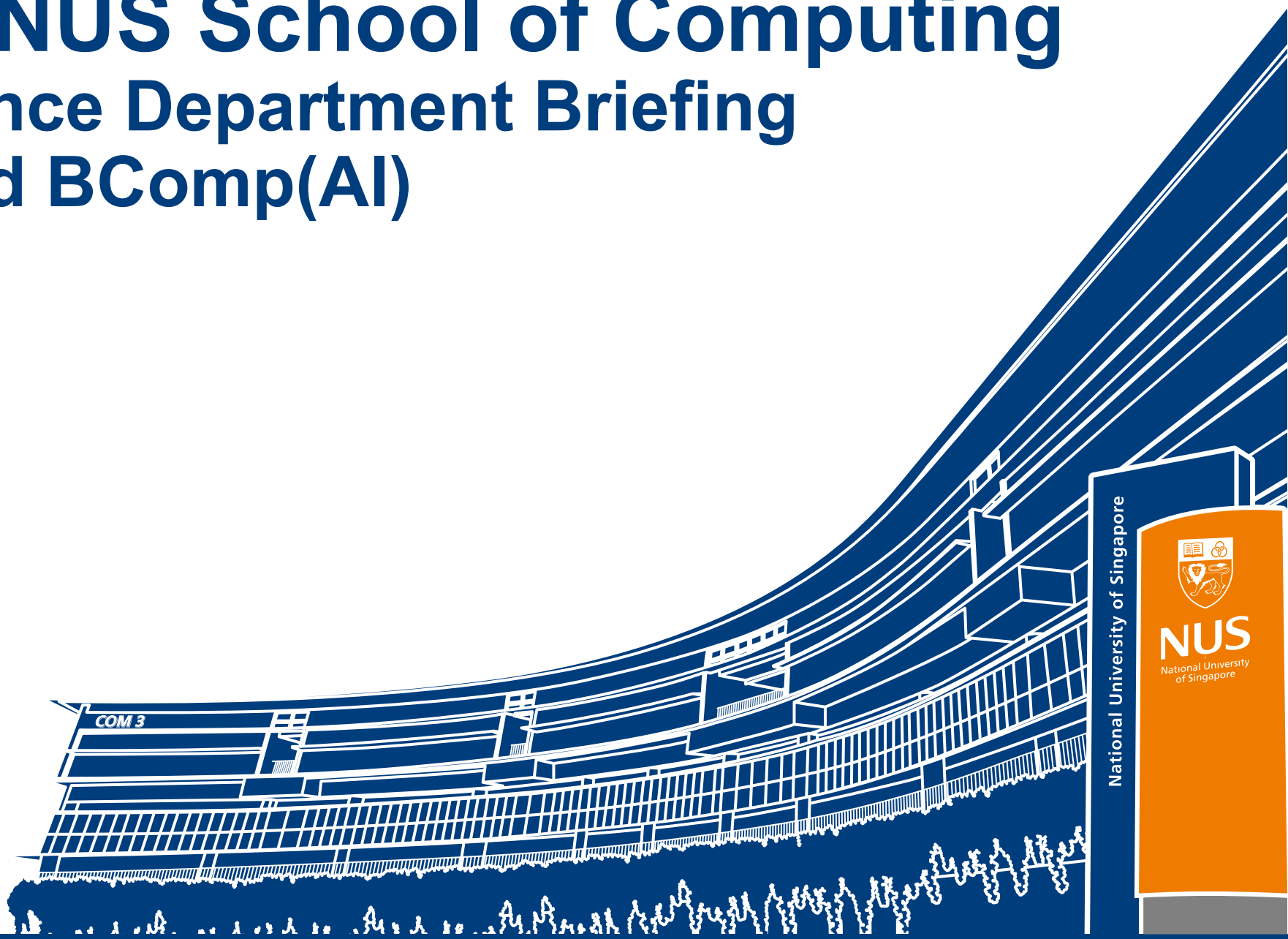
Welcome to NUS School of Computing

Computer Science Department Briefing

BComp(CS) and BComp(AI)

July 2025



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National University of Singapore

University Life (?)

Classes

Socializing

Extracurriculars

“What should I do now?”

Disclaimer

Information on these slides is simplified for this presentation and should not be treated as official degree requirements.

Students should *always* refer to the official SoC Website and NUS Bulletin for complete up-to-date information.

Please check with the SoC Undergraduate Office to clarify any requirements that are unclear.

Focus today: BComp(CS) and BComp(AI) degree requirements.

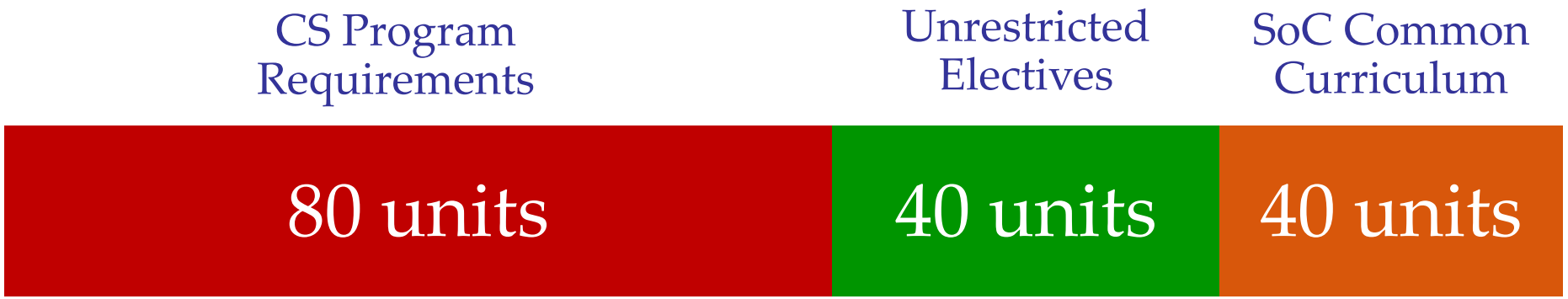
Other programs (Turing, DDP, etc.) are similar.

Common Admission and Programme Declaration

- When students first matriculate into common admission of CS and AI, they will remain in an "indeterminate" state for their first four semesters.
- At the end of their fourth semester (or equivalent), students will declare either the AI degree programme or the Computer Science degree programme.
- Difference?
  - CS: Targeting future computer scientists with knowledge of the general computing system (integrating diverse subareas, such as AI and security).
  - AI: Targeting future AI scientists who want to dive deeper into AI and drive its advancement.

BComp(CS) Degree Requirements

*Special programmes and double degree programs are slightly different.



https://www.comp.nus.edu.sg/cug/per-cohort/cs/cs-25-26/

CS Goals

Strong technical and knowledge foundations in computer science.

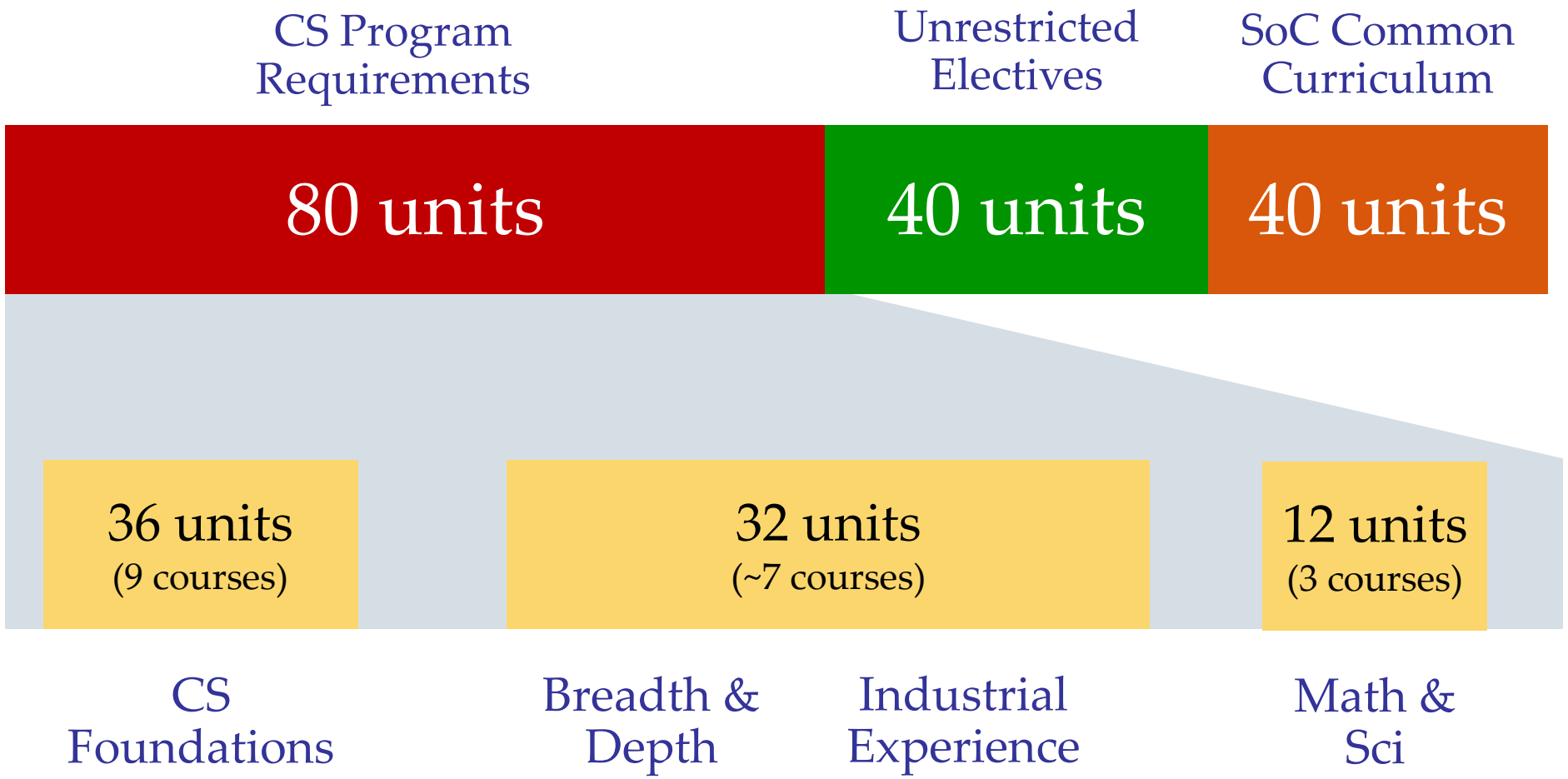
Excellent problem-solving and rigorous thinking skills.

