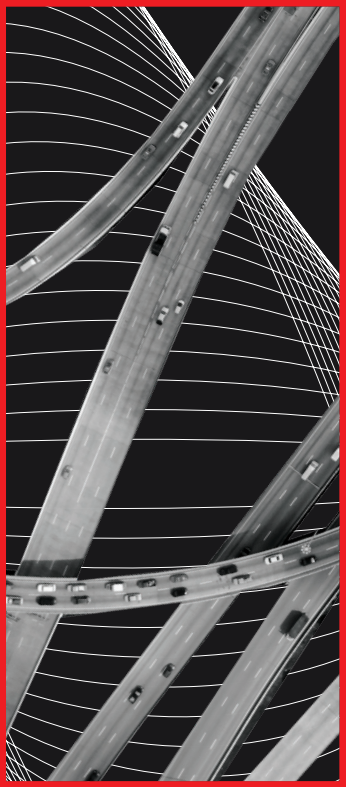
SINGAPORE UNIVERSITY OF TECHNOLOGY AND DESIGN

ESD



ENGINEERING SYSTEMS AND DESIGN

SUTD.EDU.SG/ESD

TRAILBLAZING A BETTER WORLD BY DESIGN.

THE SCIENCE BEHIND DECISION-MAKING

Many challenges that organisations face are invariably systems decisions.

Questions that system engineers tackle all the time include:

How do you decide which company or project to invest in?

How do you make a factory both green and efficient?

When should you launch the next-generation product?

ALL ORGANISATIONS NEED DATA/BUSINESS ANALYSTS AND SYSTEMS ENGINEERS. OUR ESD GRADUATES FIT THE BILL AND ARE PARTICULARLY SOUGHT AFTER FOR THEIR EXPERTISE IN DESIGN, ANALYSIS AND OPTIMISATION ALONG WITH AI TECHNOLOGIES AND KNOW-HOW TO TACKLE OPEN-ENDED CHALLENGES FOR ORGANISATIONS.

Graduate with a Bachelor of Engineering in Engineering Systems and Design.

A CURRICULUM LEADING TO AN EXCITING CAREER

Over the course of the first three common Freshmore terms, you will have built a solid foundation in Science, Mathematics and Technology (SMT), Humanities, Arts and Social Sciences (HASS) and Design, which will prepare you for your ESD major.

From day one of the ESD programme, you will be working with corporate clients, leveraging AI to solve real-world problems and improving their operations. In addition to your ESD subjects, you will continue to take courses in HASS that will prepare you to be a new kind of engineer who embraces the cultural and social context of technology in the modern world.

Every undergraduate will have worked on at least 20 design projects throughout their years of study at SUTD. These experiences culminate in a two-term Capstone project in your graduating year. This allows you to work in teams with students from other majors and apply the skills you have mastered in ESD on either a client-sponsored industry-based project or your own entrepreneurial project to solve a real-world challenge. Upon graduation, you'll possess an extensive portfolio of industry-inspired projects, well-prepared for your career journey.

TRAILBLAZING A BETTER WORLD BY DESIGN.

ESD CORE SUBJECTS

- Data & Business Analytics
- Heuristics & Systems Theory
- Manufacturing & Service Operations
- Optimisation
- Probability & Statistics
- Simulation Modelling & Analysis
- The Analytics Edge

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Pei Jinling
Business Analyst,
Standard Chartered Bank
Class of 2021, ESD Alumna

The ESD curriculum is very well designed to equip students with not only the technical skills such as systems architecture design, mathematical modelling, and coding but also **data-driven solution delivery, visualisation, and presentation skills**. I learned how to build models and perform data analysis, but more importantly, was given many opportunities to present the results of the analysis to different stakeholders. These opportunities that ESD has provided me to **meet clients and deliver data-driven solutions that help them make more informed decisions** are truly valuable.

LEARNING OUTCOMES OF ESD CORE

TRANSFORM DATA INTO DECISIONS

Be equipped with tools in data manipulation, visualisation and analysis. Gain a competitive edge using advanced optimisation models.

Application examples:
Recommend locations for new stores. Shortlist companies for mergers and acquisitions.

LEARN COMPUTATIONAL TOOLS & MODELLING SKILLS

Master the four fundamental methods for modelling dynamical systems: system dynamics, agent-based modelling, discrete-event simulation and Markov Chain Monte Carlo.

