

Information Session for CEG2 Students

- Technical Electives Requirements
- Industrial Attachment

29 March 2016, 1pm @ LT3

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CEG2 & CEG3 Coordinator
Joint Academic Committee (JAC)
Department of Electrical & Computer Engineering (ECE)

THREE groups of students going to CEG3 in AY2016/17

- CEG1, AY2014/15 intake
- Common Engrg ENG1, AY2014/15 intake
(streamed to CEG2 in AY2015/16)
- CEG2 Poly, AY2015/16 intake

B.Eng. (CEG) Curriculum Structure



AY2014/15 intake

University Level Requirements (ULR)	CEG Programme / Major Requirements	Unrestricted Elective Modules (UEM)
GEK1549 + GEM (from Subj Grp B) - 8 MCs 1 x Singapore Studies (SS) - 4 MCs 2 x Breadth modules (NOT offered by FoE/SoC) - 8 MCs	Faculty reqs: CS2101, EG2401 & HR2002 - 10 MCs Level 1000 Mathematics, Science & Technology - 30 MCs Other core modules - 38 MCs CEG core projects - 22 MCs Industrial Attachment (6-months) – 12 MCs CEG Technical Electives - 12 MCs	16 MCs (Offered by Any Faculty/School)
20 MCs	124 MCs	16 MCs
Total (minimum) MCs for graduation = 160		

Refer to the respective **File For Graduation (FFG)** document at http://www.ceg.nus.edu.sg/students/FFG_Checklists.html

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CEG Modular Requirements and Credits



AY2014/15 intake

Modular Requirements	MCs
UNIVERSITY LEVEL REQUIREMENTS	20
General Education Module	8
- GEK1549 Critical Thinking & Writing	
- 1 x GEM from Subj Grp B: Humanities & Social Sciences	
Singapore Studies (SS) Module	4
Breadth: Modules NOT offered by FoE and SoC	8
UNRESTRICTED ELECTIVE MODULES	16
PROGRAMME REQUIREMENTS	124
Faculty Requirements	10
CS2101 Effective Comm for Computing Professionals	4
EG2401 Engineering Professionalism	3
HR2002 Human Capital in Organizations	3
English (ES1000/ES1102)*	-
CEG Core Modules	68
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 & Circuits	4
EE2024 Programming for Computer Interfaces	5
EE3204 Computer Communication Networks I	4
MA1505 Mathematics I	4
MA1506 Mathematics II	4
PC1432 Physics IIE	4
ST2334 Probability & Statistics	4
Industrial Attachment (CP3880 OR EG3601)	12
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	12
TOTAL	160

* For students who have not passed or been exempted from the Qualifying English Test at the time of admission.

<http://www.ceg.nus.edu.sg/curriculum/requirements.html>

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B.Eng. (CEG) Curriculum Structure



AY2015/16 intake

University Level Requirements (ULR)	CEG Programme / Major Requirements	Unrestricted Elective Modules (UEM)
<p>One General Education Module (GEM) from each of the five pillars:</p> <p>Human Cultures Asking Questions Quantitative Reasoning Singapore Studies Thinking and Expression</p>	<p>Faculty reqs: CS2101, EG2401 & HR2002 - 10 MCs</p> <p>Level 1000 Mathematics, Science & Technology - 30 MCs</p> <p>Other core modules - 38 MCs</p> <p>CEG core projects - 22 MCs</p> <p>Industrial Attachment (6-months) – 12 MCs</p> <p>CEG Technical Electives - 12 MCs</p>	<p>16 MCs Offered by any Faculty/School</p>
20 MCs	124 MCs	16 MCs
Total (minimum) MCs for graduation = 160		

Refer to the respective **File For Graduation (FFG)** document at http://www.ceg.nus.edu.sg/students/FFG_Checklists.html

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CEG Modular Requirements and Credits