Broad knowledge of the field with understanding of responsibilities of technology.

In-depth knowledge of (at least) one specialized area.

Good communication and teamwork skills.

BComp(CS) Degree Requirements



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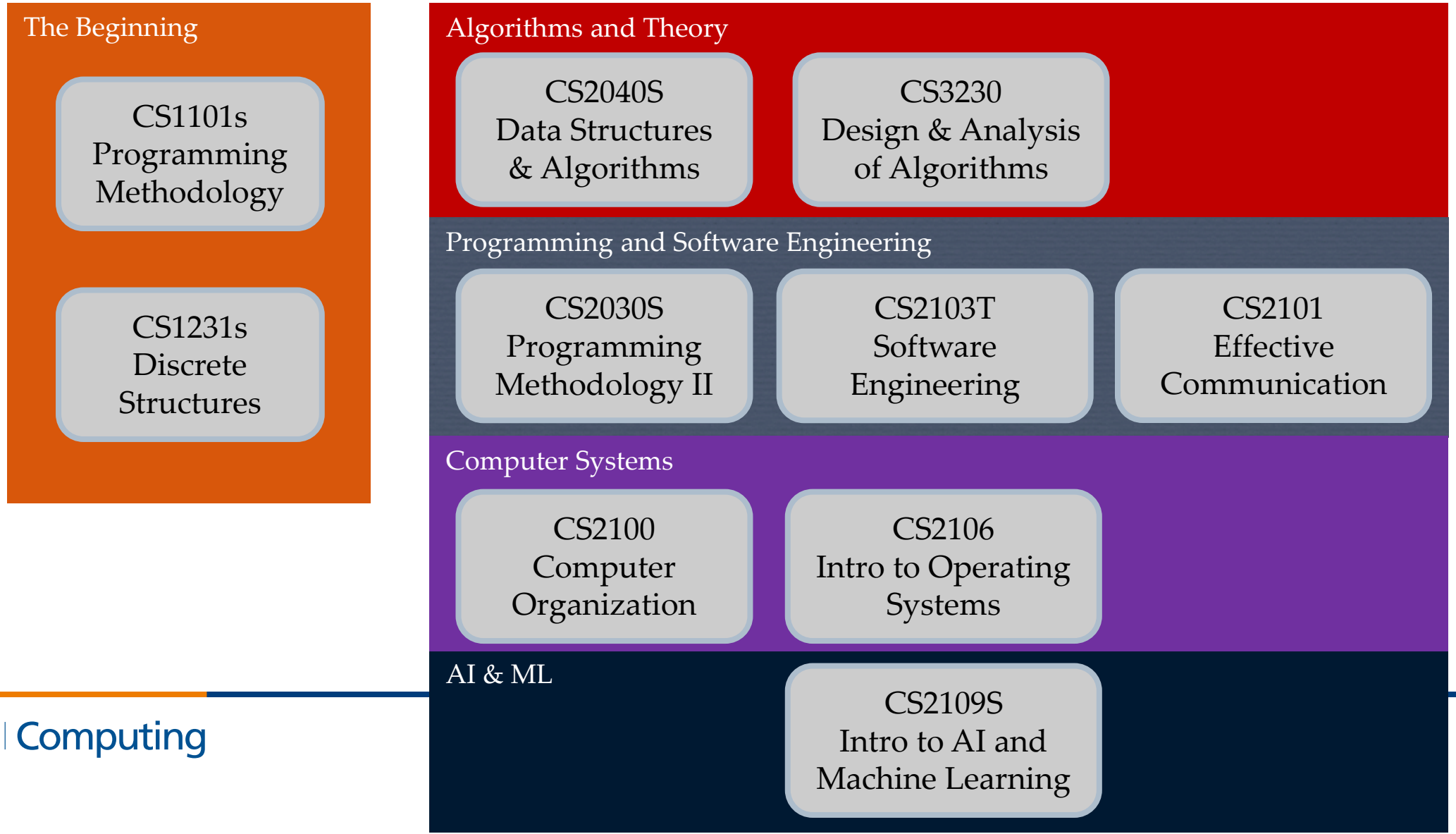
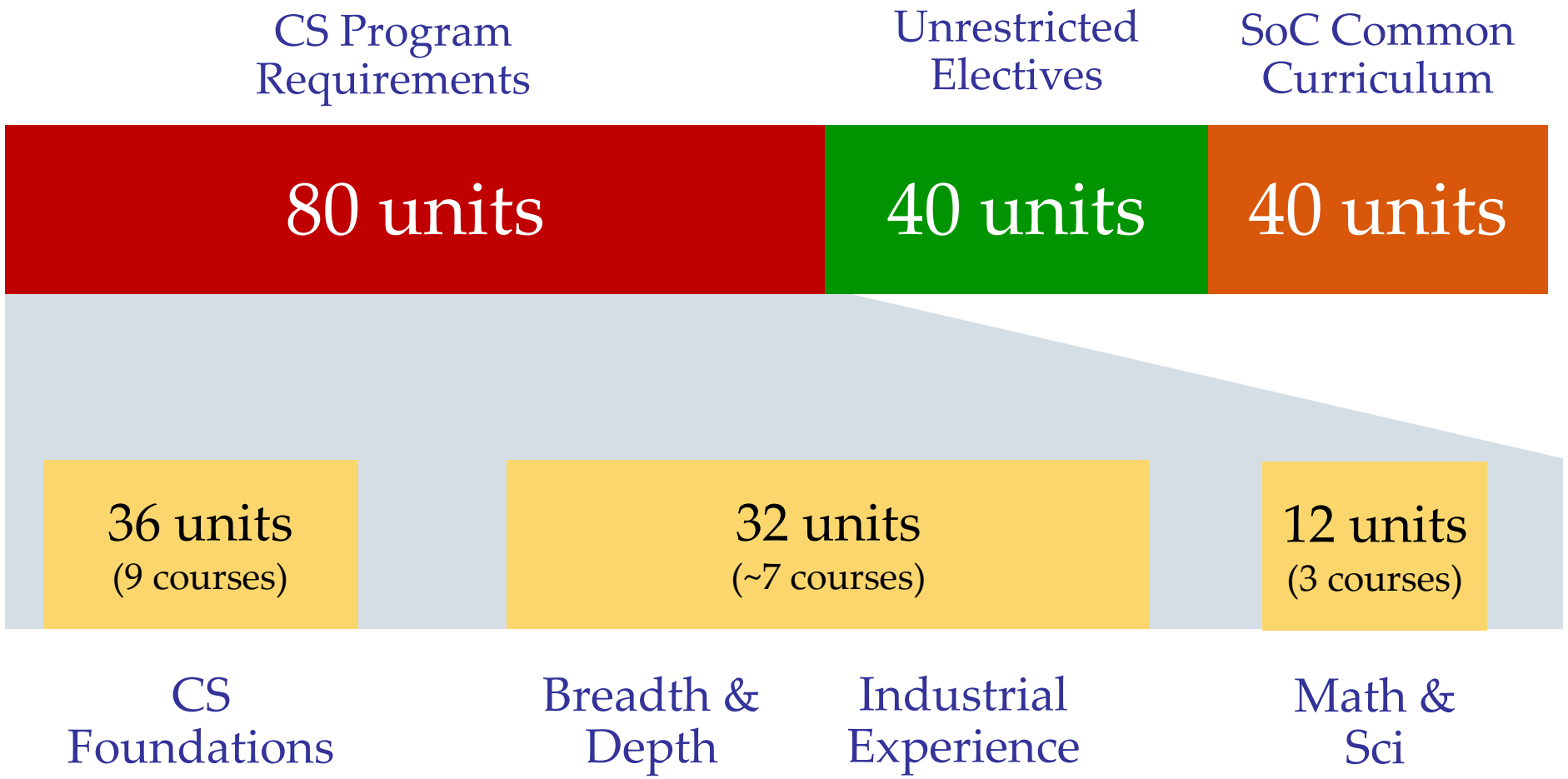
CS Foundations



BComp(CS) Degree Requirements



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CS Breadth & Depth

1. Complete 12 units at level 4000 or above.

2. Satisfy a focus area:

   Complete 3 "primary" courses in an area (at least one level 4000).

