



**NANYANG
TECHNOLOGICAL
UNIVERSITY**
SINGAPORE



SCSE

LEAD THE CHANGE • INNOVATE THE FUTURE

School of Computer Science and Engineering

Bachelor of Engineering
(Computer Engineering)

Bachelor of Engineering
(Computer Science)

Bachelor of Science
(Data Science and
Artificial Intelligence)

ADMISSION CRITERIA

Computer Engineering Programme

GCE 'A' Level

Pass in H2 Level Mathematics, and
Pass in H2 Level Biology/Chemistry/Computing/Physics, and
Pass in H1 Level/'O' Level Physics* or equivalent.

International Baccalaureate

Pass in HL Mathematics, and
Pass in HL Biology/Chemistry/Computer Science/Physics, and
Pass in SL Physics** or equivalent.

NUS High School Diploma

Major CAP of 2.0 in Mathematics, and
Major CAP of 2.0 in Biology/Chemistry/Physics, and
Overall CAP of 2.0 in Physics* or equivalent.

International & Other Qualifications

Pass in Senior High School Level Mathematics, and
Pass in Senior High School Level Biology/Chemistry/Physics, and
Pass in Junior High School Level Physics^^

Diploma Holders

Applicants should have a relevant diploma from one of the local polytechnics and those with a Certificate of Merit, Diploma with Merit or Diploma with Distinction may apply for any programme in NTU.

For the list of acceptable local diplomas and exempted courses, please visit ntu.edu.sg/url/localdiploma.html

Computer Science Programme

GCE 'A' Level

Pass in H2 Level Mathematics, and
Pass in H2 Level Biology/Chemistry/Computing/Physics

International Baccalaureate

Pass in HL Mathematics, and
Pass in HL Biology/Chemistry/Computer Science/Physics

NUS High School Diploma

Major CAP of 2.0 in Mathematics, and
Major CAP of 2.0 in Biology/Chemistry/Physics

International & Other Qualifications

Pass in Senior High School Level Mathematics, and
Pass in Senior High School Level Biology/Chemistry/Physics

Diploma Holders

Applicants should have a relevant diploma from one of the local polytechnics. Those with a Certificate of Merit, Diploma with Merit or Diploma with Distinction may apply for any programme in NTU.

For the list of acceptable local diplomas and exempted courses, please visit ntu.edu.sg/url/localdiploma.html

Data Science & Artificial Intelligence Programme

Refer to the Computer Science Programme. For details, refer to scse.ntu.edu.sg

Double Major Bachelor of Science (Honours) in Mathematical and Computer Sciences (MACS)

Refer to the Computer Science Programme. For details, visit scse.ntu.edu.sg

*Pass in H1 Level or 'O' Level Physics is only applicable to applicants who have not read H2 Level Physics.

**Pass in SL Physics is only applicable to applicants who have not read HL Physics.

*Overall CAP of 2.0 in Physics is only applicable to applicants who have not majored in Physics.

^^Pass in Junior High School Level Physics is only applicable to applicants who have not read Senior High School Level Physics.

For more information, go to Undergraduate Admissions at ntu.edu.sg/admissions

UNDERGRADUATE PROGRAMMES

Full-Time Programmes (Honours Based on Merit)**

- Bachelor of Engineering (Computer Engineering)
- Bachelor of Engineering (Computer Science)#

Double Degree in Computer Engineering/Computer Science & Business**

- Bachelor of Business** awarded by Nanyang Business School and
- Bachelor of Engineering (Computer Engineering or Computer Science)

Full-Time Programmes (Honours Based on Merit)*

- Bachelor of Science (Data Science & Artificial Intelligence)
- Bachelor of Science (Economics & Data Science)^{NEW}

More details available at scse.ntu.edu.sg

Double Degree in Computer Engineering/Computer Science and Economics*^

- Bachelor of Social Sciences in Economics awarded by School of Humanities and Social Sciences and
- Bachelor of Engineering (Computer Engineering or Computer Science)

Computer Engineering/Computer Science with a Second Major in Business**

Double Degree in Accountancy and Data Science-Artificial Intelligence^{~NEW}

Computer Engineering/Computer Science with a Second Major in Entrepreneurship^{NEW}

Double Major Bachelor of Science (Honours) in Mathematical and Computer Sciences (MACS)*

* SCSE B.Eng programmes are accredited by the Engineering Accreditation Board (EAB) of Institution of Engineers Singapore (IES).