AY2015/16 Poly intake

Modular Requirements	MCs		
UNIVERSITY LEVEL REQUIREMENTS	20		
1 x General Education Module (GEM) from each of:			
- Human Cultures GEH1xxx		5 x 4	
- Asking Questions			
- Quantitative Reasoning GER1000			
- Singapore Studies GES1xxx			
- Thinking and Expression GET1021 Critical Thinking & Writing			
UNRESTRICTED ELECTIVE MODULES	16		
- 16 MCs (exempted)			
PROGRAMME REQUIREMENTS	124		
Faculty Requirements	10		
CS2101 Effective Comm (exempted)	4		CS1010 Programming Methodology
EG2401 Engineering Professionalism	3		CS1020 Data Structures and Algorithms I
HR2002 Human Capital in Organizations (exempted)	3		CS1231 Discrete Structures
English (ES1000/ES1102)*	-		CS2103T Software Engineering
CEG Core Modules	68		EE2020 Digital Fundamentals
CG1001 Introduction to Computer Engineering	2		EE2021 Devices & Circuits
CG1108 Electrical Engineering	4		EE2024 Programming for Computer Interfaces
CG2023 Signals & Systems	4		EE3204 Computer Communication Networks I
CG2271 Real-time Operating Systems	4		MA1505 Mathematics I
CG3207 Computer Architecture	4		MA1506 Mathematics II
			PC1432 Physics IIE
			ST2334 Probability & Statistics
			PC1222 + MA1301/TE + UEM (exempted)
			CEG Project Modules
			CG3002 Embedded Systems Design Project
			EE3031 Innovation & Enterprise I
			CG4001 B.Eng. Dissertation (over 2 semesters)
			CEG Technical Electives
			TOTAL
			160

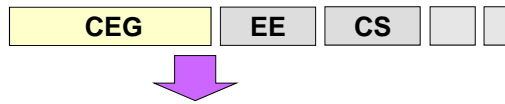
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CEG Curriculum



- **Year 1 & 2:**
Wide coverage of Math, Engineering, Computing and Scientific fundamentals



- **Year 3 & 4:**
Specialized courses that track the latest technology developments in the field



- Enable CEG graduates to deal with computer engineering problems of today and face future challenges



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Points to Consider



- **Core modules/Major requirements**
- **Choice of Technical Electives in Year 3 & 4**
(some choose to start in year 2)
- **IA semester**
- **Recommended study schedules**

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Core modules / Major requirements



■ Core Modules*

- ✓ CG3002 Embedded Systems Design Project
- ✓ CG3207 Computer Architecture
- ✓ CG4001 B.Eng. Dissertation
- ✓ EE3031 Innovation & Enterprise I
- ✓ EE3204 Computer Communications Networks I
- ✓ EG2401 Engineering Professionalism
- ✓ HR2002 Human Capital in Organizations
- ✓ Industrial Attachment

+ (at least) 12 MCs of Technical Elective modules to achieve Breadth and Depth within B.Eng. (CEG)

**This is in addition to other modules that are usually taken in the lower years.*

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Points to Consider



- Core modules/Major requirements
- Choice of Technical Electives in Year 3 & 4 (some choose to start in year 2)
- IA semester
- Recommended study schedules

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Technical Electives - Organisation



- The technical electives (TE) are organised into SIX different concentrations. Each concentration contains some **breadth** & **depth** modules.
- **Breadth modules:** Core to the area and provides broad understanding of concepts
- **Depth modules:** More specialised and provides greater depth & coverage

- Other modules hosted by CS or ECE may also be used as fulfilling CEG TE requirements. Generally, a **level 3000** module will count as **TE Breadth**, while a **level 4000** will count as **TE Depth**.
- CEG students **CANNOT** exercise S/U option on ALL higher-level modules hosted by FoE and SoC (because all have pre-requisites).

- **More than 50** modules (offered by CS/ECE) are available.
- Only **THREE TEs (equivalent to 12 MCs)** need to be taken over 3, or 4 semesters.

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Technical Electives - Organisation



There are changes to the technical electives (from last year):

- Change in semester in which a module is offered
[Most TEs are offered once a year.]
- Change in pre-requisite
- Changes in title, module code and syllabus
- New module / Module no longer offered

Useful links:

1. NUS Bulletin <http://www.nus.edu.sg/registrar/nusbuletin/modulesearch.html>
2. Updated master-list of technical electives (within the six concentrations)
http://www.ceg.nus.edu.sg/students/third_year.html
(under 'Academic Information/Useful Links')
3. CEG Technical Elective page <http://www.ceg.nus.edu.sg/students/ceg3TE/>

For above links #2 & #3, please check for updated version in May 2016.

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Technical Electives - Requirements

(a) Depth (D) requirement

At least **TWO** **Depth** technical electives

(b) Modular credits requirement

At least **12 MCs** of technical electives

Modules may come from Any/None of the concentrations!

