EE-CUHK Course Briefing Session

April 2, 2014

Profs. Chester Shu, Alex Leung, Ni Zhao, Michael Cheng, and Ken Ma
Outline

- General introduction to the curriculum, and suggestion on the study pattern (for 4-year curriculum students)

- Elective courses - what are they about, how are they related, and what are relevant job opportunities? (for both 3-year and 4-year curriculum students)
Career Goals

Professional Engineer
Career Goals

Research
Career Goals

Entrepreneur

CHI Fung Fei Won Silver Award in HKEIA Project Competition
Who are my classmates?

4-year curriculum students

2012-13 intake (JUPAS, Mainland, International)  
2013-14 intake (with advanced standing, AD/HD, 3-year effective curriculum)

3-year curriculum students (2012-13 intake)

Regular study scheme → entering final year in 2014-15  
Joining Work study → entering final year in 2015-16

2-year curriculum students → senior year entry AD/HD, SYSU
## Curriculum Structure

<table>
<thead>
<tr>
<th>Languages</th>
<th>4-year Programme</th>
<th>3-year Programme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chinese</td>
<td>6</td>
<td>Chinese</td>
</tr>
<tr>
<td>English</td>
<td>9</td>
<td>English (ELT1111)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>University Requirements</th>
<th>4-year Programme</th>
<th>3-year Programme</th>
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</thead>
<tbody>
<tr>
<td>General Education</td>
<td>21</td>
<td>General Education</td>
</tr>
<tr>
<td>Physical Education</td>
<td>2</td>
<td>Physical Education</td>
</tr>
<tr>
<td>IT Competence exemption</td>
<td>exemption</td>
<td>IT competence</td>
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<table>
<thead>
<tr>
<th>EE Major</th>
<th>4-year Programme</th>
<th>3-year Programme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sciences (incl. 2 physics)</td>
<td>9</td>
<td>Mathematics</td>
</tr>
<tr>
<td>Mathematics</td>
<td>12</td>
<td>Other Reqd Major Courses</td>
</tr>
<tr>
<td>Other Reqd Major Courses</td>
<td>27</td>
<td>Breadth Electives (Gp A)</td>
</tr>
<tr>
<td>Breadth Electives (Gp A)</td>
<td>12</td>
<td>Advanced Electives (Gp B)</td>
</tr>
<tr>
<td>Advanced electives (Gp B)</td>
<td>9</td>
<td>Final Year Project</td>
</tr>
<tr>
<td>Final Year Project</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other</th>
<th>4-year Programme</th>
<th>3-year Programme</th>
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</thead>
<tbody>
<tr>
<td>Free electives</td>
<td>9</td>
<td>Free electives</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>TOTAL</th>
<th>4 year programme</th>
<th>3 year programme</th>
</tr>
</thead>
<tbody>
<tr>
<td>75 units</td>
<td>123 units</td>
<td>73 units</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TOTAL</th>
<th>3 year programme</th>
</tr>
</thead>
<tbody>
<tr>
<td>99 units</td>
<td></td>
</tr>
</tbody>
</table>

# Recommended Study Pattern

<table>
<thead>
<tr>
<th>Term 1</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ENGG1110</strong> Problem Solving by Programming</td>
<td>3</td>
</tr>
<tr>
<td><strong>MATH1510</strong> Calculus for Engineers</td>
<td>3</td>
</tr>
<tr>
<td><strong>PHYS1110</strong> Engineering Physics I</td>
<td>3</td>
</tr>
<tr>
<td><strong>Chem/Bio. Science</strong>*</td>
<td>(3)</td>
</tr>
<tr>
<td></td>
<td>9-12</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Term 2</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ENGG1100</strong> Introduction to Engineering Design</td>
<td>3</td>
</tr>
<tr>
<td><strong>ENGG1410</strong> Engineering Mathematics I</td>
<td>3</td>
</tr>
<tr>
<td><strong>ENGG2520</strong> Engineering Physics II</td>
<td>3</td>
</tr>
<tr>
<td><strong>Chem/Bio. Science</strong>*</td>
<td>(3)</td>
</tr>
<tr>
<td></td>
<td>9-12</td>
</tr>
</tbody>
</table>

*Chem/Bio. Science: CHEM1070/1280/1380/LSCI1001 Principles of Modern Chemistry / Introduction to Organic Chemistry and Biomolecules / Basic Chemistry for Engineers / Basic Concepts in Biological Sciences
# Recommended Study Pattern