3. Get industrial experience:

   Complete 3 month (6 unit) or 6 month (12 unit) industrial experience.

10 Focus Areas

1. Algorithms and Theory
2. Artificial Intelligence
3. Computer Graphics and Games
4. Computer Security
5. Database Systems
6. Multimedia Information Retrieval
7. Networking and Distributed Systems
8. Parallel Computing
9. Programming Languages
10. Software Engineering

Focus Area Core Courses and Electives

- A CS Focus Area is satisfied by completing 3 courses from the Area Primaries, with at least one course at 4000-level or above.
  - E.g., Database Focus Area

Primaries

- **CS2102** Database Systems
- **CS3223** Database Systems Implementation
- **CS4221** Database Applications Design and Tuning
- **CS4224** Distributed Databases
- **CS4225** Big Data Systems for Data Science

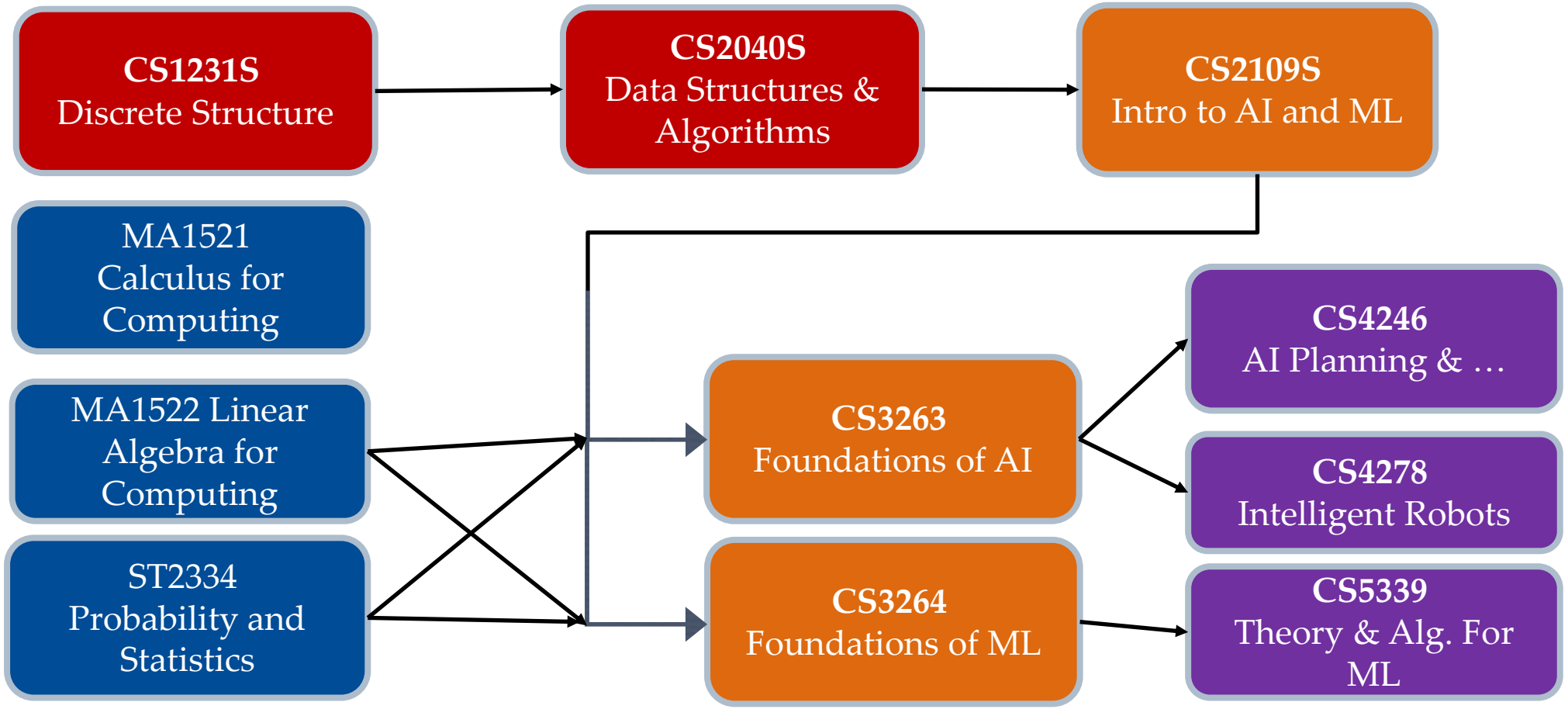
- Each focus areas has a set of "electives" for students who want to learn more about the area.
  - E.g., Database Focus Area

Electives

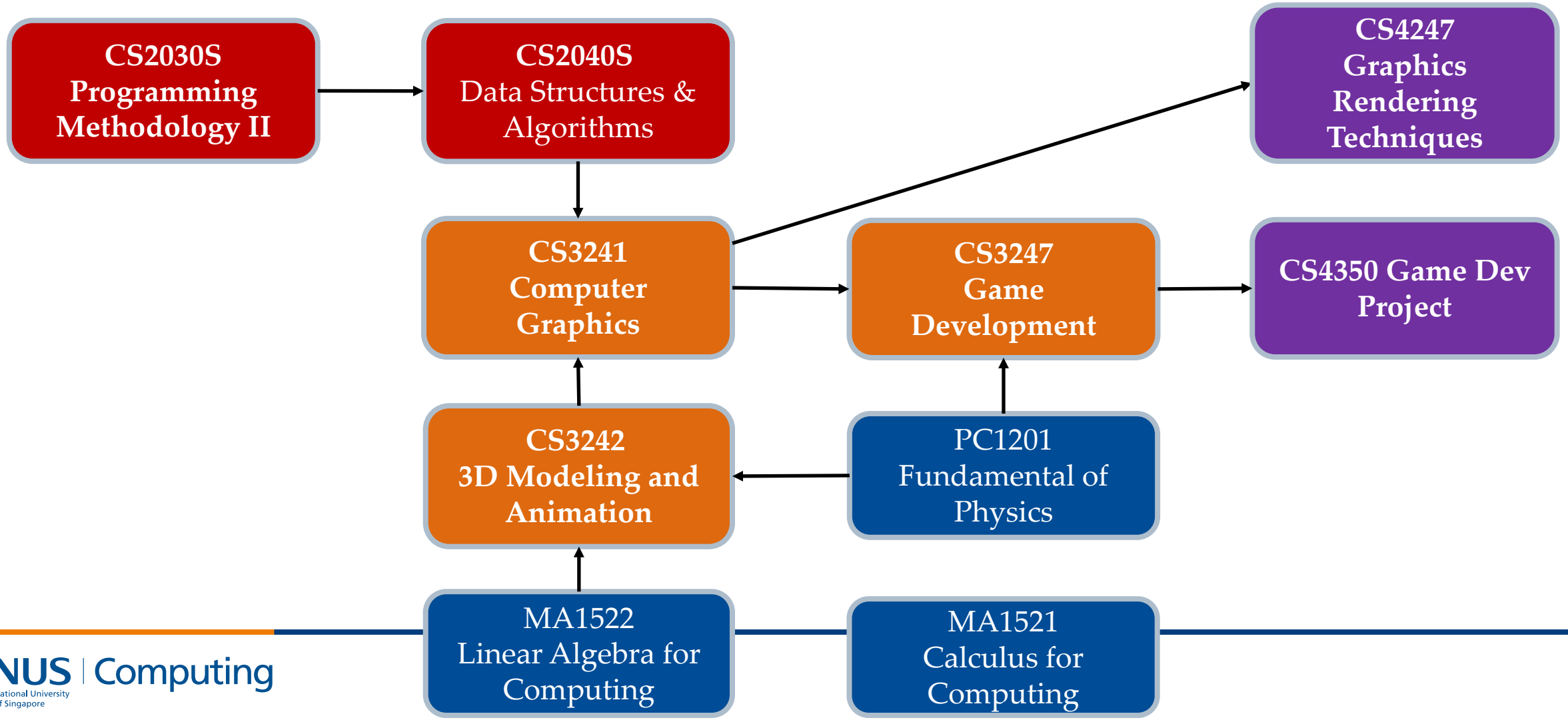
- **CS4220** Knowledge Discovery Methods in Bioinformatics
- **CS5226** Database Tuning
- **CS5228** Knowledge Discovery and Data Mining
- **CS5322** Database Security

https://www.comp.nus.edu.sg/programmes/ug/focus/

Warning: Check Prerequisites (e.g., AI)



Warning: Check Prerequisites (e.g., Computer Graphics and Games)



Breadth & Depth

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Industrial Experience

ATAP (Advanced Technology Attachment Program)

SIP (Student Internship Program)