CS/EE3xxx
-> TE Breadth

CS/EE4xxx
-> TE Depth

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Technical Electives - Concentrations

The CEG concentrations are:

- Communications & Networking
- Embedded Computing
- Large-Scale Computing
- Intelligent Systems
- Interactive Digital Media
- System-on-a-Chip Design

<http://www.ceg.nus.edu.sg/curriculum/electives.html>

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CEG concentration



Communications & Networking

CS3103 Computer Networks Practice

EE3131C Communication Systems

CS4222 Wireless Networking

CS4226 Internet Architecture

EE4113 Digital Communications & Coding

EE4114 Optical Communications

EE4210 Computer Communication Networks II

Example: CS3103 (only offered in sem 1)

Pre-req: CS2105/EE3204

Prerequisite: EE4210

CEG students are precluded from CS2105.

EE3204 (CEG Major/core requirement) is scheduled for Year 3.

Students who read
CS3103 are
precluded from
EE4210

EE3204 (sem 5) -> IA (sem 6) -> CS3103 (sem 7) -> CS4222 (sem 8)

IA (sem 5) -> EE3204 (sem 6) -> CS3103 (sem 7) -> CS4222 (sem 8)

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CEG concentration



Embedded Computing

CS2107 Introduction to Information & System Security

CS3103 Computer Networks Practice

CS3218 Multimodal Processing in Mobile Platforms

CS3235 Computer Security

CS4222 Wireless Networking

EE4210 Computer Communication Networks II

EE4214 Real-time Embedded Systems

EE4218 Embedded Hardware Systems Design

EE4415 Integrated Digital Design

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CEG concentration



Large-Scale Computing

- CS2010 Data Structures & Algorithms II
- CS2102 Database Systems
- CS2107 Introduction to Information & System Security
- CS3211 Parallel and Concurrent Programming
- CS3235 Computer Security
- CS3223 Database Systems Implementation
- CS4211 Formal Methods for Software Engineering <new>
- CS4221 Database Applications Design and Tuning
- CS4223 Multi-Core Architectures
- CS4224 Distributed Databases
- CS4345 General-Purpose Computation on GPU
- EE4210 Computer Communication Networks II

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The Need to Plan



Large-Scale Computing

- CS2010 Data Structures & Algorithms II
- CS2102 Database Systems
- CS3223 Database Systems Implementation
- CS4221 Database Applications Design and Tuning
- CS4224 Distributed Databases

Pre-req of CS4221/CS4224: CS3223 (only offered in sem 2)
Pre-req of CS3223: CS2010 AND CS2102

CS1020 (sem 2) -> CS2010 & CS2102 (sem 3/4/5) -> CS3223 (sem 6)
-> CS4224 (sem 7) / CS4221 (sem 8)

OR

CS1020 (sem 2) -> CS2010 & CS2102 (sem 5/6/7) -> CS3223 (sem 8)

'Extra' TEs may be declared as UEM

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CEG concentration



Intelligent Systems

- CS2010 Data Structures & Algorithms II
- CS3240 Interaction Design
- CS3243 Introduction to Artificial Intelligence
- CS3244 Machine Learning
- EE3206 Introduction to Computer Vision and Image Processing
- EE3331C Feedback Control Systems
- CS4244 Knowledge-based Systems
- CS4246 AI Planning and Decision Making
- CS4248 Natural Language Processing
- EE4212 Computer Vision
- EE4213 Image & Video Processing <not offered in AY16>
- EE4305 Introduction to Fuzzy/Neural Systems
- EE4306 Distributed Autonomous Robotic Systems
- EE4307 Control Systems Design and Simulation

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The Need to Plan



Intelligent Systems

- CS2010 Data Structures & Algorithms II
- CS3243 Introduction to Artificial Intelligence
- CS4244 Knowledge-based Systems
- CS4246 AI Planning and Decision Making
- CS4248 Natural Language Processing

Pre-req of CS4244: CS3243 (only offered in sem 2)

Pre-req of CS4246/CS4248: CS3243 (only offered in sem 2) AND ST2334

Pre-req of CS3243: CS2010 AND CS1231

CS1020 (& CS1231/ST2334 in Year 2) -> CS2010 (Special Term) -> IA (sem 5) ->
CS3243 (sem 6) -> CS4246/8 (sem 7) OR CS4244 (sem 8)

