

## Streaming Talk for CEG2 Students (CEG3 in AY2015/16)

**26 March 2015, 1 pm @ LT1**

**A/Prof Bharadwaj Veeravalli ([elebv@nus.edu.sg](mailto:elebv@nus.edu.sg))**

**CEG2 & CEG3 Coordinator**

**Joint Academic Committee (JAC)**

**Department of Electrical & Computer Engineering (ECE)**

## Three groups of students going to CEG3 in AY2015/16

- CEG1, AY2013/14 intake
- Common Engineering, AY2013/14 intake  
(streamed to CEG2 in AY2014/15)
- CEG2 Poly, AY2014/15 intake

## B.Eng. (CEG) Curriculum Structure

AY2014/15 intake

University Level Requirements (ULR)	CEG Programme / Major Requirements	Unrestricted Elective Modules (UEM)
2 General Education Modules (GEMs) - 8 MCs 1 Singapore Studies (SS) - 4 MCs 2 Breadth modules outside of 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 - 18 MCs  Industrial Attachment (6-months) - 12 MCs  CEG Technical Electives to satisfy Breadth and Depth requirements - 16 MCs	16 MCs from any Faculty/School
MCs = 20	MCs = 124	MCs = 16
<b>Total (minimum) MCs for graduation = 160</b>		

- Refer to the respective **File For Graduation (FFG)** document at:

[http://www.ceb.nus.edu.sg/students/FFG\\_Checklists.html](http://www.ceb.nus.edu.sg/students/FFG_Checklists.html)

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## CEG Modular Requirements and Credits

CEG2 Poly AY2014/15 intake

Modular Requirements	MCs		
<b>UNIVERSITY LEVEL REQUIREMENTS</b>	<b>20</b>		
General Education Modules Requirement (GEM) - GEK1549 Critical Thinking & Writing - Subject Group B GEM (exempted)	8	CS1020 Data Structures and Algorithms I	4
Singapore Studies (SS) Module	4	CS1231 Discrete Structures	4
Breadth: Modules Outside FoE and SoC - 1 x ULR Breadth (exempted)	8	CS2103T Software Engineering	4
<b>UNRESTRICTED ELECTIVE MODULES</b> - 12 MCs (exempted)	<b>16</b>	EE2020 Digital Fundamentals	5
<b>PROGRAMME REQUIREMENTS</b>	<b>124</b>	EE2021 Devices & Circuits	4
Faculty Requirements	10	EE2024 Programming for Computer Interfaces	5
CS2101 Effective Comm for Computing Professionals (exempted)		EE3204 Computer Communication Networks I	4
EG2401 Engineering Professionalism	3	MA1505 Mathematics I	4
HR2002 Human Capital in Organizations (exempted)	3	MA1506 Mathematics II	4
English*	-	PC1432 Physics IIE	4
<b>CEG Core Modules</b>	<b>80</b>	ST2334 Probability & Statistics	4
CG1001 Introduction to Computer Engineering	2	PC1222 + MA1301/TE/UEM + internship/TE/UEM	14/12
CG1108 Electrical Engineering	4	CEG Project Modules	18
CG2023 Signals & Systems	4	CG3002 Embedded Systems Design Project	6
CG2271 Real-time Operating Systems	4	EE3031 Innovation & Enterprise I	4
CG3207 Computer Architecture	4	CG4002 B.Eng. Dissertation (over 2 semesters)	8
CS1010 Programming Methodology	4	CEG Technical Electives	16
		Technical Electives to satisfy the Breadth and Depth requirements of the B.Eng. (CEG) programme	
		<b>TOTAL</b>	<b>160</b>

\* For students who have not passed or been exempted from the Qualifying English Test at the time of admission  
S/U policy – cannot S/U Technical Electives - [http://www.eng.nus.edu.sg/ugrad/SU\\_su\\_policies.html](http://www.eng.nus.edu.sg/ugrad/SU_su_policies.html)

