Briefing
Bachelor of Computing in Information Security
2020/21

A/P Chang Ee-Chien
Joint-Academic-Committee (InfoSec)
BCOMP Information Security


• Started with 11 students from AY14/15.
• 11, 16, 26, 43, 70, 54,...
Programme Structure
Curriculum

• Cybersecurity is multi-disciplinary
  o System + Management aspects.
  o Domain specific knowledge.

• Provide
  o Solid technical background (Foundation + Core)
  o In-depth studies in chosen domains (Elective, FYP)
  o Industrial Relevance (Internship, selected modules)
Degree Requirements

Refer to the official SoC website and NUS Bulletin for complete, up-to-date information.


For degree requirements of previous cohort:
http://www.comp.nus.edu.sg/cugresource/per-cohort/isc/isc-17-18/
From https://www.comp.nus.edu.sg/programmes/ug/isc/curr/

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>ULR</td>
<td>20</td>
<td>Required</td>
</tr>
<tr>
<td>Foundation</td>
<td>36</td>
<td>Computing Foundation</td>
</tr>
<tr>
<td>Math</td>
<td>12</td>
<td>Security Core</td>
</tr>
<tr>
<td>Communication</td>
<td>8</td>
<td>In-depth in chosen topics</td>
</tr>
<tr>
<td>Infosec Core</td>
<td>20</td>
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</tr>
<tr>
<td>Infosec Elective</td>
<td>12</td>
<td>Industrial/research experience</td>
</tr>
<tr>
<td>CS Breath</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Intern/FYP</td>
<td>12</td>
<td>Choose what suit you</td>
</tr>
<tr>
<td>Unrestrictive UE</td>
<td>32</td>
<td></td>
</tr>
</tbody>
</table>

What a graduate should know

Computing Foundation

Security Core

In-depth in chosen topics

Industrial/research experience

Choose what suit you
Electives (choose 3).
Can be counted as Breadth (choose 2) or UE
CORE

- CS2107 Intro to InfoSec.
  - Illustrates how system fails. Focus on communication security (basic crypto + network).
- CS3235 Computer Security.
  - In-depth. System, Web/mobile. Focus on System security

- (IFS4103 + CS4238) or (IFS4105)
  - IFS4103: (Pentesting) Let’s pentest NUS systems
  - CS4236: (Lab) Let’s hack some virtual environment. Attack kill chain.
  - or
  - IFS4105: (Capstone Project) Let’s build a security system.

- IS4231 Infosec Management.
  - Infeasible to be “perfectly secure”. Let’s manage it.

ELECTIVES

e.g.

IFS4101 Legal Aspect

CS4239 Software security

CS4238 Cryptography

...
Remarks

• CS3235 (Sys) is the pre-req of many advanced modules. Complete it early.

• CS3230 (Algo) is a core in BCOMP CS but not in InfoSec. Algorithm Analysis is fundamental. Recommended although not core.

• CS2107 (Intro).
  • Currently (including this cohort), students graduated from security-focus diploma could waive CS2017. No waiver for later cohort (AY21/22 onward).
  • We recently revised CS2107 (intro)+CS3235(sys)+CS4236(crypto). New version of CS2107 contains more components in crypto and security formulation.
  • Although current cohort can waive, they are encouraged to take CS2107.
## CS vs Infosec

<table>
<thead>
<tr>
<th>CS</th>
<th>InfoSec</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS1101S / CS2040</td>
<td>CS1010 / CS2040C</td>
<td>In C++ instead of Java</td>
</tr>
<tr>
<td>CS2030, CS2103T</td>
<td>CS2113T</td>
<td>Combined SE and OOP</td>
</tr>
<tr>
<td>ES2660</td>
<td>IS3103</td>
<td>IS Leadership &amp; Communication</td>
</tr>
<tr>
<td>CS3230</td>
<td>CS2102</td>
<td>Database replaces Algorithms</td>
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<tr>
<td>SoftEng Project</td>
<td>InfoSec Project</td>
<td></td>
</tr>
<tr>
<td>CS Electives</td>
<td>InfoSec Core + Electives</td>
<td></td>
</tr>
<tr>
<td>1 Sci Module</td>
<td>2 SoC Electives</td>
<td>Any CP/IS/CS coded modules</td>
</tr>
</tbody>
</table>