CVWO (Computing Voluntary Welfare Organization)

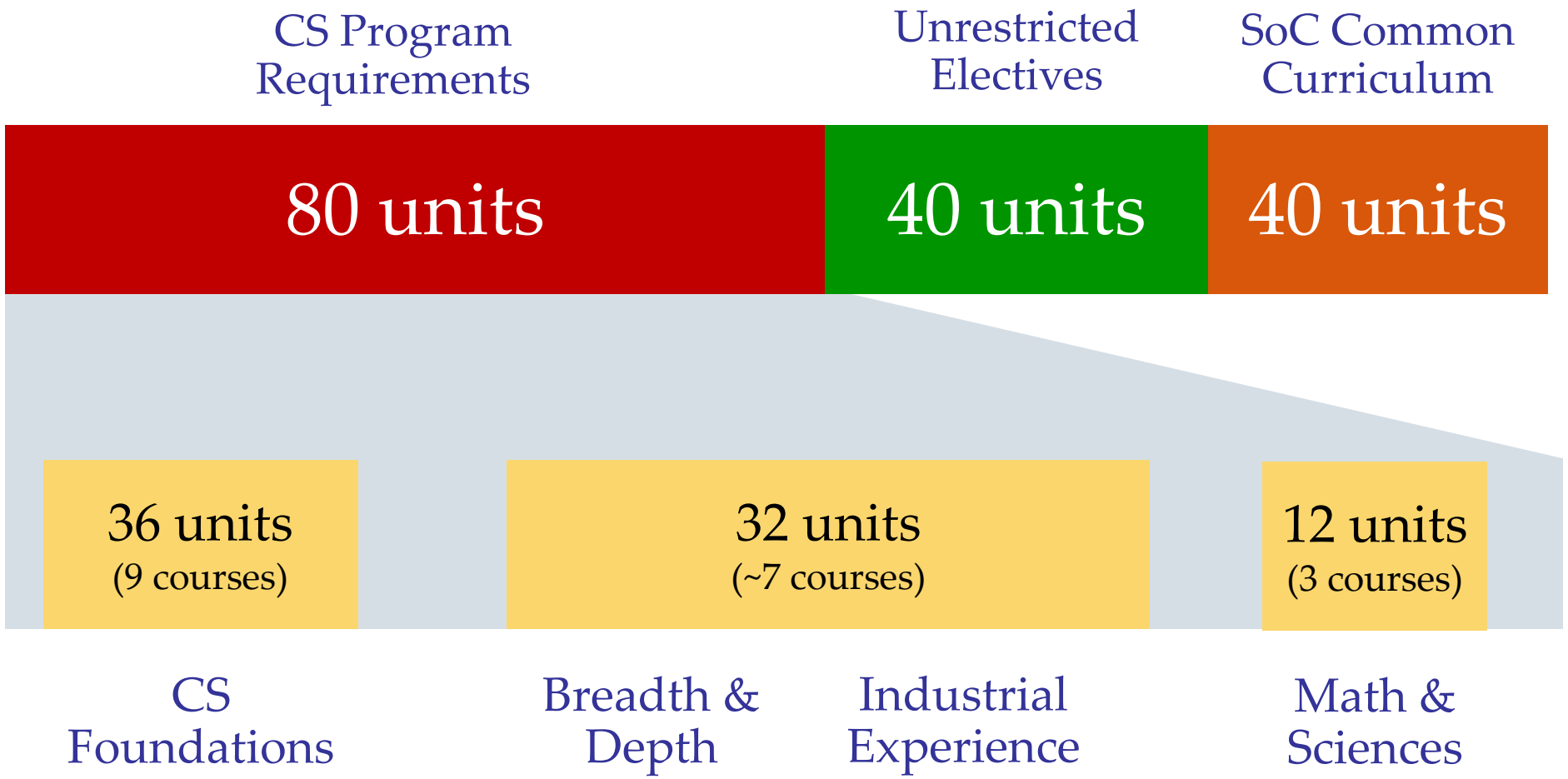
NOC (NUS Overseas College)

Other…

Students with CAP of 4.00 or higher may replace Industry Experience with a dissertation (Final Year Project: CP4101).

Students who aim for Honours (Highest Distinction) must pass the programme's dissertation course (i.e. CP4101).

BComp(CS) Degree Requirements



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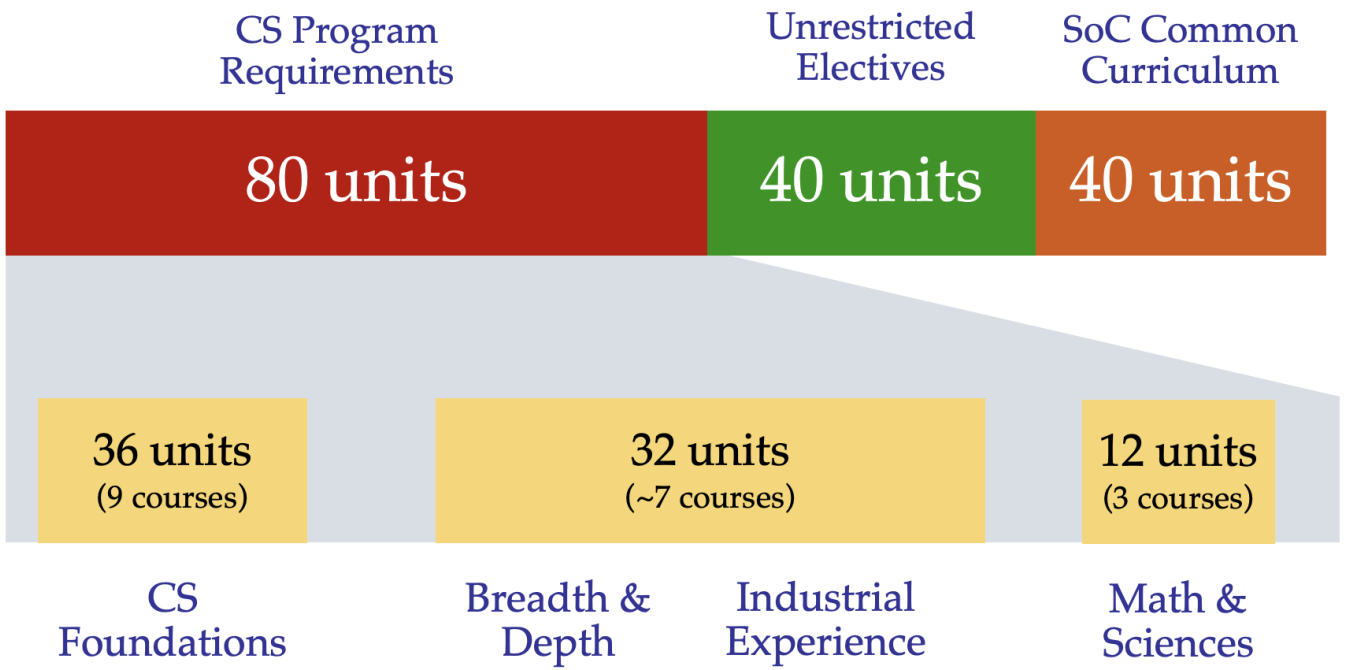
BComp(CS) Degree Requirements: Math Courses