## CEG Modular Requirements and Credits

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Singapore Studies (SS) Module	4	CS1231 Discrete Structures	4
Breadth: Modules Outside FoE and SoC - 1 x ULR Breadth (exempted)	8	CS2103T Software Engineering	4
<b>UNRESTRICTED ELECTIVE MODULES</b> - 12 MCs (exempted)	<b>16</b>	EE2020 Digital Fundamentals	5
<b>PROGRAMME REQUIREMENTS</b>	<b>124</b>	EE2021 Devices & Circuits	4
Faculty Requirements	10	EE2024 Programming for Computer Interfaces	5
CS2101 Effective Comm for Computing Professionals (exempted)	4	EE3204 Computer Communication Networks I	4
EG2401 Engineering Professionalism	3	MA1505 Mathematics I	4
HR2002 Human Capital in Organizations (exempted)	3	MA1506 Mathematics II	4
English*	-	PC1432 Physics IIE	4
<b>CEG Core Modules</b>	<b>80</b>	ST2334 Probability & Statistics	4
CG1001 Introduction to Computer Engineering	2	PC1222 + MA1301/TE + internship/TE	14/12
CG1108 Electrical Engineering	4	CEG Project Modules	18
CG2023 Signals & Systems	4	CG3002 Embedded Systems Design Project	6
CG2271 Real-time Operating Systems	4	EE3031 Innovation & Enterprise I	4
CG3207 Computer Architecture	4	CG4001 B.Eng. Dissertation (over 2 semesters)	12
CS1010 Programming Methodology	4	CEG Technical Electives	12
		Technical Electives to satisfy the Breadth and Depth requirements of the B.Eng. (CEG) programme	
		<b>TOTAL</b>	<b>160</b>

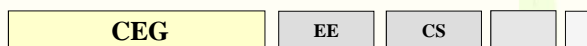
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## CEG Concentrations and Technical Elective Modules

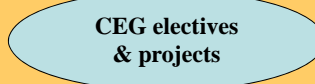
- **What does streaming involve?**
- What are the compulsory requirements?
- How are technical electives organised?
- CEG technical electives requirements
- Recommended study schedules

## CEG Curriculum

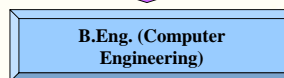
- **Year 1 & 2:** Wide coverage of Math, Engineering, Computing and Scientific fundamentals.



- **Year 3 & 4:** Highly 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.



## Streaming involves...

- Own choice of technical elective modules in year 3 & 4 (some choose to start in year 2)
- Choice of technical elective modules must satisfy the **technical elective requirement**
- Failure to meet the requirements can delay graduation!

## CEG Concentrations and Technical Elective Modules

- What does streaming involve?
- **What are the compulsory requirements?**
- How are technical electives organised?
- CEG technical electives requirements
- Recommended study schedules

## Compulsory Requirements

- **Core Modules\***
  - ✓ CG3002 Embedded Systems Design Project
  - ✓ CG3207 Computer Architecture
  - ✓ CG4001 BEng Dissertation
  - ✓ EE3031 Innovation & Enterprise I
  - ✓ EE3204 Computer Communications Networks I
  - ✓ EG2401 Engineering Professionalism
  - ✓ HR2002 Human Capital in Organizations
  - ✓ Industrial Attachment [3-months internship OR Technical Elective]

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

**+ (at least) 12 MCs of Technical Elective modules to achieve Breadth and Depth in the B.Eng. programme.**

## CEG Concentrations and Technical Elective Modules

- What does streaming involve?
- What are the compulsory requirements?
- **How are technical electives organised?**
- CEG technical electives requirements
- Recommended study schedules

## Organisation of Technical Electives

- The technical electives (TE) are organised into 6 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 (level 3/4000) modules hosted by FoE and SoC (regardless taken to fulfill TE or UE requirements).
- **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. Students from the Poly intake are encouraged to take more TEs (in lieu of IA).