### Notes:
- CS Electives include 1 Sci Module and 2 SoC Electives.
- InfoSec Electives include InfoSec Core + Electives.
## Sample Study Plan (AY20/21)

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sem 1</strong></td>
<td><strong>Sem 2</strong></td>
<td><strong>Sem 1</strong></td>
<td><strong>Sem 2</strong></td>
</tr>
<tr>
<td>CS1010 Programming Methodology</td>
<td>ST2334 Probability and Statistics</td>
<td>CS2106 Introduction to Operating System</td>
<td>+ CS2101 Effective Communication for Computing Professionals</td>
</tr>
<tr>
<td>CS1231S Discrete Structures</td>
<td>CS2100 Computer Organisation</td>
<td>CS2107 Introduction to Computer Security</td>
<td>CS3235 Computer Security</td>
</tr>
<tr>
<td>IS1103 Ethics in Computing</td>
<td>CS2040C Data Structures and Algorithms</td>
<td>UE (2MC)</td>
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<tr>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>UE (2MC)</td>
<td>ULR</td>
<td>UE</td>
<td></td>
</tr>
<tr>
<td>ULR</td>
<td>ULR</td>
<td>ULR</td>
<td>ULR</td>
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<tr>
<td>22 MCs</td>
<td>22 MCs</td>
<td>20 MCs</td>
<td>22 MCs</td>
</tr>
</tbody>
</table>

Same samples listed in Luminus "OTH881"

*: core requirement (IFS4205) or (CS4238+IFS4203). If taken all 3, (1) CS4238 can be counted as “Breadth elective” or “Infosec elective” or UE, (2) IFS4203 can be counted as infosec electives or UE.
Many variations/options:

- NOC
- Co-op
- Internship
- Double degree, 2nd Major, Minor.
- Exchange
Second Major/Minor

Some interesting options:
• Second Major in Mathematics
• Second Major in Statistics
• Minor in Mathematics
• Minor in Statistics
• Minor in Financial Mathematics
• Minor in Life Science
• Minor in Geography Information Systems
• Minor in Interactive Media Development
• Minor in Management
• Minor in Technopreneurship
• and many others

Co-op (Infosec)
Co-operative Education Programme (Infosec)

• Integrates academic studies with relevant work experience.

• Students complete multiple (3) industrial attachment stints alternating with regular academic semesters over their 4-year candidature at NUS.

• Students can expect to work at an attached company for three internships (about 64 weeks or around 16 months).
### A-level intake

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sem 1 (early-Aug~mid-Dec)</td>
<td>Special term (mid-May~end-July)</td>
<td>Sem 1</td>
<td>Sem 2</td>
</tr>
<tr>
<td>NUS 1st internship (~12 weeks)</td>
<td>NUS 2nd internship (~24 weeks)</td>
<td>NUS 3rd internship (~28 weeks)</td>
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### Poly Intake

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<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
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</thead>
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<tr>
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<td>Special term</td>
<td>Sem 1</td>
<td>Sem 2</td>
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<tr>
<td>1st internship (12 weeks)</td>
<td>2nd internship (~24 weeks)</td>
<td>3rd internship (~28 weeks)</td>
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See Sample Study Plan in IVLE
# Sample Study Plan (Co-op A level intake)