Application examples:
Predict the evolution of financial option prices. Devise scheduling rules to relieve airport ground transportation congestion.

UNDERSTAND & MANAGE COMPLEX ENGINEERING SYSTEMS

Learn to use probability, statistics and optimisation, opening the door to powerful techniques for tackling complex engineering systems.

DEVELOP CONSULTANCY SKILLS

Become familiar with accounting and finance — the language of business — even as you acquire skills in project management and professional communication.

ESD CURRICULUM

JAN-APR	MAY-AUG	SEP-DEC
Freshmore Subject Core Subject Humanities, Arts and Social Sciences (HASS) Subject Elective Capstone	Y1 Y2 Y3 Y4	**TERM 1** Modelling & Analysis Physical World Computational Thinking for Design Social Science: Understanding Behaviour, Culture & Society (HASS)
TERM 2 Modelling Space & Systems Technological World Science for a Sustainable World Design Thinking & Innovation	**TERM 3** Modelling Uncertainty Global Humanities: Literature, Philosophy, and Ethics (HASS) Any Two Electives*	**VACATION**
TERM 4 Data & Business Analytics Probability & Statistics Optimisation HASS	**TERM 5** Manufacturing & Service Operations Heuristics & Systems Theory The Analytics Edge HASS	**VACATION/ INTERNSHIP/ EXCHANGE**
TERM 6 Simulation Modelling & Analysis Elective Elective HASS	**VACATION/ INTERNSHIP/ SUMMER PROGRAMME**	**TERM 7** Capstone Elective Elective HASS
TERM 8 Capstone Elective Elective HASS		

***Term 3 Electives:** Science and Technology for Healthcare
Data Driven World
Designing Energy Systems
Spatial Design World

- In addition to all subjects in Term 1 being grade-free (Pass/No Record), students can choose up to four more subjects from Terms 2 and 3 to be grade-free.
- Students will declare their choice of major in Term 3.

Information is subject to change. Visit sutd.edu.sg/esd for latest updates.

MINOR PROGRAMMES

Our range of minors offers you more choices and flexibility in pursuing your broader interests.

- **Minor in Artificial Intelligence (AI)**
- **Minor in Computer Science (CS)**
- **Minor in Design Innovation, Ventures and Entrepreneurship (DIVE)**
- **Minor in Design, Technology and Society (DTS)**
- **Minor in Digital Humanities (DH)**
- **Minor in Healthcare Informatics (HI)**
- **Minor in Sustainability by Design (SD)**

Students will indicate their choice of minor at the start of Term 8.
Information is subject to change. Visit sutd.edu.sg/minors for latest updates.

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Chloe Tan
SIA Executive (Ground Experience Development), Singapore Airlines Limited
Class of 2021, ESD Alumna

My current role relies heavily on the design-centric approach to produce elegant system features that enhance the multi-faceted user experience. Being able to seamlessly bring together and consolidate different perspectives in producing a holistic and satisfying solution is widely appreciated and embraced in the modern working industry. The **design and analytical thinking** skills I learned at ESD help to tackle the inevitable complexities embedded in all systems regardless of industry.

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Google Cloud

Mirabel has demonstrated her ability to grasp technologies and learn things quickly. She has an impressive record in obtaining four technical certifications within five months after joining the team. Mirabel has applied her data analytics and machine learning skills to create a **more adaptive model which better predicts demands and optimises the inventory management during COVID-19 times.**

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International SOS

The ESD students have demonstrated remarkable independence and proactivity, actively engaging with our healthcare system to deepen their understanding with the data and the work we do. **Their dedication and innovative thinking have allowed International SOS to further enhance our data analytics capabilities, significantly improving our operations and developing new commercial solutions.** Through this collaboration, the students have created advanced wellbeing analytics systems that have transformed the way we use and analyse data, enabling a healthier and more productive workforce for our clients. We truly appreciate the significant contributions made by the ESD students.