Part-Time Course Available - Refer to scse.ntu.edu.sg for more details.

** With Specialisation in Business Analytics.

+ 4-year Programme.

~ 4.5-year Programme.

^ 5-year Programme.

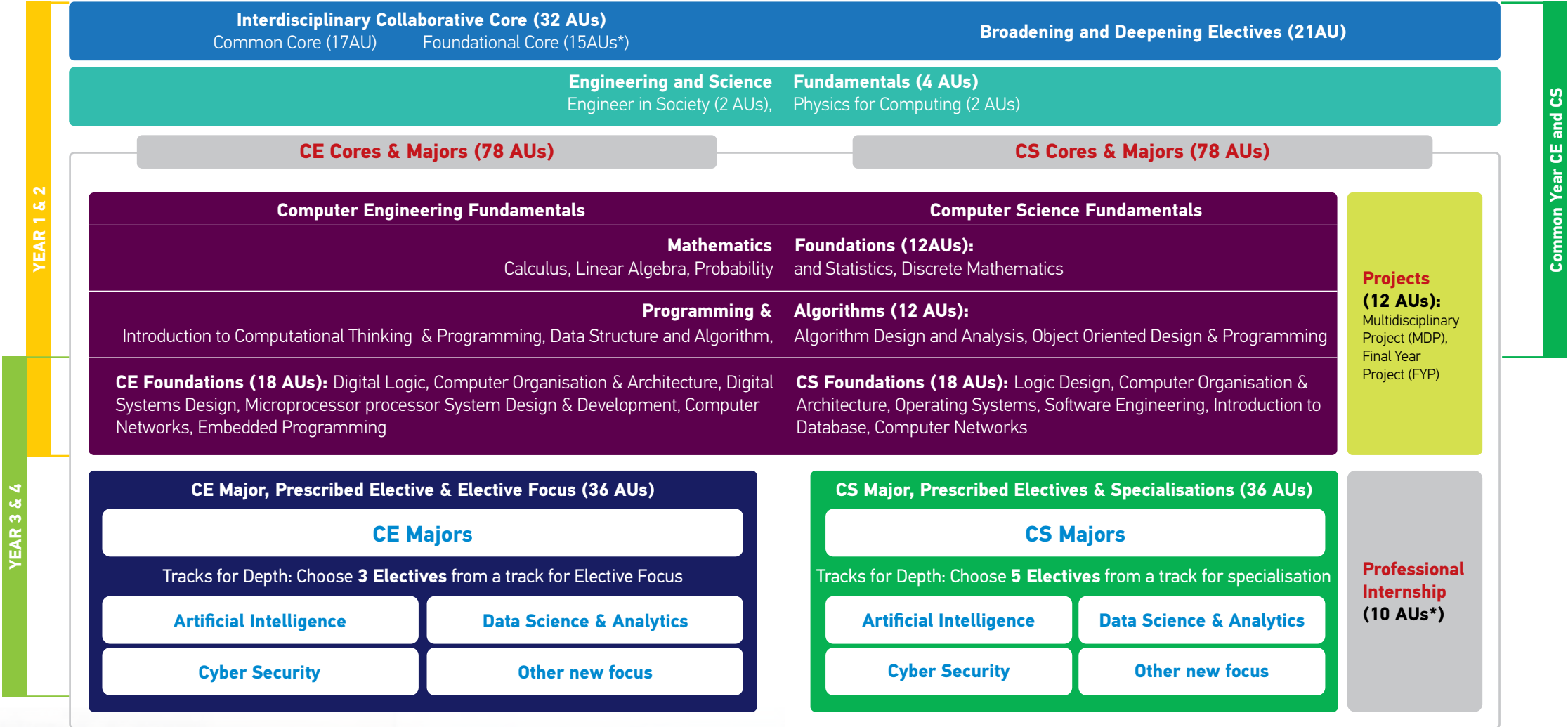


SINGLE DEGREE

COMPUTER ENGINEERING

SINGLE DEGREE

COMPUTER SCIENCE



Note: The curriculum is correct at the time of printing. For updates/changes in modules for programme, please refer to scse.ntu.edu.sg



