Briefing
Bachelor of Computing in Information Security 2019/20

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

• Started in 2015, enhancing and replacing Specialisation in Information Security.

• Starting with 11 students from AY14/15.
• 11, 16, 26, 43, 70, …
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/isiccurr/
**CORE**

- **CS2107 Intro to InfoSec.**
  - Illustrates how system fails. General knowledge for all IT professionals.

- **CS3235 Computer Security.**

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

- **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 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). Students graduated from security-focus diploma could waive CS2017. Nevertheless, try taking it, maybe in year 1 semester 2.
## CS vs Infosec

<table>
<thead>
<tr>
<th>CS</th>
<th>InfoSec</th>
<th>Remarks</th>
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<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>
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<tr>
<td>ES2660</td>
<td>IS3103</td>
<td>IS Leadership &amp; Communication</td>
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<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>
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<tr>
<td>CS Electives</td>
<td>InfoSec Core + Electives</td>
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<tr>
<td>1 Sci Module</td>
<td>2 SoC Electives</td>
<td>Any CP/IS/CS coded modules</td>
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**Sample Study Plan (AY19/20)**

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<thead>
<tr>
<th>Year 1</th>
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<tbody>
<tr>
<td>Sem 1</td>
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<tr>
<td><strong>MA1521</strong>&lt;br&gt;Calculus for Computing</td>
<td><strong>MA1101R</strong>&lt;br&gt;Linear Algebra I</td>
<td><strong>ST2334</strong>&lt;br&gt;Probability and Statistics</td>
<td><strong>CS2113T</strong>&lt;br&gt;Software Engineering &amp; Object-Oriented Programming</td>
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<td><strong>CS1010</strong>&lt;br&gt;Programming Methodology</td>
<td><strong>CS2105</strong>&lt;br&gt;Introduction to Computer Networks</td>
<td><strong>CS2107</strong>&lt;br&gt;Introduction to Information Security</td>
<td>+ <strong>CS2101</strong>&lt;br&gt;Effective Communication for Computing Professionals</td>
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<td><strong>CS1231S</strong>&lt;br&gt;Discrete Structures</td>
<td><strong>CS2100</strong>&lt;br&gt;Computer Organisation</td>
<td><strong>CS2106</strong>&lt;br&gt;Introduction to Operating Systems</td>
<td><strong>CS3235</strong>&lt;br&gt;Computer Security</td>
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<tr>
<td><strong>IS1103</strong>&lt;br&gt;IS Innovations in Organisations and Society</td>
<td><strong>CS2040C</strong>&lt;br&gt;Data Structures and Algorithms</td>
<td>UE (2MC)</td>
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<tr>
<td>22 MCs</td>
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<td>20 MCs</td>
<td>22 MCs</td>
<td>20MC</td>
<td>16MC</td>
<td>20MC</td>
<td>20 MCs</td>
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*: 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

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

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<th>Year 4</th>
<th>Year 5</th>
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<tbody>
<tr>
<td><strong>Sem 1</strong> (early-Aug~mid-Dec)</td>
<td><strong>Sem 1</strong></td>
<td><strong>Sem 1</strong></td>
<td><strong>Sem 1</strong></td>
<td><strong>Sem 1</strong></td>
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<tr>
<td>Exemption</td>
<td>NUS</td>
<td>1st internship (12 weeks)</td>
<td>NUS</td>
<td>3rd internship (~28 weeks)</td>
</tr>
<tr>
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See Sample Study Plan in IVLE
### Sample Study Plan (Co-op A level intake)

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<td>Sem 1</td>
<td>Sem 2</td>
<td>Sem S</td>
<td>Sem 1</td>
</tr>
<tr>
<td>MA1521 Calculus</td>
<td>MA1101R Linear A</td>
<td>CS2113T SW Eng</td>
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<tr>
<td>CS1010 Programming</td>
<td>CS2107 Intro</td>
<td>CS2106 OS</td>
<td>IS3103 Leadership</td>
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<td>CS1231S Discrete</td>
<td>CS2100 C. Organ</td>
<td>CS2105 Network</td>
<td>InfoSec Elective 1</td>
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<tr>
<td>IS1103 IS innovation</td>
<td>CS2040C Data S. Algo</td>
<td>CS2102 Database</td>
<td>Breadth Elective 1</td>
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<tr>
<td>UE(2MC)</td>
<td>ST2334 Stat</td>
<td>ULR</td>
<td>UE</td>
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<tr>
<td>ULR</td>
<td>Prep workshop + Placement</td>
<td>ULR</td>
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# Sample Study Plan (Co-op Poly intake)

<table>
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<th>Year 5</th>
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<tbody>
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<td>6 MC s</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: SOC Undergraduate Office
socug@comp.nus.edu.sg
Security Cluster

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

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

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

**Divesh Aggarwal**  
Information Theoretic 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

**Prateek Saxena**  
System Security Data Protection  
Fintech

**Reza Shokri**  
Computer Security & Privacy

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

**Guo Charing Rang**  
Trusted System Voting  
Cryptography

**Jun Han**  
IoT Security
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

- **National Cybersecurity R&D Lab (NCL)**: Shared infrastructure, resources & platform of interactions for cybersecurity R&D community

- **NUS-Singtel Corporate Lab in Cybersecurity**:
  - Enhancing capabilities for the next-gen Managed Security Service Provider
  - Security Data analytics
  - Security-as-a-Service in Cloud
  - IoT
  - Future-ready technology

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

- **TSUNAMI**:
  - R&D on how trustworthy software can be built from commercial off-the-shelf (COTS) components

- **N-CRIPT**:
  - 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
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