FUTURE POSSIBILITIES

CAREERS

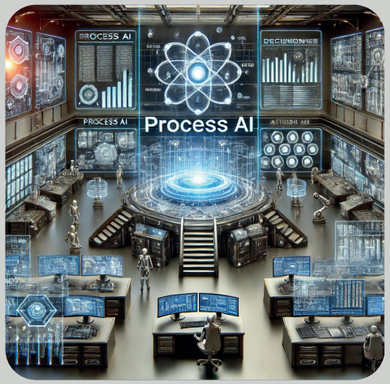
ESD graduates are equipped with skills that make them suited for a wide range of engineering and management careers. With skills in analytics, management and design, they have excelled in both the private and public sectors in industries such as consulting, healthcare, banking and finance, manufacturing, supply chain, energy, transportation, telecommunications, retail, entertainment and hospitality.

POSITIONS HELD BY ESD GRADUATES:

- Aviation analyst
- Corporate planner
- Data scientist/engineer
- Financial analyst
- Hospital planner/ data analyst
- Management/Technology consultant
- Operations analyst
- Project manager
- Supply chain analyst
- Systems engineer

WHERE ESD GRADUATES ARE MAKING AN IMPACT:

- Accenture
- Boston Consulting Group
- Bloomberg
- Changi Airport Group
- Citibank
- DB Schenker
- DBS Bank
- Defence Science and Technology Agency
- EY
- Huawei International
- Infineon Technologies Asia Pacific
- Land Transport Authority
- Monetary Authority of Singapore
- Procter & Gamble
- PwC Singapore
- Shopee
- Singapore Airlines
- SMRT Corporation
- United Overseas Bank
- Visa



TRAILBLAZING A BETTER WORLD BY DESIGN.

ENTREPRENEURSHIP

Strong engineering and design skills, coupled with practical knowledge in developing solutions for real-world challenges will put you in good stead to initiate your start-up ventures.

START-UPS BY ESD GRADUATES:

- **Renderspace provides property agents with virtual staging services using AI. Helping homeowners visualise their future home, giving them the assurance to make the big purchase.**

  Co-founded by ESD alumnus, Alexander Koh.

- **SGP Foods, winner of the Singapore SME 500 Award, is a resource efficiency tech company which uses a multi-pronged approach to combat issues of climate change and food security. Through its carbon crediting, vertical farming via IoT and energy efficiency solutions, it aims to build Singapore's food and climate resilience.**

  Founded by ESD alumna, Pek Yun Ning.

GRADUATE SCHOOL

The rigorous technical training from ESD will prepare you for various post-graduate programmes such as industrial and systems engineering, operations research, business, economics and public policy. Our ESD graduates have enrolled at top universities including:

- Carnegie Mellon University
- Cornell University
- Harvard University
- London School of Economics and Political Science
- Massachusetts Institute of Technology
- University of California, Berkeley
- Yale University

PREPARE TO TAKE ON THE WORLD

AVIATION SYSTEMS

Learn and explore the intricacies of the airport systems from both a 'landside' and an 'airside' perspective, acquire modelling skills to evaluate alternative operational designs, and consider integration issues with land transportation systems.

Designed for students interested in careers in the aviation industry.

BUSINESS ANALYTICS AND OPERATIONS RESEARCH

Prepares you for a career in the field of data-driven decision-making. You will gain experience in modelling, analysing and solving complex decision-making situations. You will also learn the tools and techniques in both the descriptive domain (statistics and predictive analytics) and the prescriptive domain (optimisation and reinforcement learning).

4 SPECIALISATIONS

HAVE THE FLEXIBILITY TO CUSTOMISE YOUR CURRICULUM WITH ONE OR MORE SPECIALISATIONS*. YOUR SPECIALISATION WILL BE REFLECTED ON YOUR TRANSCRIPT SO THAT EMPLOYERS RECOGNISE YOUR ADDITIONAL EXPERTISE.

*Specialisations offered in a given year are subject to change. Choosing a specialisation is optional.

SCAN TO FIND OUT MORE

FINANCIAL SERVICES

Learn about portfolio theory, derivatives valuation and financial risk analysis, complementing the core subjects in stochastic processes, optimisation, simulation and statistics.

Designed for students interested in careers in the securities, banking, financial management and consulting industries; or as quantitative analysts in corporate treasury and finance departments.

SUPPLY CHAIN AND LOGISTICS

Covers the design and management of products, information and financial flow related to supply chains in a wide range of industries.

You will learn quantitative methods (built upon statistics, optimisation, and microeconomics) relevant to a variety of supply chain decisions; read and critique industry cases; and also participate in supply chain simulation games that simulate real-world decision-making scenarios.

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