MA1521 Calculus for Computing

MA1522 Linear Algebra for Computing

ST2334 Probability & Statistics

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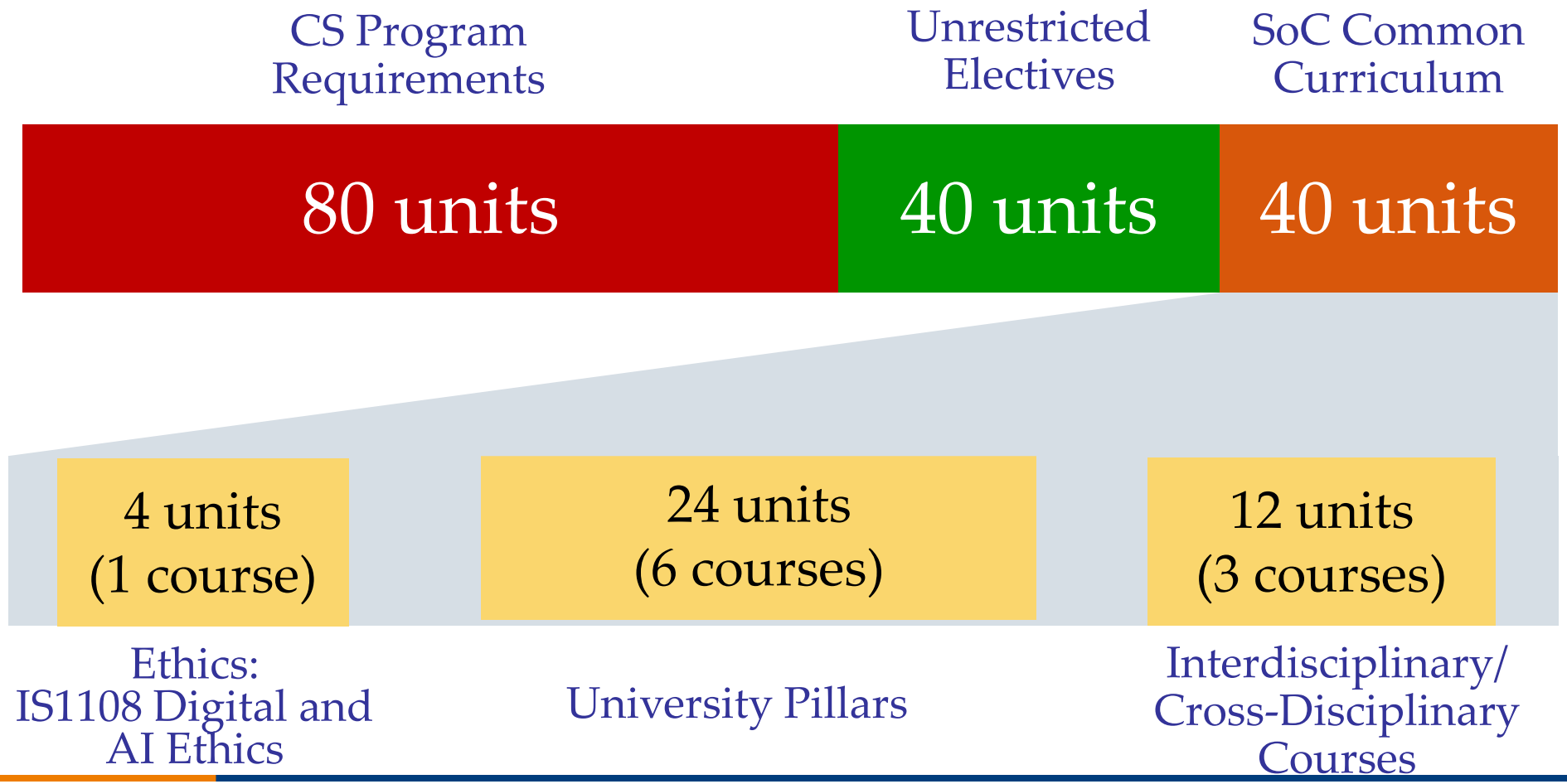
BComp(CS) Degree Requirements



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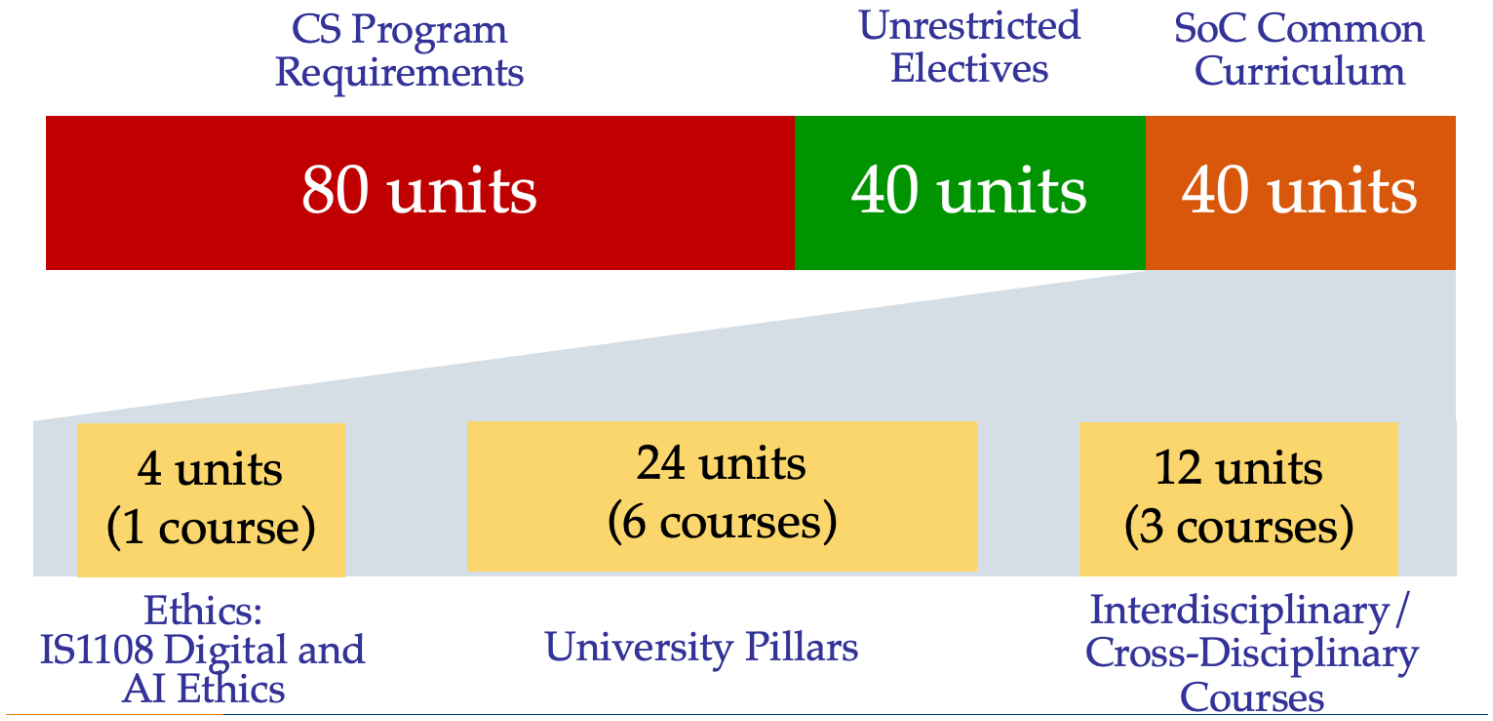


University Pillars

- Data Literacy
- Critique & Expression
- Cultures & Connections
- Digital Literacy
- Singapore Studies
- Communities & Engagement

https://www.comp.nus.edu.sg/cug/per-cohort/cs/cs-25-26/

BComp(CS) Degree Requirements

University Pillars

Data Literacy:

- Preregistered: GEA1000
- Other options: DSA1101, ST1131
- Can drop GEA1000 and apply for other options

Data Literacy

Critique & Expression

ES2660 Communicating in the Information Age

Cultures & Connections

Digital Literacy

CS1101S Programming Methodology

Singapore Studies

Communities & Engagement

https://www.comp.nus.edu.sg/cug/per-cohort/cs/cs-25-26/

Data Literacy

GEA1000: Quantitative Reasoning
- Intro to statistics
- Data analysis
- Data analysis project

Broader
Less mathematical
Less programming

ST1131: Introduction to Statistics and Statistical Computing
- Statistics
- R programming
- Data analysis

DSA1101: Introduction to Data Science
- Basic probability and statistics
- Data manipulation
- Data analysis

Targeted at DSA students
Fewer seats available
More overlap with CS courses

Data Literacy

GEA1000: Quantitative Reasoning
- Intro to statistics
- Data analysis
- Data analysis project

Computational/programming centered
Mathematically rigorous
Good preparation for CS courses in AI/ML

ST1131: Introduction to Statistics and Statistical Computing
- Statistics
- R programming
- Data analysis

DSA1101: Introduction to Data Science
- Basic probability and statistics
- Data manipulation
- Data analysis

BComp(CS) Degree Requirements

Interdisciplinary / Cross-disciplinary courses

- Choose three courses from the specified course lists.
- At least two must be interdisciplinary.

Interdisciplinary = integrates more than one discipline

Cross-disciplinary = a field different from CS that has interesting connections to CS.

BComp(CS) Degree Requirements

Examples: Interdisciplinary courses

- IS1128 IT, Management and Organisation
- IS2238 Economics of IT and AI
- HSH1000 The Human Condition
- HSI2001 Scientific Inquiry & Health: Good Science, Bad Science
- HSI2011 The World of Quantum
- DTK1234 Design Thinking
- EG2501 Liveable Cities
- IE2141 Systems Thinking and Dynamics
- PF1101A Project Management and Finance

BComp(CS) Degree Requirements

Examples: Cross-disciplinary courses

- DAO2703 Operations and Technology Management
- EL1101E The Nature of Language
- SPH2002 Public Health and Epidemiology
- NUR1113A Healthy Ageing and Well-being
- EG2201A User-Centred Collaborative Design
- EG2310 Fundamentals of Systems Design
- Any Chemistry, Physics, or Biological Sciences (PC, CM, or LSM coded)

Some options:

- Second major in mathematics.
- Second major in statistics.
- Minor in mathematics.
- Minor in statistics.
- Minor in financial mathematics.
- Minor in life sciences.
- Minor in geographic information systems.
- Minor in interactive media development.
- Minor in management.
- Minor in management of technology.
- Minor in entrepreneurship.