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<td>MA1521 Calculus</td>
<td>MA1101R Linear A</td>
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<td>CS2113T SW Eng</td>
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<td>CS2100 C. Organ</td>
<td>Internship 2</td>
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<td>CS2040C Data S. Algo</td>
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<td>ST2334 Stat</td>
<td>CS2102 Database</td>
<td>Breadth Elective 1</td>
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<td>ULR</td>
<td>Prep workshop + Placement</td>
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<table>
<thead>
<tr>
<th><strong>Year 1</strong></th>
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<th><strong>Year 3</strong></th>
<th><strong>Year 4</strong></th>
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<td><strong>14 MCs</strong></td>
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## Sample Study Plan (Co-op Poly intake)

<table>
<thead>
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<td>26 MCs</td>
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<tr>
<td>16 MCs</td>
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Timeline in 1st year for Co-op

~July 2019: Submit Application form

Early Jan 2020: Students to be informed if they can continue in the programme

End of Jan 2020: apply internship via TalentConnect Interviews.

End of Feb 2020: Companies convey decisions.

Early Mar 2020: Students accept offer.

End Mar 2020: Placement finalized

First internship
Admin
• Joint Academic Committee (InfoSec)
  • A/P Chang Ee-Chien
  • A/P Roland Yap
  • A/P Setiono Rudy

Enquiry, question: send to SoC Office of Undergraduate Studies
socug@comp.nus.edu.sg

The email will be redirected to administrative officer in-charge.
Platform for info dissemination
Security Cluster

**Abhik Roychoudhury**  
Binary Analysis  
Trustworthy Software  
Software Security

**Chang Ee-Chien**  
Multimedia Security  
Data Privacy  
Cloud Security

**Divesh Aggarwal**  
Information Theoretic Cryptography

**Guo Charng Rang**  
Trusted System Voting  
Cryptography

**Kang Min Suk**  
Network & Distributed  
System Security  
Wireless Network Security  
Internet User Privacy

**Liang Zhenkai**  
Binary hardening  
System Security

**Norman Hugh Anderson**  
Hardware Security

**Jun Han**  
IoT Security

**Prateek Saxena**  
System Security Data Protection  
Fintech

**Reza Shokri**  
Computer Security & Privacy

**Roland Yap**  
System Security  
Cloud Computing  
Programming Languages
Other Researchers

- **Stephane Bressan** - Data Anonymization
- **Chan Mun Choon** - Network Security
- **Xiao Xiaokui** - Data Privacy
- **Harold Soh** - Human Behaviour
- **Terence Sim** - Face Recognition, Biometric Security
- **Rahul Jain** - Quantum Cryptography, Algorithms
- **Yu Haifeng** - Distributed Computing, Sybil Attacks
- **Tan Kian Lee** - Database Security & Data Privacy
- **Dong Jinsong** - Formal Method, Security Protocol Analysis
- **Mohan Kankanhalli** - Image/Video Security & Privacy
Research Centers

**NCL**
National Cybersecurity R&d Lab

**NUS-Singtel Corporate Lab in Cybersecurity**

**SGCSC**
Singapore Cybersecurity Consortium

**N-CRiPT**
NUS Centre for Research in Privacy Technologies

**CRYSTAL**
Cryptocurrency Strategy, Techniques, and Algorithms

**Shared infrastructure, resources & platform of interactions for cybersecurity R&D community**

**Enhancing capabilities for the next-gen Managed Security Service Provider**
- Security Data analytics
- Security-as-a-Service in Cloud
- IoT
- Future-ready technology

**A seamless platform for engagement between industry, government and IHLs in the area of information security in Singapore**

**Towards a privacy-aware Smart Nation**
The goal is to develop privacy-preserving technologies to protect people’s and organisations’ privacy in a holistic manner

**Providing scientific clarity in shaping technical ideas in the blockchain and cryptocurrency space**
Activities

NUS Greyhats.

https://nusgreyhats.org/
https://www.facebook.com/groups/nusgreyhats/about/
Advise & suggestions

• Prepare for the “culture-shock”.
• Be openminded.
• Learn how to learn.

• Cybersecurity is multidisciplinary.
• *We are the good guy.*
Thank You!

Q&A

Let’s secure the cyberworld