<table>
<thead>
<tr>
<th>Term 3</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEG2201 Digital Circuits and Systems</td>
<td>3</td>
</tr>
<tr>
<td>ELEG2202 Circuits and Devices I</td>
<td>3</td>
</tr>
<tr>
<td>ENGG2420 Engineering Mathematics II</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>9</td>
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</table>

<table>
<thead>
<tr>
<th>Term 4</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGG2600 Technology, Society and Engg Practice</td>
<td>3</td>
</tr>
<tr>
<td>ELEG3201 Circuits and Devices II</td>
<td>3</td>
</tr>
<tr>
<td>ENGG2030 Signals and Systems</td>
<td>3</td>
</tr>
<tr>
<td>ENGG2430 Engineering Mathematics III</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>12</td>
</tr>
</tbody>
</table>
Year 2  Summer

Summer Industrial Training (~ 4 weeks):

- Basic Electronic Practice
- Computer Aided Design
- Electrical Installation Practice and Safety
- Linux and Java Programming
## Recommended Study Pattern

### Term 5

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEG2401</td>
<td>Introduction to Embedded Systems</td>
<td>3</td>
</tr>
<tr>
<td>ENGG2310</td>
<td>Principles of Communication Systems</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Group A Major Elective</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9</td>
</tr>
</tbody>
</table>

### Term 6

<table>
<thead>
<tr>
<th></th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>Group A Major Electives</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>9</td>
</tr>
</tbody>
</table>
## Recommended Study Pattern

### Term 7

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>Group B Major Electives</td>
<td>4</td>
</tr>
<tr>
<td>ENGG4010 Final Year Project I</td>
<td>3</td>
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</table>

**Total:** 7 units

### Term 8

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>Group B Major Electives</td>
<td>5</td>
</tr>
<tr>
<td>ENGG4020 Final Year Project II</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total:** 8 units
Major Electives: Subject Areas

- IC Technology
- Solid State & Microelectronics
- Microwave and Wireless
- Photonics and Fiber Optics
- DSP & Multimedia
- BME
- Photonics and Fiber Optics

3D head models for movie characters constructed from video sequences
Other Learning Experiences

- Work study Programme
- Summer Intern/Research
- Campus Workstudy Scheme (part-time)
- Overseas Exchange
- Undergraduate Research ELEG3920- Penultimate year
- Seminars and Workshops
- Company/Plant Visits
- EE Interest Club
- Project Competitions (Robocon, HKIE, HKEIA, IET, Hong Kong ICT,FYP)
- Student Helpers (Open Day, Orientation, IT summer camps)
Our Areas of Focus

• Integrated Circuit Technology
• Microelectronics and Photonics
• Microwave and Wireless Engineering
• Digital Signal Processing and Multimedia Technology
Circuit Courses in CUHK-EE

Typical IC System:

- **Power Supply Circuits (Energy)**
- **Analog Circuits (V & I)**
- **Digital Circuits (0 & 1)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yr 2</td>
<td>ELEG2202 + ELEG3201 Circuits and Devices I &amp; II</td>
</tr>
<tr>
<td></td>
<td>ELEG2201 Digital Circuits and Systems</td>
</tr>
<tr>
<td>Yr 3</td>
<td>ELEG3202 Analog Integrated Circuits</td>
</tr>
<tr>
<td></td>
<td>ELEG3205 Modern Digital Circuit Design</td>
</tr>
<tr>
<td></td>
<td>ELEG3207 Introduction to Power Electronics</td>
</tr>
<tr>
<td>Yr 4</td>
<td>ELEG5210 CMOS Analog Integrated Circuits</td>
</tr>
<tr>
<td></td>
<td>ELEG4201 CMOS Integrated Circuits</td>
</tr>
<tr>
<td></td>
<td>ELEG4205 Power Converter Circuits</td>
</tr>
<tr>
<td>Yr 4 or postgraduate</td>
<td>ENGG5201 Analog-Digital ASIC Design</td>
</tr>
<tr>
<td></td>
<td>ELEG5726 Power Management Technology</td>
</tr>
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</table>
Circuit-Related Job Opportunities

HK Science Park, Solomon Systech, Philips, Vixs, AppoTech, Pericom, TI, Fujitsu, Supertex, etc.