And many more…

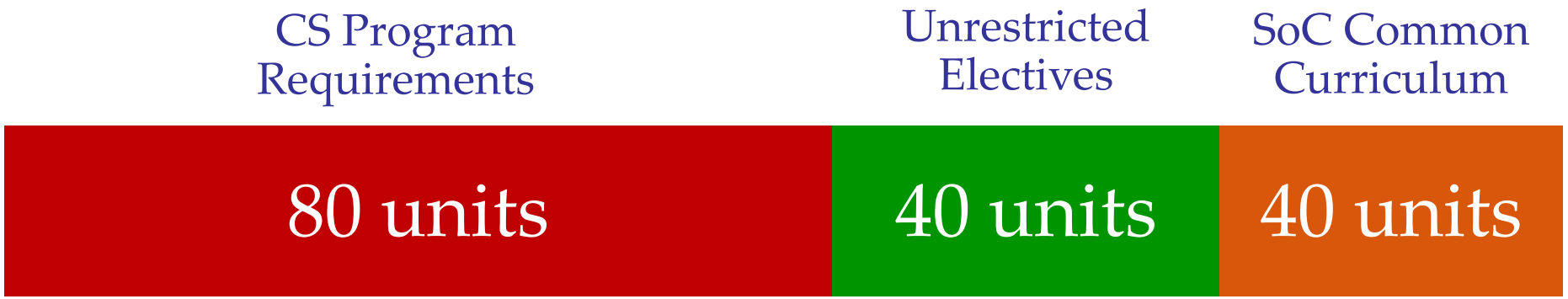
Unrestricted Electives

40 units of Unrestricted Electives are useful here…

40 units

BComp(CS) Degree Requirements

*Special programmes and double degree programs are slightly different.



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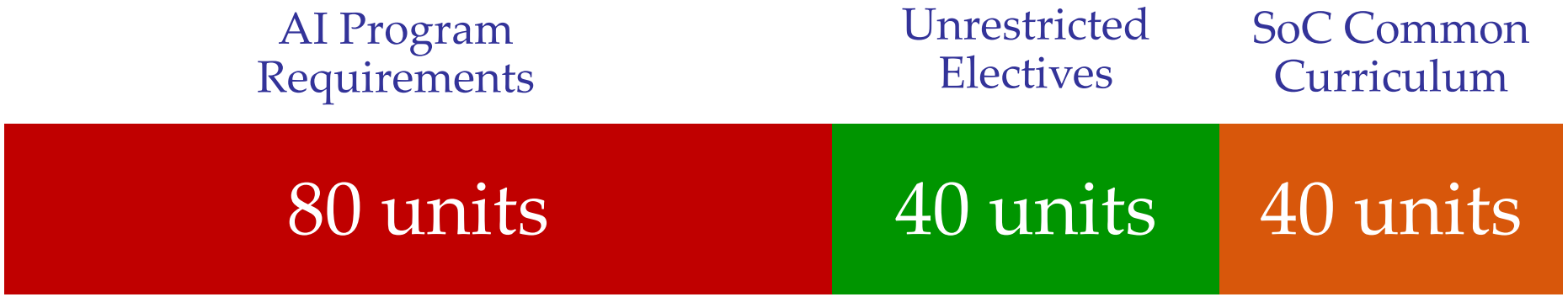
BComp(AI) Degree Requirements

The Bachelor of Computing (Honours) in Artificial Intelligence or BComp (AI) programme aims to provide students with a strong foundation in AI knowledge and skills to meet today's computing needs, and to prepare them for the continuously changing computing landscape of the future.



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AI Goals

Strong knowledge of computing foundations and fundamentals.

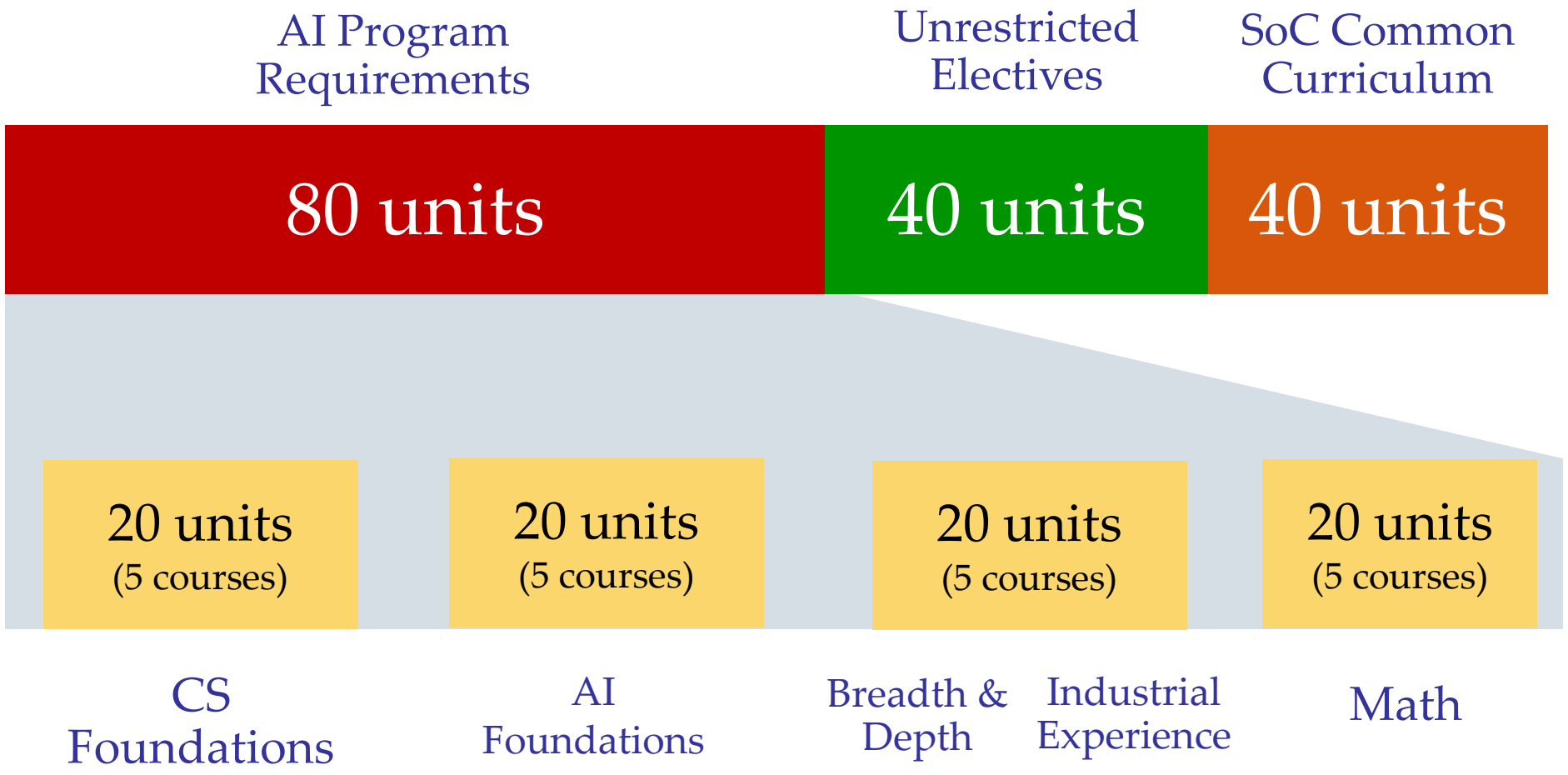
Strong knowledge of AI foundations and fundamentals,
- including broad-based knowledge across the three major areas of AI: Reasoning & Decision Making, Learning, and Perception & Language.

Ability to design, implement, and evaluate AI systems, models, and AI tools.

Understanding of the responsible use of AI.
- including issues of ethics, privacy, and AI governance.

Good communication and teamwork skills.