BEng (CE) Programme

Applicable to students matriculating from AY21-22 onwards

BEng (CS) Programme

Applicable to students matriculating from AY 21-22 onwards

COMMON YEAR

YEAR 1

- ▶ Mathematics I
- ▶ Discrete Mathematics
- ▶ Introduction to Computational Thinking & Programming

- ▶ Linear Algebra for Computing
- ▶ Digital Logic
- ▶ Computer Organisation & Architecture
- ▶ Physics for Computing

- ▶ Data Structures & Algorithms
- ▶ Engineers in Society
- ▶ Introduction to Data Science & Artificial Intelligence

- ▶ Navigating the Digital World
- ▶ Ethics & Civics in a Multi-Cultural World
- ▶ Healthy Living & Mental Wellbeing
- ▶ Inquiry & Communication in an Interdisciplinary World
- ▶ Broadening & Deepening Elective 1

- ▶ Probability & Statistics for Computing
- ▶ Algorithm Design & Analysis
- ▶ Object Oriented Design & Programming
- ▶ Operating Systems
- ▶ Digital Systems Design
- ▶ Sensors, Interfacing & Digital Control
- ▶ Microprocessor System Design & Development

- ▶ Software Engineering
- ▶ Computer Network
- ▶ Career & Entrepreneurial Development for the Future World
- ▶ Sustainability: Human, Social, Economic & Environment
- ▶ Science & Technology for Humanity
- ▶ Broadening & Deepening Elective 1

- ▶ Probability & Statistics for Computing
- ▶ Algorithm Design & Analysis
- ▶ Object Oriented Design & Programming
- ▶ Operating Systems
- ▶ Software Engineering
- ▶ Computer Network
- ▶ Introduction to Databases
- ▶ Artificial Intelligence

- ▶ Career & Entrepreneurial Development for the Future World
- ▶ Sustainability: Human, Social, Economic & Environment
- ▶ Science & Technology for Humanity
- ▶ Broadening & Deepening Elective 2
- ▶ Broadening & Deepening Elective 3

YEAR 2

YEAR 3

- ▶ Embedded Programming
- ▶ Signal, System and Transform
- ▶ Multidisciplinary Design Project

- ▶ Effective Communication II
- ▶ Broadening & Deepening Elective 2
- ▶ Broadening & Deepening Elective 3
- ▶ Professional Internship

- ▶ Computer Security
- ▶ Major Prescribed Elective I 1
- ▶ Major Prescribed Elective I 2
- ▶ Multidisciplinary Design Project

- ▶ Effective Communication 2
- ▶ Professional Internship

- ▶ Final Year Project
- ▶ Major Prescribed Elective 1
- ▶ Major Prescribed Elective 2
- ▶ Major Prescribed Elective 3
- ▶ Major Prescribed Elective 4

- ▶ Broadening & Deepening Elective 4
- ▶ Broadening & Deepening Elective 5
- ▶ Broadening & Deepening Elective 6
- ▶ Broadening & Deepening Elective 7

- ▶ Final Year Project
- ▶ Major Prescribed Elective II 1
- ▶ Major Prescribed Elective II 2
- ▶ Major Prescribed Elective II 3
- ▶ Major Prescribed Elective II 4

- ▶ Broadening & Deepening Elective 4
- ▶ Broadening & Deepening Elective 5
- ▶ Broadening & Deepening Elective 6
- ▶ Broadening & Deepening Elective 7

YEAR 4

▶ Interdisciplinary and Collaborative Core ▶ Core ▶ Major Prescribed Electives ▶ Broadening and Deepening Electives

Elective Focus (3 MPEs)