Hong Kong American Megatrends, ASUS, AOpen, Avision, etc

Taiwan Samsung, LG, etc.

三菱, NEC, Nikko, etc.

Silicon Valley: Intel, Maxim, Qualcomm, Broadcom, Apple, etc.

Simens, Chipidea, etc.

IDT, Hisense, Huwei, TCL, Vtech, etc.

American Megatrends, ASUS, AOpen, Avision, etc.

Samsung, LG, etc.

Creative Technology, Chartered Semiconductor, STATS ChipPAC, etc.

HK Science Park, Solomon Systech, Philips, Vixs, AppoTech, Pericom, TI, Fujitsu, Supertex, etc.

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Silicon Valley: Intel, Maxim, Qualcomm, Broadcom, Apple, etc.

Simens, Chipidea, etc.

IDT, Hisense, Huwei, TCL, Vtech, etc.
Alumni Working in Circuit-Related Area

- Professor, The Chinese University of Hong Kong
- Senior Circuit Designer, ASTRI
- Senior IC Designer, Qualcomm at San Diego
- Senior Engineer, CLP
- Ph.D candidate, University of Colorado at Boulder
- Electronic Engineer, ASM Pacific Technology Ltd.
- IC Designer, AppoTech Ltd.
- Engineering Graduate, EMSD
Device Courses in CUHK-EE

- Microelectronics
- Photonics
- Circuits

Yr 2
- ELEG2202 + ELEG3201 Circuits and Devices I & II

Yr 3
- ELEG3301 Principles of Semiconductor Devices
- ELEG3302 Fundamentals of Photonics
- ENGG 4020 Solar Energy and Photovoltaic Technology

Yr 4
- ELEG4301 Physics and Technology of Semiconductor Devices
- ELEG5303 Introduction to Optical Communications
- ELEG 4302 Micro optics

Yr 4 or postgraduate
- ELEG 5303 Flexible Electronics – Physics and Technology
- ELEG5302 Biophotonics
- ELEG5301 Photonic Integrated Circuits
Applications of Device Courses

- Neuron imaging
- Transistors for IC
- LEDs for lighting and display
- Solar cells

ELEG5302 Biophotonics

ELEG3301 Principles of Semiconductor Devices
ELEG4301 Physics and Technology of Semiconductor Devices
ENGG4020 Solar Energy and Photovoltaic Technology

ELEG3303 Introduction to Optical Communications

Integrated optics for quantum computers

ELEG3302 Fundamentals of Photonics
ELEG5301 Photonic Integrated Circuits
Destinations of Students – Microelectronics & Photonics

Electronic Engineer
- National Semiconductor
- Cathay Pacific
- IBM
- TDK
- Huawei
- Vartronix
(CEO of Anwell, K.L., Franky Fan, is a EE alumni)
(CEO of ASM Pacific Technology Ltd., Wai-kwong Lee, is a EE alumni)

Entrepreneur
- Other companies include: Hong Kong Productivity Council, Lite Array, RCL Semiconductors, Xinyi Glass, etc.

R&D
- ASTRI
- Nano and Advanced Materials Institute Limited

Academia
- (Professor, postdoc, postgraduate)
- City University of Hong Kong
- Hong Kong Institute of Vocational Education
- University of California, San Diego
- University of Rochester
Wireless Technology
Wireless Technology
Wireless Courses in EE-CUHK

Microwave and Wireless (Elective)

**Yr 3**
- ELEG 3203 (ELEG 3310) Basic Electromagnetism
- ELEG 3204 (ELEG 3330) Wireless Technology and Systems

**Yr 4**
- ELEG 4203 (ELEG 4320) RF Electronics
- ELEG 4204 Advanced RF Circuit Design
- ELEG 5205 (ELEG 5310) Advanced topics in Microwave Engineering

**Yr 4 or postgraduate**
- ELEG 5732 RF Circuits & Systems
- ELEG 5380 RFIC Design
Elective Courses in Wireless Tech.

ELEG 3203
Basic Electromagnetism

\[ \nabla \cdot D = \rho \quad \nabla \cdot B = 0 \]
\[ \nabla \times E = -\frac{\partial B}{\partial t} \quad \nabla \times H = J + \frac{\partial D}{\partial t} \]

ELEG 3204
Wireless Technology and Systems
(Antenna design, mobile systems, GPS, RFID)