BComp(AI) Degree Requirements



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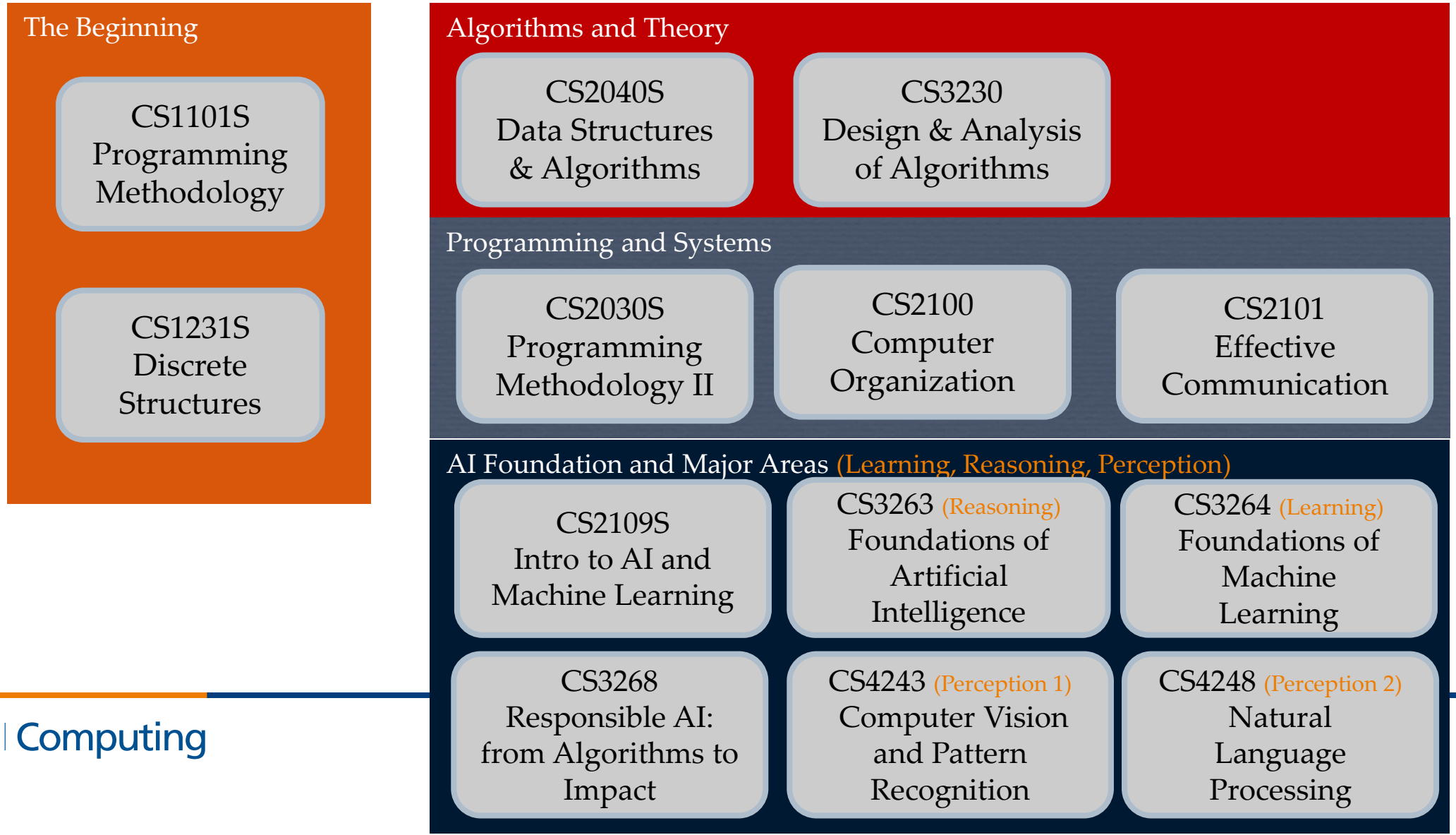
AI Foundations



AI Breadth & Depth

1. At least 12 units at level 4000 or above.

2. At least 12 units from AI Technical Elective List.

3. Get industrial experience:

   Complete 3 month (6 unit) or 6 month (12 unit) industrial experience.

AI Technical Electives List

- CS4220 Knowledge Discovery Methods in Bioinformatics
- CS4225 Big Data Systems for Data Science
- CS4240 Interaction Design for Virtual and Augmented Reality
- CS4244 Knowledge Representation and Reasoning
- CS4246 AI Planning and Decision Making
- CS4261 Algorithmic Mechanism Design
- CS4347 Sound and Music Computing
- CS4277 3D Computer Vision
- CS4278 Intelligent Robots: Algorithms and Systems

Industrial Experience

ATAP (Advanced Technology Attachment Program)

SIP (Student Internship Program)

CVWO (Computing Voluntary Welfare Organization)

NOC (NUS Overseas College)

Other…

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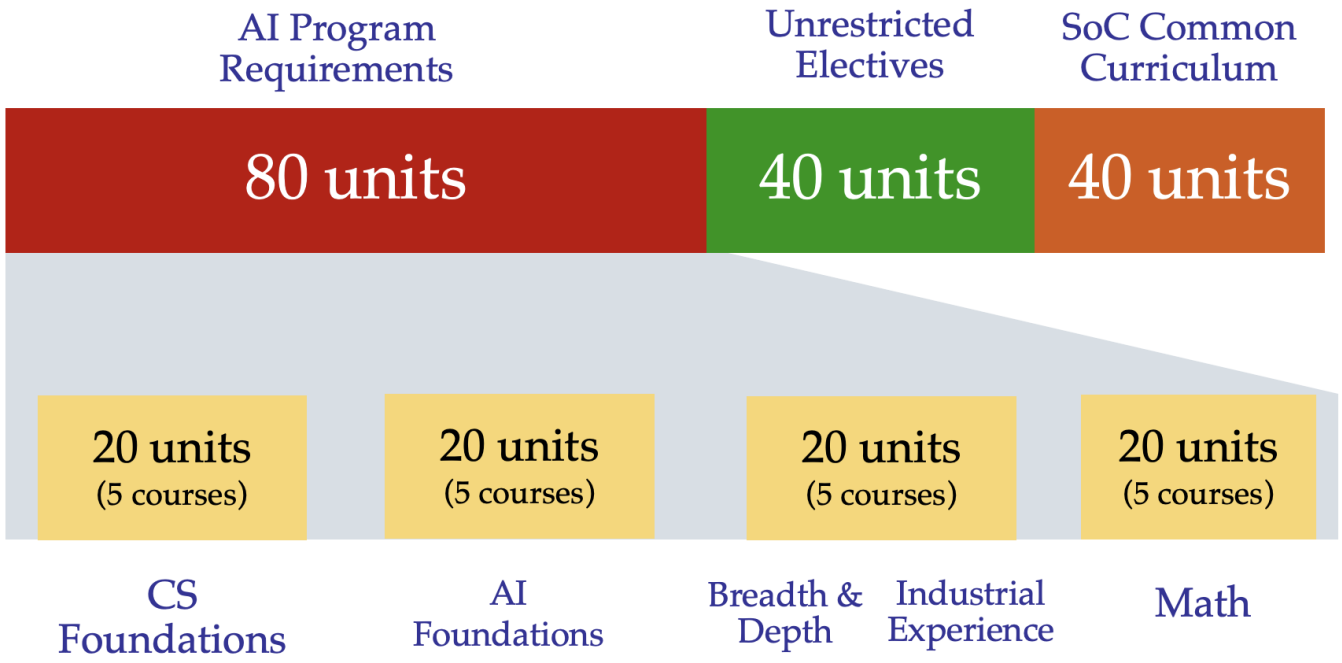
BComp(AI) Degree Requirements: Math Courses



CS1231S Discrete Structures

CS2251 Optimization and Regression

MA1521 Calculus for Computing

MA1522 Linear Algebra

ST2334 Probability & Statistics

https://www.comp.nus.edu.sg/cug/per-cohort/ai/ai-25-26/


How should I plan my time?

CS Year 1: The Basic Foundation

CS1101S
Programming
Methodology

CS2040S
Data Structures
& Algorithms

IS1108
Privacy/Ethics
in Computing

CS2030S
Programming
Methodology II

CS1231S
Discrete
Structures

CS2100
Computer
Organization

How to think computationally.
How to solve computational problems.
How to program.
How does a computer work.
Basic computing math.
Ethical/legal/social issues.

Data Literacy
course

Math

University Pillar
or
Interdisciplinary

Math

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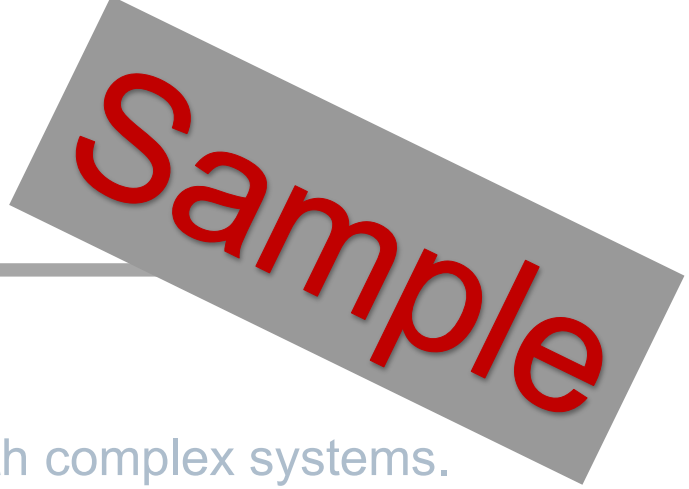
CS Year 2: The CS Core



CS3230
Design & Analysis of Algorithms

CS2106
Intro. to Operating Systems

CS2101
Communication

ES2660
Communication

CS2103T
Software Engineering

CS2109S
Intro to AI and Machine Learning

How to deal with complex systems.
How to deal with complex software.
How to solve hard problems.
Advanced algorithmic techniques.
Begin to specialize.
Develop software skills.

University Pillar or Interdisciplinary

Math

University Pillar or Interdisciplinary

University Pillar or Interdisciplinary

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CS Year 3: The Practical Year

Focus Area Primary	Industrial Experience		
Focus Area Primary	Breadth & Depth	University Pillar or Interdisciplinary	University Pillar or Interdisciplinary
Breadth & Depth	Elective	Elective	Math

Apply knowledge to projects.
Learn practical skills on internships or NOC.
Drill deeper into focus area.

CS Year 4:
Choose Your Own Adventure

Sample

Focus Area Primary

Breadth & Depth

Study advanced courses.
Do research.
Work on projects.
Broaden your knowledge.