- ▶ Artificial Intelligence
- ▶ Security
- ▶ Data Science
- ▶ IoT
- ▶ Networking

- ▶ Artificial Intelligence
- ▶ Security
- ▶ Data Science

Specialization (5 MPEs)

DOUBLE DEGREE

COMPUTER ENGINEERING OR COMPUTER SCIENCE WITH BUSINESS

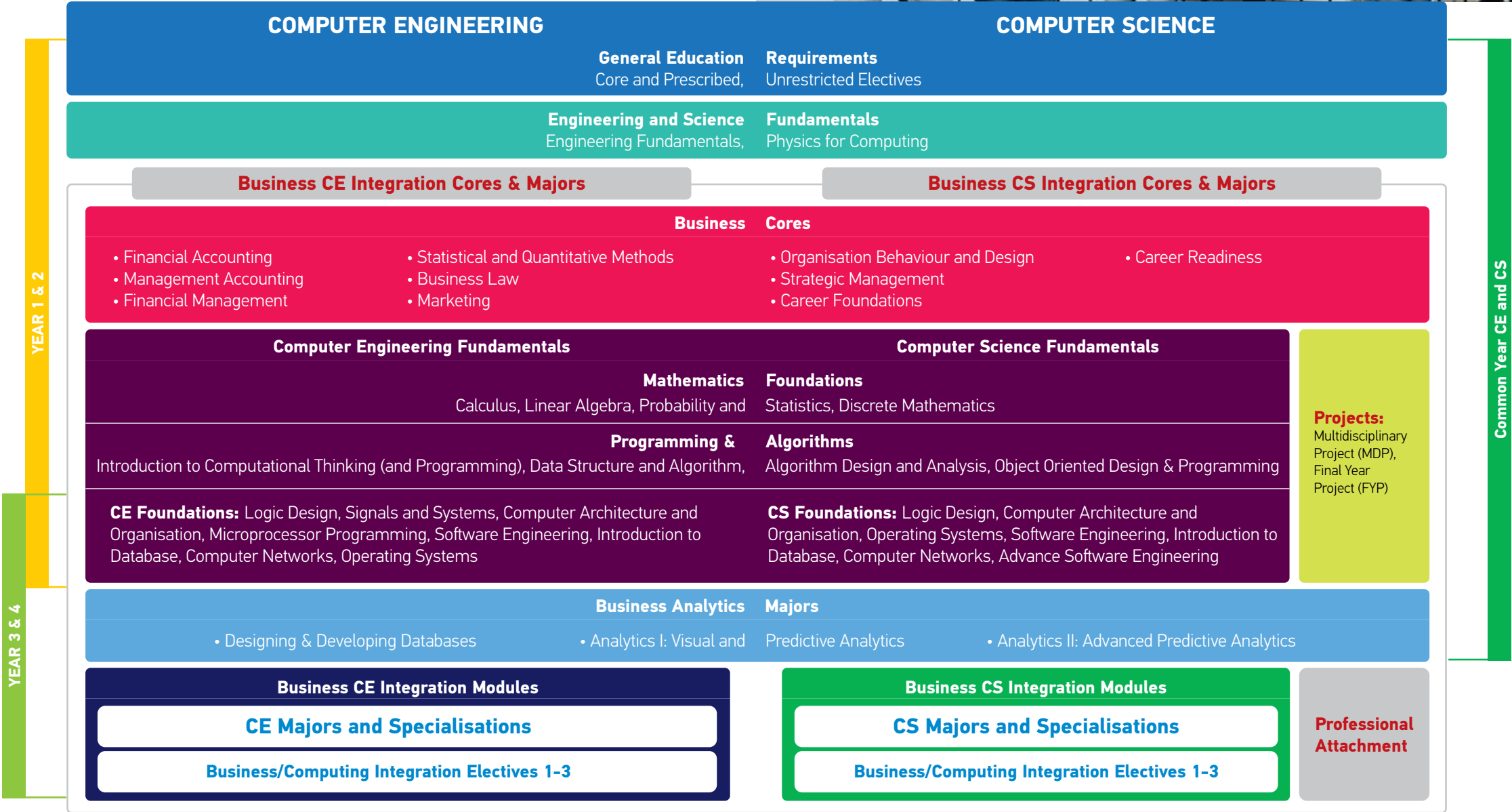
The School of Computer Science and Engineering and the Nanyang Business School have come together to design two hybrid undergraduate Double Degree programmes to meet the challenges of a changing economic landscape. A specialisation in business analytics will equip students to monitor target markets, analyse information and forecast future trends across various industries while formulating ways to improve business strategies, operations and business decisions.