ELEG 4203
RF Electronics

ELEG 4204
Advanced RF Circuit Design
Job Markets in Wireless Technology

Tele-communications:
PCCW, Hutchison, SMARTONE

Servicing:
Asia-Satellite Ltd.
MTR
Airport
Octopus (RFID)
TVB/ATV

Wireless Products:
VTECH, CCT (listed companies in HK stock market)
SIERRA WIRELESS (Offices: HK, Canada, US, China, Korea, France)
Signal Processing

Fundamentally, learn the skills to deal with any signals – speech, music, image, video, biomedical, geoscience, astronomy, financial data, any data (e.g., your exam results)…
Signal Processing

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Signal Processing

Fundamentally, learn the skills to deal with any signals - speech, music, image, video, biomedical, geoscience, astronomy, financial data, any data (e.g., your exam results)...

![Diagram of EKG procedure](image)
Signal Processing

Fundamentally, learn the skills to deal with any signals – speech, music, image, video, biomedical, geoscience, astronomy, financial data, any data (e.g., your exam results)...

When the Sun Attacks

One of the main ways the sun triggers geomagnetic storms on Earth is through a coronal mass ejection, or CME, which is a large, violent ejection of charged particles that are carried by the solar wind at speeds of over 2000 kilometers per second. The CME’s magnetic fields have complex helical shapes that start at the sun’s surface and expand through interplanetary space. By the time they reach Earth, these magnetic fields can have enormous volume, and their passing can last for many hours as they couple with Earth’s magnetic fields, resulting in geomagnetic storms.

Source: NASA/SDO/AIA, HMI, and SDO/EUVI

Mean no. of sunspot

Year

1700 1750 1800 1850 1900 1950 2000
Signal Processing

Fundamentally, learn the skills to deal with any signals – speech, music, image, video, biomedical, geoscience, astronomy, financial data, any data (e.g., your exam results)...
Signal Processing

- Learn how to analyze and process signals
- Gain fundamental knowledge of signal processing, image processing, multimedia and communications
- More on software skills, and mathematics
- (my view) apart from actual skills, train analytical thinking
Signals Courses in CUHK-EE

Signal and Image Processing

ENGG2030 Signals and Systems

Yr 2

Yr 3

ELEG3503 Introduction to Digital Signal Process.

ELEG3502 Analog and Digital Communications

Yr 4

ELEG4410 Digital Signal Processing & Apps.

ELEG4430 Digital Image Processing

ELEG5431 Video Coding Technology

Yr 4 or postgraduate

ELEG5040 Advanced Topics in Signal Process.

Communications (Physical-layer and signal processing)

ENGG2310 Principles of Communication Systems

ELEG4503 Modern Communication Systems

(May not offer) ELEG4503 Modern Communication Systems
Jobs with Signals

- companies for developing multimedia techs. and apps.
- communications or broadcast industry (Smartone, PCCW, Television Broadcasts Limited, you name it)
- speech and hearing departments of hospitals
- technical services department of Police/ICAC
- financial analyst? MTR (yes they have signals)?

Other Major Elective Courses

- **Group A Electives**
  - BMEG3420 Medical Robotics
  - ELEG3101 Medical Instrumentation and Sensors
  - IERG3310 Computer Networks
  - Either DSME1030 or SEEM2440 (Economics for Business Studies I or Engineering Economics, resp.)
  - 1-unit programming courses: CSCI1010, CSCI1020, CSCI1040, CSCI1050
  - CSCI2100 Data Structures

- **Group B Electives**
  - BMEG4103 Biomedical Modelling
  - Also some ELEG5XXX biomedical courses; check our dept. website for details.
Let us know what you think

- Fill up an online survey on your intention to take certain elective courses.
The Chinese University of Hong Kong
Department of Electronic Engineering

Survey on Major Electives

Please select the survey for your curriculum. You can conduct the survey once only.

3-year curriculum

4-year curriculum

Logout
The Chinese University of Hong Kong  
Department of Electronic Engineering  
Survey on Major Electives (3-year curriculum)

Please indicate which of the following EE major electives you are interested to take in 2014/15 if they are offered:

Group A: (Note: the graduation requirement on Group A electives is 9 units, with at least 6 units at 3000 level or above. Non-EE and BMSE courses are not shown here.)