Need to take CS2010 in
Special Term, and IA
sem affected

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CEG concentration



Interactive Digital Media

CS2108 Introduction to Media Computing
CS3240 Interaction Design
CS3241 Computer Graphics
CS3242 3D Modeling and Animation
CS3247 Game Development
CS3249 User Interface Development
EE3206 Introduction to Computer Vision and Image Processing
EE3331C Feedback Control Systems
EE3731C Signal Processing Methods
EE3701 Digital Media Technologies
CS4243 Computer Vision and Pattern Recognition <new>
CS4247 Graphics Rendering Techniques
CS4249 Phenomena and Theories of Human-Computer Interaction
CS4347 Sound and Music Computing
EE4212 Computer Vision
EE4213 Image & Video Processing <not offered in AY16>
EE4604 Biological Perception in Digital Media
ME4245 Robot Kinematics, Dynamics and Control

Students who read CS4243 are precluded from EE4212

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CEG concentration



System-on-a-Chip Design

EE3407 Analog Electronics
EE3408C Integrated Analog Design
CS4223 Multi-Core Architectures
EE4214 Real-time Embedded Systems
EE4218 Embedded Hardware Systems Design
EE4415 Integrated Digital Design
EE4505 Power Semiconductor Devices & ICs

The pre-requisite(s) of ALL modules within this concentration is CEG core modules.

CG2271 (sem 4) -> CG3207 (sem 5) -> CS4223 (sem 7)

EE2020 -> EE4218 (sem 5/7) OR EE4415 (sem 6/8)

EE2021 -> EE4505 (sem 5/7)

EE2024 -> EE4214 (sem 6/8)

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Technical Electives - Advices



- Be flexible in your choice of technical electives
- Take more technical electives, and declare the 'extra' as UEM (16 MCs)
- Plan ahead
- Interest vs Ability [Cannot exercise S/U option]
- Participate in the Module Preference Exercise (MPE) to indicate your interest in the TEs hosted by SoC. MPE is carried out in early-July (for sem 1), and early-Dec (for sem 2).
- CS2010 and CS2107 will be offered in upcoming ST2. Online registration (via STRS) starts end-May.

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Points to Consider



- Core modules/Major requirements
- Choice of Technical Electives in Year 3 & 4 (some choose to start in year 2)
- **IA semester**
- Recommended study schedules

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IA semester



- NOT allowed to do two rounds of 3-months internships, in lieu of (compulsory) 6-months IA (EG3601/CP3880).
- For AY16/17,
 - CG3002, EE3204 (and CG2271) will be offered in both semesters.
 - CG3207 will be offered as an evening module in sem 1 (only). Its lecture and one lab session will be scheduled at 6pm.
- May take (up to) TWO evening modules during IA, **subjected to the approval of the company and module availability**, consisting of:
 - Core modules e.g. CG3207 (sem 1), EE3031, EG2401
 - Technical Electives:
 - Sem 1: CS3216, CS4211/2, CS4236, CS4343/6/9, EE3731C, EE4218
 - Sem 2: CS4221, CS4231/8, CS4242, EE4212
 - BTech modules e.g. EExxxxE (very limited quota)
 - Modules offered by other Fac/Sch e.g. GEK1505

<http://www.ceg.nus.edu.sg/ia/>

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IA semester



- Online application, Round 2
FoE IAP (Jul-Dec 2016)/VIP (May-Jul 2016): 29 Mar - 5 Apr
SoC ATAP (May-Oct 2016)/SIP May-Jul 2016): 30 Mar - 3 Apr

Refer to <http://www.ceg.nus.edu.sg/ia/> and look out for the emails from FoE/SoC.

- Self-sourced IA (or internship)
Either apply to convert to EG3601/EG3602 via FoE,
or
CP3880/CP3200 via SoC, latest by 29 Apr.
- IA/internship (for AY14 intake) will remain to be on 'Completed Satisfactorily/Completed Unsatisfactorily' (CS/CU) basis.

<http://www.ceg.nus.edu.sg/ia/>

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Points to Consider



- Core modules/Major requirements
- Choice of Technical Electives in Year 3 & 4 (some choose to start in year 2)
- IA semester
- Recommended study schedules

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Recommended Study Schedules



- UEM, ULR (SS, GEM, ULR Breadth) requirements are indicated in random semesters. Remember to read these modules.
- Workload per semester: Minimum 18 MCs, and up to 25 MCs
- Project Modules:
 - Be careful about taking CG3002/EE3031 together with FYP (CG4001 B.Eng. Dissertation) in semester 7 (e.g. due to SEP/IA).
 - Workload is very heavy!
 - If unable to avoid (e.g. cannot find suitable module during SEP), students should still keep to the average workload of 20 MCs [i.e. CG3002, CG4001 and two other modules].
 - Read EE3031 during IA, or find equivalent module during SEP
- Pay attention to workload balancing!