The double degree programme is a comprehensive and well-rounded curriculum to be completed in 4 years while integrating two disciplines, thereby broadening the scope of the students and enabling them to leverage on a kaleidoscope of opportunities.

The programmes are planned to enable graduates to hone their business management and computer science and engineering skills, helping to discover and maximise their capabilities which will enable them to develop relevant skills that are much sought after in today's job market.

This diverse mix of business skills and technical knowledge will provide graduates with an edge over their competitors, while giving them a wider range of career opportunities.

Graduates also have an exciting opportunity to embark on a 10-week Professional Attachment in leading technology, management consulting or financial firms in key industries.



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DATA SCIENCE & ARTIFICIAL INTELLIGENCE

This is a full time four-year direct honours Bachelor of Science degree programme, jointly offered by SCSE and the School of Physical and Mathematical Sciences (SPMS). The programme targets visionary students who aspire to master the demands of integrating the synergistic disciplines of computer science and statistics for the study of data science (DS) and artificial intelligence (AI).

This programme will provide students with opportunities to solve real-life problems in different application domains such as science and technology, healthcare and clinical medicine, business and finance, environmental sustainability, and others – using their knowledge in DS and AI. As such, there will be rich opportunities for graduating students to work across multiple domains of the digital economy and participate in enhancing Singapore’s global competitiveness.

DSAI Graduates can expect to be employed as a



Machine Learning Engineer



Data Scientist



Research Scientist



R&D Engineer



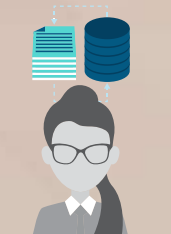
Business Intelligence Developer



Computer Vision Research Engineer



Data Analyst



Data Architect



AI Engineer



AI Scientist

YEAR 1

Semester 1

- Calculus
- Discrete Mathematics
- Introduction to Computational Thinking & Programming
- Navigating the Digital World
- Inquiry & Communication in an Interdisciplinary World
- Broadening & Deepening Elective

Semester 2

- Linear Algebra for Scientists
- Introduction to Data Science & AI
- Data Structures & Algorithms
- Object Oriented Design & Programming
- Ethics & Civics in a Multi-Cultural World
- Healthy Living & Mental Wellbeing

YEAR 2

Semester 1

- Calculus III
- Probability and Introduction to Statistics
- Algorithm Design and Analysis
- Software Engineering
- Career & Entrepreneurial Development for the Future World
- Sustainability: Human, Social, Economic & Environment

Semester 2

- Statistics
- Data Analysis with Computer
- Introduction to Databases
- Artificial Intelligence
- Science & Technology for Humanity
- Broadening & Deepening Elective

YEAR 3

Semester 1

- Machine Learning
- Data Analytics and Mining Major
- Prescribed Elective
- Major Prescribed Elective
- Effective Communication 2
- Broadening & Deepening Elective

Semester 2

- Professional Internship

YEAR 4

Semester 1

- Final Year Project
- Major Prescribed Elective
- Major Prescribed Elective
- Broadening & Deepening Elective
- Broadening & Deepening Elective

Semester 2

- Final Year Project
- Major Prescribed Elective
- Major Prescribed Elective
- Broadening & Deepening Elective
- Broadening & Deepening Elective

Interdisciplinary and Collaborative Core

Core and Major Prescribed Electives

Broadening and Deepening Electives

Major Prescribed Electives

- Regression Analysis
- Basic Optimization
- Time Series Analysis
- Multivariate Analysis
- Sampling & Survey
- Survival Analysis
- Econophysics
- Applied Bayesian Statistics