- [ ] ELEG 390 [3392] Introduction to Lasers and Photonics (3 units)
- [ ] ELEG 3307 Introduction to Power Electronics (3 units)
- [ ] ELEG 3320 [3120] Modern Digital Circuit Design (3 units)
- [ ] ELEG 3340 [3140] Medical Instrumentation and Sensors (3 units)
- [ ] ELEG 3350 [3150] Introduction to Optical Communications (3 units)
- [ ] ELEG 3330 [3130] Wireless Technology and Systems (3 units)
- [ ] ELEG 3340 [3140] Analog and Digital Communications (3 units)
- [ ] ELEG 3410 [3150] Random Processes and Digital Signal Processing (3 units)
- [ ] ELEG 3420 Medical Robotics (3 units)

Group B: (Note: the graduation requirement on Group B electives is 12 units. Non-EE courses are not shown here.)

- [ ] ELEG 4190 [3490] Biomedical Modelling (3 units)
- [ ] ELEG 4210 [4210] Power Management Electronics (3 units)
- [ ] ELEG 4260 [4260] CMOS Integrated Circuits (3 units)
- [ ] ELEG 4300 [4300] Modern Communication Systems (3 units)
- [ ] ELEG 4300 [4300] Microwave Electronics (3 units)
- [ ] ELEG 4410 [4410] Advanced Digital Signal Processing and Applications (3 units)
- [ ] ELEG 4470 [4470] Digital Image Processing (3 units)
- [ ] ELEG 4510 [4510] Physics and Technology of Semiconductor Devices (3 units)
- [ ] ELEG 4520 [4520] Integrated Optics (3 units)
- [ ] ELEG 4530 [4530] Integrated Circuits Fabrication Technology (3 units)
- [ ] ELEG 4560 Electronic Thin Film Science (3 units)
- [ ] ELEG 4580 [4580] Microoptics (3 units)
- [ ] ELEG 5103 Biomechanics and Artificial Organs (3 units)
- [ ] ELEG 5314 Introduction to Biomimetic Engineering (3 units)
- [ ] ELEG 5110 [5110] Advanced Medical Instrumentation and Biosensors (3 units)
- [ ] ELEG 5140 [5140] Biomedical Information Engineering (3 units)
- [ ] ELEG 3210 CMOS Analog Integrated Circuits (3 units)
- [ ] ELEG 5280 [5280] Analog/digital ASIC Design (3 units)
- [ ] ELEG 3303 Flexible Electronic – Physics and Technology (3 units)
- [ ] ELEG 5310 [5310] Advanced Microwave Engineering (3 units)
- [ ] ELEG 5410 [5410] Pattern Recognition (3 units)
- [ ] ELEG 5420 [5420] Speech and Audio Processing (3 units)
- [ ] ELEG 5431 [5431] Video Coding Technology (3 units)
- [ ] ELEG 5521 [5521] Biophotonics (3 units)

End of Survey – Thank you for your valuable opinions!

Submit
The Chinese University of Hong Kong
Department of Electronic Engineering

Survey on Major Electives (4-year curriculum)

Please indicate which of the following EE major electives you are interested to take in 2014/15 if they are offered:

Group A: (Note - the graduation requirement on Group A electives is 12 units, with at least 9 units at 3000 level or above. Non-EE and BME courses are not shown here.)

- ELEG 3101 Medical Instrumentation and Sensors (3 units)
- ELEG 3202 Analog Integrated Circuits (3 units)
- ELEG 3203 Electromagnetic Fields and Waves (3 units)
- ELEG 3204 Wireless Technology and Systems (3 units)
- ELEG 3205 Modern Digital Circuit Design (3 units)
- ELEG 3207 Introduction to Power Electronics (3 units)
- ELEG 3301 Principles of Semiconductor Devices (3 units)
- ELEG 3302 Fundamentals of Photonics (3 units)
- ELEG 3303 Introduction to Optical Communications (3 units)
- ELEG 3502 Analog and Digital Communications (3 units)
- ELEG 3503 Introduction to Digital Signal Processing (3 units)
- BMEG 3420 Medical Robotics (3 units)

End of Survey – Thank you for your valuable opinions!

Submit

Logout
Let us know what you think

• Fill up an online survey on your intention to take certain elective courses.

  https://eeims.ee.cuhk.edu.hk/Survey/

• Please do so on or before April 18.