentration. To do so, a student must read all three depth modules from the same concentration. Students will have to ensure that they have read any prerequisite modules to read the depth modules. This may have an impact on the selection of breadth modules.

Please refer online for the [list of modules in the various concentrations](#).

As an additional note, other modules hosted by CS or ECE may be used as fulfilling CEG Technical Elective (TE) requirements. Generally, a level 3000 module will count as CEG TE Breadth, while a level 4000 will count as CEG TE Depth.

(J) Special Programmes

Aside from the regular degree programme, there are also other opportunities for students to challenge themselves in different ways or be enriched through other programmes which are available in NUS.

J.1 Offered by the Faculty of Engineering

(i) Enhancement Programmes: This consists of the following modules in the table below.

Module Codes	MCs	Duration	Dept Coordinator
EG3601: Industrial Attachment Programme (IAP)	12	24 weeks	Dr Ha Yajun
EG3602: Vacation Internship Programme (VIP)	6	12 weeks during vacation	Dr Ha Yajun

Module Codes	MCs	Duration	Dept Coordinator
EG2604: Innovation Programme (IP)	4	13 weeks	A/P Xu Yong Ping
EG2605: Undergraduate Research Opportunities Programme (UROP)	4	130 working hrs over 2 semesters	A/P AA Mamum
EG2606A: Independent Work (IWP)	2	total 65 hrs	A/P Xiang Cheng
EG2606B: Independent Work (IWP)	4	total 130 hrs	A/P Xiang Cheng

Refer to <http://www.eng.nus.edu.sg/undergrad/epmc/ep.html> for more details.
Contact Person at FoE: Ms Lisa Moo (engmrc@nus.edu.sg)

(ii) Global Engineering Programme

The Global Engineering Programme (GEP) is an exclusive programme designed to attract the very best students to read any branch of engineering at the National University of Singapore (NUS). Students with exceptional potential will be provided an accelerated pathway and enhanced educational experience that incorporates a strong global learning aspect. The objective is to align and nurture the particular strength of this select group of top engineering undergraduates to be engineer-leaders.

GEP students are expected to complete their BEng programme in 3 years (2 or 2.5 for Poly students) and proceed to a postgraduate programme either locally or overseas in the 4th year. Every GEP student will be mentored by a faculty member in the Department.

Website: http://www.eng.nus.edu.sg/ugrad/SP_gep.html
Contact Person at FoE: Ms Jennifer Phang (engpcl@nus.edu.sg)

ECE Department Mentors: A/P Loh Ai Poh (elelohap) / A/Prof Tan Woei Wan (eletanww) / A/Prof Vivian Ng (elengv) / Prof Yeo Swee Peng (eyeosp)

(iii) Design Centric Programme (DCP)

Design-Centric Programme (DCP) is a different learning pathway for engineering. It aims to produce engineering graduates with a global perspective yet sensitive to local cultural subtleties, and who have the ability to identify and solve complex problems of societal importance. The key feature is that that students work on group projects as early as year 1 semester 2 and are expected to continue on these projects all the way to their final year.

Applications are open to all students in semester 1 of Year 1. A rigorous process is in place for the selection of students.

Please refer to the FAQ at <http://www.eng.nus.edu.sg/ugrad/dcc/faq.html>.
Website: <http://www.eng.nus.edu.sg/edic/dcp.html>
Contact Person at FoE: Dr Pang Sze Dai (ceepsd@nus.edu.sg),
Dr Liaw Hwee Choo (englhc@nus.edu.sg)

J.2 Offered by the School of Computing

(i) Industrial Attachment and Internship

CP3880 Advanced Technology Attachment Programme (ATAP) – 12 MCs
Website: http://www.comp.nus.edu.sg/undergraduates/beyond_atap.html

CP3200 Student Internship Programme (SIP) – 6 MCs

Website: http://www.comp.nus.edu.sg/undergraduates/sip_overview.html

Contact Person at SoC: Ms Quek Woon Woon (comqww@nus.edu.sg)

CEG students who are keen in a 6-month IA or 3-month summer internship may apply through the respective system. Refer to <http://www.ceg.nus.edu.sg/ia/>.

(ii) Enhanced Learning in Infocomm Technology (ELITE)

In partnership with the Infocomm Development Authority (IDA), the ELITE programme prepares students to be industry ready by providing industry mentors, internship opportunities and funding.