- Applied Categorical Data Analysis
- Data Applications in Natural Sciences
- Simulation Techniques in Finance
- Applied Cryptography
- Database System Principles
- Information Retrieval
- Natural Language Processing
- Network Sciences

- Big Data Management
- Data Science for Business
- Data Visualization
- Developing Data Products
- Distributed Computing for Data Science and AI
- Social Media Mining
- Media Planning and Strategies

Note: The curriculum is correct at the time of printing. For updates/changes in modules for programme, please refer to scse.ntu.edu.sg

COMPUTER ENGINEERING/ COMPUTER SCIENCE

WITH A SECOND MAJOR IN BUSINESS

Offered by NTU's School of Computer Science and Engineering (SCSE) and Nanyang Business School, The Bachelor of Engineering with a Second Major in Business (EGBM) programme integrates the requirements of both the Engineering and Business majors within the typical candidature of 4 years. Right from Year 1, the EGBM curriculum incorporates Business foundation courses alongside Engineering major courses.

At the end of Year 1, students can continue with the Second Major in Business (Mainstream) or branch into the International Trading Programme (ITP):

Second Major in Business (Mainstream)

Foundation Business Courses

- ▶ Financial Accounting
- ▶ Financial Management
- ▶ Business Law
- ▶ Marketing
- ▶ Organisational Behaviour and Design
- ▶ Business Operations and Processes

Advanced Business Courses (Choose 3)

- ▶ Investments
- ▶ Market Behaviour
- ▶ Market Intelligence
- ▶ Management Principles, Skills and Competencies

Second Major in Business (International Trading Programme)

Foundation Business Courses

- ▶ Financial Accounting
- ▶ Financial Management
- ▶ Marketing
- ▶ Business Operations and Processes

ITP Courses

- ▶ International Tax and Trading Law
- ▶ Commodities Trading
- ▶ Commodities' Geology and Metallurgy
- ▶ Enterprise Risk Management
- ▶ Commodities Finance
- ▶ Introduction to Ship Chartering and Trade Practice
- ▶ Industry Seminar

Excellent opportunities await graduates in economic sectors such as Aerospace Industries, Banking and Financial Services, Business, Engineering and Design Consultancies, Educational and Research Institutions as well as Government Agencies, among others.

For more information on a Second Major in Business (Mainstream/International Trading Programme), please visit coe.ntu.edu.sg/EngBizMajor.



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BACHELOR OF SCIENCE (HONOURS) IN MATHEMATICAL AND COMPUTER SCIENCES

This four-year double major degree programme is in partnership with the School of Physical and Mathematical Sciences. It aims to attract top students who can master the technically demanding disciplines from both schools.

The programme provides students with strong foundations in their two majors with core courses and in-depth specialised training in one of four areas at the interface of Mathematical Sciences and Computer Science.

The areas of specialisation include Theoretical Computer Science, Cryptography and Cybersecurity, Financial Modelling, and Data Science.

Double Major Programme

Bachelor of Science in Mathematical and Computer Sciences

Duration (Years) **4**

Minimum Subject Requirements			
Singapore-Cambridge GCE 'A' Level	International Baccalaureate Diploma	NUS High School Diploma	International & Other Qualifications
H2 Level pass in Mathematics and H2 Level pass in Physics/Chemistry/Biology/Computer	Mathematics at Higher Level and Physics/Chemistry/Biology/Computer Science at Higher Level	Major CAP of 2.0 in Mathematics and Major CAP of 2.0 in Physics/Chemistry/Biology	Mathematics at Senior High School Level and Physics/Chemistry/Biology at Senior High School Level

Graduates from the programme are expected to either be ICT leaders and entrepreneurs in fast developing areas such as Financial Technology, Cybersecurity, and Data Analytics, or pursue postgraduate degrees in Mathematics and Computer Science-related disciplines.