<http://www.ceg.nus.edu.sg/students/studyschedule.html>

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Recommended Study Schedules AY2014/15 intake



Sem 4	Sem 5	Sem 6	Sem 7	Sem 8
CG2023 Signals & Systems	CP3880 ATAP or EG3601 IAP	CG3002 Embedded Systems Design Project	CG4001 B.Eng. Dissertation	CG4001 B.Eng. Dissertation
CG2271 Real-Time Operating Systems		EE3031 Innovation & Enterprise I	HR2002 Human Capital in Organizations	Depth Elective
EE2024 Programming for Computer Interfaces		EE3204 Computer Comms Networks I	Breadth Elective	Depth Elective
ST2334 Probability & Statistics	CG3207 Computer Architecture	UEM 1	UEM 2	UEM 4
ULR Breadth 2	EG2401 Engrg Profsm	GEM Subj Grp B	UEM 3	
21 MCs	19 MCs	22 MCs	21 MCs	18 MCs

IMPORTANT:

- Students are encouraged to use UEM space to take more technical electives.
- The minimum 12 MCs of electives satisfying CEG Breadth/Depth requirements can be taken in any semester upon satisfying the pre-requisites.
- The ULR (GEMs, SS, ULR Breadths) and UEM can be taken in any semester.

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Recommended Study Schedules AY2014/15 intake



Sem 4	Sem 5	Sem 6	Sem 7	Sem 8
CG2023 Signals & Systems	CG3002 Embedded Systems Design Project	CP3880 ATAP or EG3601 IAP	CG4001 B.Eng. Dissertation	CG4001 B.Eng. Dissertation
CG2271 Real-Time Operating Systems	CG3207 Computer Architecture		HR2002 Human Capital in Organizations	Depth Elective
EE2024 Programming for Computer Interfaces	EE3204 Computer Comms Networks I		Breadth Elective	Depth Elective
ST2334 Probability & Statistics	EG2401 Engrg Profsm	EE3031 Innovation & Enterprise I	UEM 2	UEM 4
ULR Breadth 2	GEM Subj Grp B	UEM 1	UEM 3	
21 MCs	21 MCs	20 MCs	21 MCs	18 MCs

IMPORTANT:

- Students are encouraged to use UEM space to take more technical electives.
- The minimum 12 MCs of electives satisfying CEG Breadth/Depth requirements can be taken in any semester upon satisfying the pre-requisites.
- The ULR (GEMs, SS, ULR Breadths) and UEM can be taken in any semester.

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Recommended Study Schedules AY2015/16 Poly intake



Sem 2	Sem 3	Sem 4	Sem 5	Sem 6	Sem 7
CS1020 Data Structures & Algorithms I	CS2103 Software Engrg	CG2023 Signals & Systems	CG3002 Embedded Systems Design Project	CG4001 B.Eng. Dissertation	CG4001 B.Eng. Dissertation
CS1231 Discrete Structures	EE2021 Devices & Circuits	CG2271 Real-Time Operating Systems	CG3207 Computer Architecture	EE3031 Innovation & Enterprise I	Depth Elective
EE2020 Digital Fundamentals	MA1506 Math II	EE2024 Programming for Computer Interfaces	EE3204 Computer Comms Networks I	EG2401 Engrg Profsm	Depth Elective
MA1505 Math I	PC1222 Fundamentals of Physics II	PC1432 Physics IIE	ST2334 Probability & Statistics	Breadth Elective	
GET1021	GES1xxx	GEH1xxx	GEQ GEH/GES/GET		
21 MCs	20 MCs	21 MCs	22 MCs	17 MCs	14 MCs

IMPORTANT:

- Students are encouraged to use UEM space to take more technical electives.
- The minimum 12 MCs of electives satisfying CEG Breadth/Depth requirements can be taken in any semester upon satisfying the pre-requisites.
- The GE modules can be taken in any semester.

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Reminders



ECE Career Fair

ideas engineered into reality

- Networking with potential employers
- Recruitment talks
- Information on available positions

Friday, 1 April · 12 - 5 pm
Outside LT6 · Formal Attire

EEE2 Streaming Talk
1 April (Friday)
12 - 3pm @ LT6
CEG2 may join from 1.15pm.

Participating Companies



Organised by

ECE Undergraduate Student Council