## Organisation of Technical Electives

- There are changes in 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-requisites
  - changes in title, code and syllabus
  - new / removal of technical elective

Refer to:

1. NUS Bulletin

<http://www.nus.edu.sg/registrar/nusbulletin/modulesearch.html>

2. the updated master-list of **Technical Electives**

[http://www.ceg.nus.edu.sg/students/third\\_year.html](http://www.ceg.nus.edu.sg/students/third_year.html)

(under 'Academic Information/Useful Links')

3. CEG TE page - <http://www.ceg.nus.edu.sg/students/ceg3TE/>

## CEG Breadth/Depth

- Specialisation in CEG is achieved through technical breadth/depth electives from the following concentrations:
  - **Communications & Networking**
  - **Embedded Computing**
  - **Large-Scale Computing**
  - **Intelligent Systems**
  - **Interactive Digital Media**
  - **System-on-a-Chip Design**

## CEG Concentrations

### Communications & Networking

~~CG3204L Computer Networks Laboratory <no longer offered>~~  
 CS3103 Computer Networks Practice <new>  
 EE3131C Communication Systems  
 CS4222 Wireless Networking ~~Computing & Sensor Networks~~  
 CS4226 Internet Architecture <new>  
~~CS4274 Mobile and Multimedia Networking <no longer offered>~~  
 EE4113 Digital Communications & Coding  
 EE4114 Optical Communications  
 EE4210 Computer Communication Networks II

Example: CS3103 [Offer semester in AY15: pending]

Pre-req is CS2105/EE3204

Preclusion: EE4210

CEG students are precluded from CS2105.

EE3204 (CEG Major/core requirement) is only offered in sem 1, and scheduled for Year 3.

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

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



## CEG Concentrations

### Embedded Computing

~~CG3204L Computer Networks Laboratory <no longer offered>~~  
 CS2107 Introduction to Information & System Security  
 CS3103 Computer Networks Practice <new>  
 CS3218 Multimodal Processing in Mobile Platforms  
 CS3235 Computer Security  
 CS4222 Wireless Networking ~~Computing & Sensor Networks~~  
~~CS4274 Mobile and Multimedia Networking <no longer offered>~~  
 EE4210 Computer Communication Networks II  
 EE4214 Real-time Embedded Systems  
 EE4218 Embedded Hardware Systems Design  
 EE4415 Integrated Digital Design

## CEG Concentrations

### 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  
 CS4221 Database Design  
 CS4223 Multi-Core Architectures  
 CS4224 Distributed Database  
 CS4345 General-Purpose Computation on GPU  
 EE4210 Computer Communication Networks II

Example: CS4224 [Pre-req change]  
 AY13: CS2102  
 AY14: CS3223 or CS2102  
 AY15: CS3223 (strictly!)

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

## CEG Concentrations

### 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 <new>  
 CS4246 AI Planning and Decision Making <new>  
 CS4248 Natural Language Processing  
 EE4212 Computer Vision  
 EE4213 Image & Video Processing <not offered in AY15>  
 EE4305 Introductory to Fuzzy/Neural Systems  
 EE4306 Distributed Autonomous Robotics Systems  
 EE4307 Control Systems Design and Simulation

## CEG Concentrations

### Interactive Digital Media

CS2108 Introduction to Media Computing <new>  
 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 <new>  
 EE3701 Digital Media Technologies  
 CS4247 Graphics Rendering Techniques  
 CS4249 Phenomena and Theories of Human-Computer Interaction <new>  
 CS4347 Sound and Music Computing <new>  
 EE4212 Computer Vision  
 EE4213 Image & Video Processing <not offered in AY15>  
 EE4604 Biological Perception in Digital Media <new>  
 ME4245 Robot Kinematics, Dynamics and Control

## CEG Concentrations

### 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

~~EE4410A Integrated Circuit Design~~ <no longer offered>

EE4415 Integrated Digital Design

EE4505 Power Semiconductor Devices & ICs

## CEG Concentrations and Technical Elective Modules

- What does streaming involve?
- What are the compulsory requirements?
- How are technical electives organised?
- **CEG technical elective requirements**
- Recommended study schedules

## CEG Technical Electives requirements

**(a) Depth (D) requirement**

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

**(b) Modular credits requirement**

At least **12 MCs** (from Technical Elective modules)

**Modules may come from any of the concentrations!**

ECE2 Streaming Talk & Career Fair tomorrow - 27 Mar (Fri)  
12 - 5pm @ Engineering Auditorium and EA foyer  
CEG2 may join from 1.15pm.