Note: This information is correct at the time of printing. For updates/detailed modules for Double Major BSc (Hons) in Mathematical and Computer Sciences, please refer to scse.ntu.edu.sg



OUR GRADUATES AND SUCCESS STORIES

CAREER PROSPECTS

Our industry-ready graduates are equipped with a strong foundation in the disciplines of computer engineering and computer science. As a result, they are well-prepared to use their skills to harness technology and continually work towards making breakthroughs that enable people to communicate more seamlessly, manage their environments more effectively and lead more comfortable lives.

No matter which industry they are in, graduates of SCSE are able to provide innovative solutions.

Graduates of CE, CS and DSAI are employed in companies such as:



Adrian Chye
Co-Founder,
Mediafreaks Group of
Companies.
(Class of 2004)



**Budhaditya
Bhattacharya**
Founder,
WAYV Digital
(Class of 2013)



Ngo Chee Yong
Co-Founder and CTO,
Swag Soft LLP
(Class of 2005)



Jolene Lim
RSA
Technology Consultant
(Class of 2014)



Pamela Lim Jiah Min
Senior Associate
Technology Consultant
PricewaterhouseCoopers
Consulting (Singapore)
(Class of 2015)



Loh Jia Wen, Doreen
Presales Specialist -
Asia Pacific and Japan
SAP ASIA
(Class of 2014)



Russell Loh Weibin
J.P. Morgan
Technology Analyst
(Class of 2018)



Jonathan Samraj
Infocomm Development
Authority of Singapore
Telecom Cyber Security
Cluster (Class of 2014)



Deepank Vora
PayPal
Software Engineer
(Class of 2014)

OVERSEAS ENTREPRENEURSHIP PROGRAMME (OEP)

Sing Swee Yang

UG Programme: Bachelor of Computer Science, Year 4

START, Beijing, China

“At START, I interned as a back-end software developer and though I lacked some knowledge and experience, my mentor was very understanding and helpful, guiding me along. I also participated in an exchange at Tsinghua University, studying alongside China's best students. It was an honour to do so, and the experience taught me to treasure the abundance of academic resources and opportunities available to students at NTU.”



INTERNSHIP

Alfie Farhana Binte Mohamed

Computer Science, Class of 2018

Hewlett Packard Enterprise

“The most rewarding part of my NTU journey has been successfully applying the theoretical and practical knowledge gained from the modules in Computer Science into my internship at Hewlett Packard Enterprise.”



Prabhjot Vicky Grewal

Computer Science, Class of 2018

Merrill Lynch

“My internship experience with the Bank of America Merrill Lynch was enlightening, and I'm glad that we get to choose our professional internships from an exhaustive list of companies. I also appreciate how the faculty provides us with lecture recordings, giving us the flexibility to pursue our passions both in and out of the classroom.”



RESIDENT AND OVERSEAS EXCHANGE

Laurensia Anjani

Computer Science, Year 4

University of Sydney

“My 6-week exchange programme at the University of Sydney (Australia) was the first time I set foot in New South Wales. I took a course called Designing Social Media, which gave me new insights into social media design and allowed me to develop a social media strategy for Osteoporosis Australia.”



OUTSTANDING ACHIEVERS

Managing
Director at age 23 by
setting up a mobile and
on-line food delivery
portal



“SCSE challenged me in many ways to explore different options, which in turn, helped me find what I wanted to do in life. SCSE built the right foundation for the entrepreneur in me to develop – teaching me key lessons and skills that have helped me immensely in my journey after graduation. The school offered me a great platform to test my hypotheses and pave the way for my entrepreneurial journey.”

Chinmay Malaviya
Co-Founder and Advisor
Food Panda (Global)
(Class of 2012)



1st Singaporean
employed by
Google
Headquarters



“The School has been very supportive of students' research. We were always given a lot of leeway to experiment and discuss our ideas. That helped a lot when I went into Google as I was very comfortable sharing my ideas with my colleagues and we had no qualms about trying out new things, just like in school.”

Tan Chade-Meng
Google's Jolly Good Fellow
(Class of 1995)

新加坡第一位被Google聘為
「Jolly Good Fellow」的校友





NTU's
Computer Science
Ranks **1st** in Asia and
2nd Globally

US News & World Report's Best Global Universities Rankings

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