Website: http://www.comp.nus.edu.sg/undergraduates/beyond_IDA.html

Contact Person at SoC: Ms Pamela Lim (comlmf@nus.edu.sg)

J.3 University-wide

Beyond the Faculty of Engineering and School of Computing, at the University-wide level, there are many other programmes which students can enroll or participate in. These are given below.

1	<p>NUS Overseas Colleges (NOC)</p> <p>Students intern with start-up companies for up to a year and interact with the founders of start-up companies. Seven colleges :</p> <ul style="list-style-type: none">• Silicon Valley, California (NCSV)• Bio Valley, Pennsylvania (NCBV)• Shanghai, China (NCSH)• Stockholm, Sweden (NCST)• Beijing, China (NCBJ)• Bangalore, India• Israel <p style="text-align: right;">Curriculum structure</p>
2	<p>French Double Degree Programme (FDDP)</p> <p>Under the DDP, a student will graduate with a B.Eng.degree, Diplome d'Ingenieur (from one of the French Grandes Ecoles) and M.Eng. (from NUS) after 5 years of studies. Students 2 years in NUS + 2 years in France + 1 year back in NUS.</p> <p style="text-align: right;">Ms Lesley Poong (engpge@nus.edu.sg)</p>
3	<p>Double Degree Programmes (DDP)</p> <ul style="list-style-type: none">• DDP with Business• DDP with Economics• DDP with Accounting <p>This DDP is expected to take 4.5 or 5 years to complete. Students are admitted at Year 1 or Year 2 and are expected to maintain a minimum CAP of 4.0 throughout.</p> <p style="text-align: right;">Ms Lesley Poong (engpge@nus.edu.sg)</p>
4	<p>University Scholars Programme (USP)</p> <p>Students take about 30% of their modules in USP, comprising First-Tier Curriculum and Advanced Curriculum, and the remaining modules in their major and other Faculties. Within USP, students read eight first-tier modules and four advanced modules.</p> <p style="text-align: right;">Ms Lesley Poong (engpge@nus.edu.sg)</p> <p style="text-align: right;">Curriculum structure</p>
5	<p>Student Exchange Programme (SEP)</p> <p style="text-align: right;">Ms Quek Woon Woon (comqww@nus.edu.sg)</p>

	CEG-SEP website Overseas SEP loan Partner Universities
6	<p>Double Major Programmes</p> <p>Double Major is a <u>single degree programme</u>, in which a student satisfies the requirements of two majors. The second major is not to be taken to the same level of intensity as the primary major, and it may be taken in the same Faculty/School or from a different Faculty/School.</p> <p>The second major will be a non-Honours major and will consist of at least 48 MCs of modules of which:</p> <ul style="list-style-type: none"> • Up to 8 MCs can be double counted • At least 16 MCs must be at level 3 or above <p>ULR and UEM can be used to fulfill the Double Major.</p> <p>Ms Nuraini (engnss@nus.edu.sg)</p>
7	<p>Minor Programmes</p> <p>The modular credits (MC) requirements for a Minor Programme should not be less than 24MCs (typically 6 modules). Students are required to read all six modules on graded basis. They are counted towards the CAP, which will in turn count towards the honors classification.</p> <p>Up to 8 MCs may be double counted towards the Minor. ULR and UEM can be used to fulfill the Minor.</p> <p>Ms Nuraini (engnss@nus.edu.sg)</p> <p>List of Minors</p>

(K) Module Grading Policies

Modules read in each semester may be graded or ungraded. “Graded” means that the module will be given a letter grade in your transcript while an ungraded module means that the module may be given either a “Satisfactory (S)” or “Unsatisfactory (U)” grade. An “S” grade is a passing grade while a “U” grade is a fail grade. A student is allowed to declare up to 12 MCs as S/U grade. The policies for S/U are given in Section L.

All programme requirements must be graded. Each letter grade is converted to points as follows :

Letter Grade	A+	A	A-	B+	B	B-	C+	C	D+	D	F
Grade Point	5.0	5.0	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0	0.0

At the end of each semester, every student will have a Cumulative Average Point (CAP) which is calculated according to the following formula :

$$\text{CAP} = \frac{\text{Sum (module grade point X MCs assigned to module)}}{\text{Sum (MCs assigned to all modules used in calculating the numerator)}}$$

The online CAP calculator is available at <http://www.eng9.nus.edu.sg/cap/>.