Breadth & Depth

Breadth & Depth

Elective

Elective

Breadth & Depth

Elective

Elective

Elective

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AI Year 2: The AI Core

CS3230
Design & Analysis of Algorithms

CS2109S
Intro to AI and Machine Learning

How to solve hard problems.
Advanced algorithmic techniques.
Introduction to AI and ML
Foundations of AI
Responsible AI

CS2101
Communication

ES2660
Communication

University Pillar or Interdisciplinary

Math

CS3263
Foundations of Artificial Intelligence

CS3268
Responsible AI: from Algorithms to Impact

University Pillar or Interdisciplinary

Math

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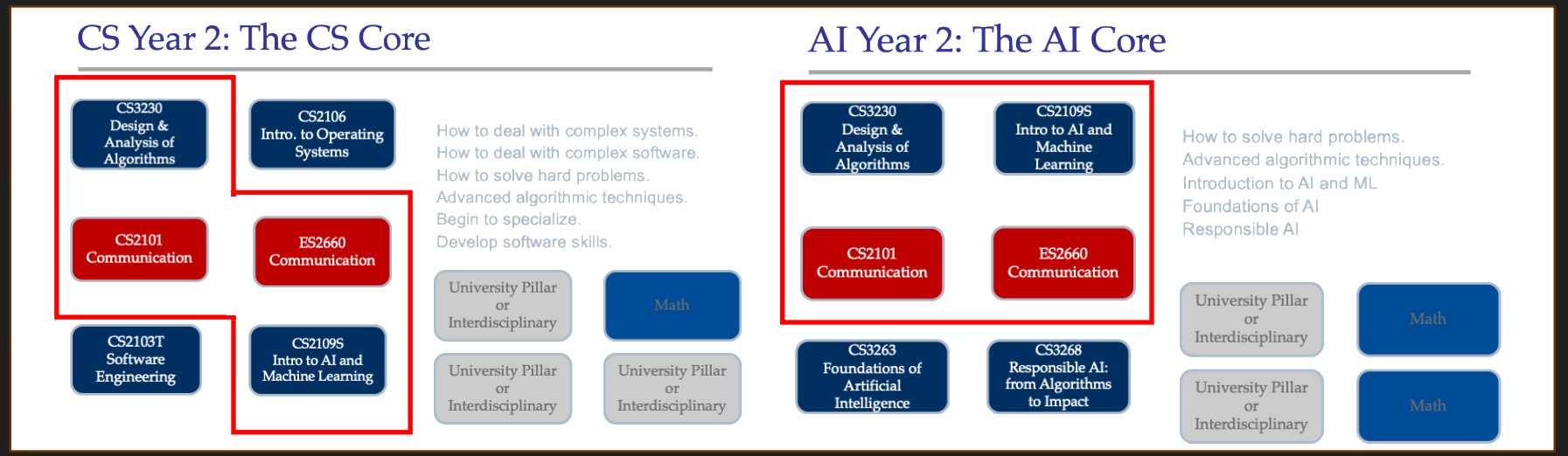
Deciding between CS and AI Programme at the end of Year 2



- CS and AI course plan are only slightly different by Year 2
- Try and decide the degree programme to continue
  - The default path is CS

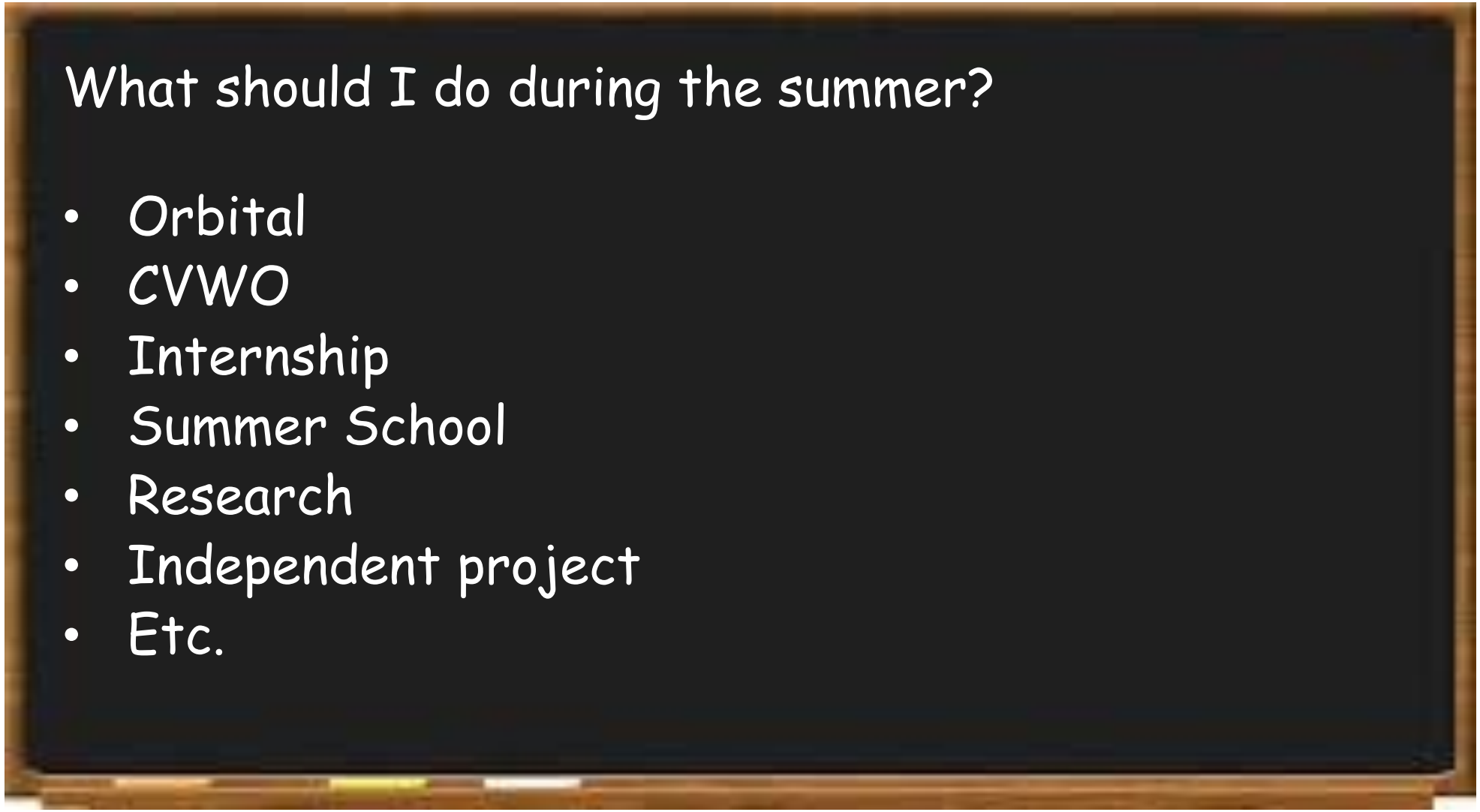
What if I can't take XXX in Year 1?

Example: Student cannot take CS1231S in Semester 1

- Semester 1: CS1101S
- Semester 2: CS1231S
- Semester 3: CS2040S
- Semester 4: CS2103T

It's okay!

As long as CS Foundations are *mostly* finished by the end of Year 2, you are on track!


What should I do during the summer?
• Orbital
• CVWO
• Internship
• Summer School
• Research
• Independent project
• Etc.

Undergraduate Research at SOC

You can be part of it…

Error Correction of Reads in DNA Fragment Assembly
By Zheng Jia

Algorithms for Peptide Sequencing via Tandem Mass Spectrometry
By Ye Nan

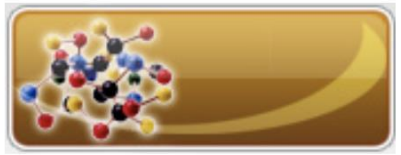
A Repetition-Based Framework for Lyric Alignment in Popular Songs
By Luong Minh Thang

Performance Analysis of Two Data Delivery Schemes for Underwater Sensor Networks
By Pius W. Q. Lee

Secure and Lightweight Acknowledgment for Peer-to-Peer Overlay Networks
By Lim Chee Liang

Modeling from Photographs
By Tan Min Rui

Directed Novelty and Redundancy in Information Retrieval
By Joseph Tan Kai Huang



Recognition of Polyadenylation Sites from Genomic Arabidopsis Sequences
By Koh Chuan Hock

Simplified Muscle Dynamics For Appealing Real-Time Skin Deformation
By Lee Keng Siang

Turing Programme

TP aims to nurture students who aspire to engage in pure research careers in Computing. It is most suitable for students who love to solve technically challenging problems and are able to handle theoretical and practical work. Students will be selected for admission to TP based on their performance in selected courses, including CS2309 and CS3230. Students in TP are expected to build sufficient track records by the time they graduate to gain admission into PhD programmes in top schools including SoC. Students in this programme will be assigned CS professors as their mentors to help them to build their research track records.

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https://www.comp.nus.edu.sg/cug/per-cohort/cs/tp-25-26/

Turing Programme

- Take CS2309: Research Methodology.
- Do a UROP (Undergraduate Research Opportunity Project)
- Do an FYP (Final Year Project)

Why?

- You are interested in research!
- You may want to pursue a career in research (either industrial or academic).
- "Honors" program for our most successful students.
- Networking opportunities.
- Mentor in research.

By invitation only.

Based on recommendation from CS2309 instructor or UROP advisor.

Welcome!