## CEG Concentrations and Technical Elective Modules

- What does streaming involve?
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## Recommended Study Schedules

- UEM, ULR (SS, GEM, ULR Breadth) requirements are indicated in random semesters. Remember to read these modules. Refer to the respective document at <http://www.ceb.nus.edu.sg/students/studyschedule.html>.
- Workload: Minimum of 15 MCs and up to 25 MCs per semester
- Compulsory Modules (Faculty requirements): EG2401 and HR2002
- CG3002 & EE3031 Project Modules:
  - Be careful about taking CG3002/EE3031 together with CG4001 FYP in semester 7 (e.g. due to SEP/IA).
    - Workload is very heavy!
    - Should try to find suitable mapping modules for either EE3031 (relatively easier) or CG3002 while on SEP.
  - If you plan to go for IA in semester 6, you may apply to read EE3031 and one other module (UEM/ULR/TE) in the evenings, *subject to availability and approval*.
- Pay attention to workload balancing!

### Recommended Schedule for CEG AY2014/15 (Poly) Intake (Exempted from CG1108)

Sem 2	Sem 3	Sem 4	May - July	Sem 5	Sem 6	Sem 7
CS1020 Data Structures & Algorithms I	GEK1549 Critical Thinking & Writing	CG2023 Signals & Systems	(CP 3200 Student Internship Programme OR EG3302 Vacation Student Programme)*	CG3002 Embedded Systems Design Project	CG4001 B.Eng. Dissertation	CG4001 B.Eng. Dissertation
CS1231 Discrete Structures	CS2103 Software Engineering	CG2271 Real-Time Operating Systems		CG3207 Computer Architecture	EE3031 Innovation & Enterprise I	Depth Elective
EE2024 Programming for Computer Interfaces	MA1506 Math II	EG2401 Engng Profsm		Breadth Elective	Depth Elective	UEM
MA1505 Math I	PC1432 Physics IIE	ST2334 Probability & Statistics		ULR Breadth	*Breadth / Depth Elective	
PC1222 Fundamentals of Physics II	EE3204 Computer Comms Networks I	SS				
21 MCs	20 MCs	19 MCs		6 MCs	18 MCs	14/18 MCs

**IMPORTANT:**

- Students are encouraged to take at least one business/management module to satisfy ULR/UEM.
- 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.
- \* If not taking SIP/VIP, need to take TE in lieu (in the regular semester).

### Recommended Schedule for CEG AY2014/15 (Poly) Intake (Not exempted from CG1108)

Sem 2	Sem 3	Sem 4	May - July	Sem 5	Sem 6	Sem 7
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CS1231 Discrete Structures	CS2103 Software Engineering	CG2271 Real-Time Operating Systems		CG3207 Computer Architecture	EE3031 Innovation & Enterprise I	Depth Elective
EE2020 Digital Fundamentals	EE2021 Devices & Circuits	EG2401 Engg Profsm		EE3204 Computer Comms Networks I	Breadth Elective	Depth Elective
MA1505 Math I	MA1506 Math II	EE2024 Programming for Computer Interfaces		ST2334 Probability & Statistics	ULR Breadth	UEM
ES1102*	PC1432 Physics IIE	SS			*Breadth / Depth Elective	
17 MCs	20 MCs	20 MCs		6 MCs	18 MCs	18/22 MCs

**IMPORTANT:**

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- \* If not taking SIP/VIP, need to take TE in lieu (in the regular semester).

Enjoy the rest of your  
**B.Eng. programme!**

... the best is yet to come!

**Questions??**