A student may be awarded an Incomplete (IC) grade in some circumstances e.g. sickness during exams, or other unforeseen non-medical cases which prevents a student from writing the exam. Under such circumstances, a student may appeal for special consideration (SC). If SC is granted, normally an IC grade will follow. This grade will not affect the CAP computation for that semester. However, the student has to repeat the module in the next semester when the module is offered.

At the end of each semester after the exam results are finalized, a student can be promoted to the next stage of study according to:

Stage* 2	Completed at least 23% of the minimum MCs required for graduation
Stage 3	Completed at least 48% of the minimum MCs required for graduation
Stage 4	Completed at least 70% of the minimum MCs required for graduation. (*IA credits are not included.)

A “Stage” is synonymous with year of study. After all programme requirements have been fulfilled, a student graduates with an Honours classification which is mapped to the CAP as follows:

Class of Honours	CAP Cut-Offs
First Class	4.5 and above, and at least ‘A minus’ in the Final Year Project
Second Class Upper	4.0 to 4.49
Second Class Lower	3.5 to 3.99
Third Class	3.2 to 3.49
Pass	2.0 to 3.19
Fail	Below 2.0

To graduate, a student must have a minimum CAP of 2.0.

A student must not have:

- i) CAP below 1.50 for two consecutive semesters; or
- ii) CAP below 2.00 for three consecutive semesters

If a student does not fulfill the above requirements, he/she will be placed in “Warning”, “Probation” or “Dismissed” according to the following criteria:

CAP falls below 2.0 in a semester *	Warning
$1.5 \leq \text{CAP} \leq 2.0$ for 2 consecutive semesters *	Probation
$1.5 \leq \text{CAP} \leq 2.0$ for 3 consecutive semesters *	Dismissal
$\text{CAP} < 1.5$ after 2 consecutive semesters *	
$\text{CAP} < 2.0$ at the end of the final semester of study	

* Excluding the special term

Students who are in any of the above lists should consult their academic advisors or the year coordinators for advice and guidance. It is important that a student stays in close touch with the Department administrators and faculty.

Students may spend an additional semester to improve their CAP even though all programme requirements have been fulfilled. However, in this additional semester, the student has to read at least 15 MCs of academic load with modules which are of level 3 and above.

(L) Satisfactory / Unsatisfactory (S/U) Policies

Website: http://www.eng.nus.edu.sg/ugrad/SI_su_policies.html

Contact Person in FoE: Ms Nuraini (engnss@nus.edu.sg)

Students may opt for at most 12 MCs on any module, except those used to meet Programme, Major, Minor, or University Scholars Programme (USP) requirements, to be graded on Satisfactory/Unsatisfactory (S/U) basis. This is to encourage intellectual exploration by students. Modules taken on S/U basis will not count towards CAP. They will count towards the degree requirement if a "S" grade is attained. If the total number of S/U MCs exceeds 12, only a total of 12 MCs will be counted towards his/her degree requirements.

CEG students are **not** allowed to exercise S/U option on:

- bridging modules (i.e. MA1301 and PC1222),
- Engineering modules (all levels), including those taken as unrestricted electives (UE), Technical Electives (TE) except for General Education (GEMs), Singapore Studies (SS) & Freshmen Seminar modules hosted by the Faculty,
- all CS level 3000/4000 modules.

Can students opt S/U for the following type of modules?	SU?
Faculty Enhancement Programmes	Yes
General Education Modules (GEM/GEK)	Yes*
Singapore Studies (SS)	Yes*
ULR Breadth Modules	Yes*^
Unrestricted Elective Modules (UEM)	Yes*^
Minor Modules	No
Programme Requirement (Faculty & Major)	No
Graded modules done in previous semesters	No
Faculty Enhancement Programmes	See below

* **All** modules are available on S/U option unless the faculties offering them indicate otherwise.

^ Students are **not allowed** to exercise the S/U option on **Engineering modules (all levels)**, including those taken as unrestricted electives (UE) & Technical Electives (TE). They must be taken on graded basis.

Faculty Enhancement Programmes are graded as 'CS/CU' by default and will not be counted towards CAP. In order for CS/CU MCs to be counted within the programme requirement, they must be taken to fulfill the UEM requirement.

Contacts

Chairman, JAC: A/Prof Tan Woei Wan (eletanww@nus.edu.sg)

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CEG3 & CEG4: Ms Winnie Chua (cegcwn@nus.edu.sg)