



EPD

ENGINEERING PRODUCT DEVELOPMENT



SINGAPORE UNIVERSITY OF
TECHNOLOGY AND DESIGN

Established in collaboration with MIT

PILLAR OVERVIEW

The following chart illustrates the EPD curriculum structure. It depicts the typical sequence of subjects. Each major row indicates a calendar year with columns representing the Jan-Apr, May-Aug, and Sep-Dec terms ordered from left to right.

Advanced Math I	Advanced Math II
Physics I	Physics II
Chemistry and Biology: Natural World	Introduction to Design
HASS	HASS
Modelling the Systems World	Probability & Statistics
Engineering in the Physical World	Circuit & Electronics
The Digital World	Structures & Materials
Introduction to Biology*	HASS
Introduction to Physical Chemistry*	
Systems & Control	Elective
Engineering Design & Project Engineering	Elective
Elective	Elective
HASS	HASS
Capstone	Capstone
Elective	Elective
Elective	Elective
HASS	HASS

● - Freshmore Subject
 ● - Core Subject
 ● - Humanities, Arts and Social Sciences (HASS) Subject
 ● - Elective Subject
 ● - Capstone
 *half-credit subject

The Engineering Product Development (EPD) pillar prepares you for leadership in the conception, design, implementation and operation of innovative technology-intensive products, with emphasis on products and systems whose development cuts across traditional disciplinary boundaries.

All SUTD students will take foundational subjects in humanities and the sciences as part of their curriculum. You are immersed in a rigorous curriculum that is focused on design and a modern pedagogy where students learn how to solve complex problems in interdisciplinary teams.

In Term 4, EPD pillar students are engaged in common foundation classes in both Mechanical and Electrical subjects, building a strong base. From Term 5 onwards, aside from EPD core subjects, you have a variety of Humanities, Arts and Social Sciences (HASS) electives and Technical Application (TECH) Electives to choose from.

CORE SUBJECTS

- Probability and Statistics
- Circuits and Electronics
- Structures and Materials
- Systems and Control
- Engineering Design and Project Engineering

TECHNICAL APPLICATION ELECTIVES

All engineering pillars have a set of elective subjects associated with different applications streams, which gives greater focus and depth, and promotes inter-pillar interaction. You will be able to take technical application electives in focused areas such as Global Issues, Transportation, Manufacturing Systems, Information Systems and Enterprise Systems.

In Terms 7 and 8, the capstone is a culminating project that allows you to use the skills you have mastered in EPD in a real world industry or research project. The capstone projects focus on interdisciplinary applications, solved by a team of students chosen appropriately from different pillars.

EPD pillar graduates will be prepared for a wide variety of engineering, design and management careers across multiple industries. The skills learnt would provide you with a deep understanding of the technical fundamentals, and with skills and capabilities for leading the development of new products, systems, processes or methodologies, in both the private and public sector, including:

- Technical Engineering Consultation
- Biomedical and Healthcare
- Consumer Products
- Aerospace Systems
- Measurement, Automation and Robotics
- Finance and Real Estate
- Management Consultation
- Marine and Offshore Engineering
- Defence Systems
- Energy

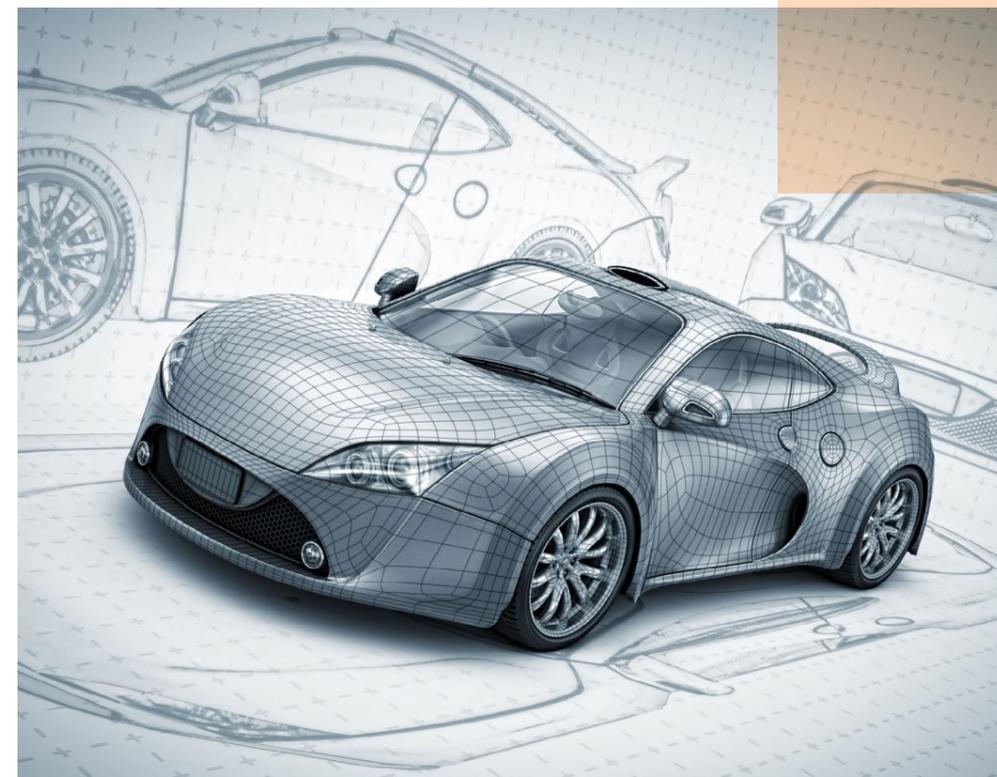
SUTD-SMU DUAL DEGREE PROGRAMME IN TECHNOLOGY AND MANAGEMENT (SUTD-SMU DDP)

For students interested in both technology and management, the SUTD-SMU DDP offered with the Singapore Management University (SMU) brings you the best of both worlds.

Students will graduate with a Bachelor in Engineering from SUTD with a major in one of the following three pillars and a Bachelor in Business Management from SMU.

- Engineering Product Development (EPD)
- Engineering Systems and Design (ESD)
- Information Systems Technology and Design (ISTD)

For more information, visit sutd.edu.sg/ddp

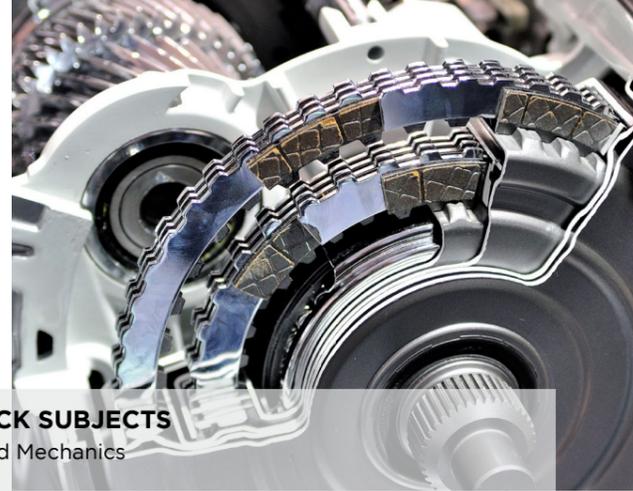


MECHANICAL ENGINEERING

Mechanical Engineering (ME) is the application of physical principles in the analysis, design, construction and operation of mechanical systems. The ME track provides you with solid knowledge of mechanical concepts, thermal fluid systems, materials science, principles of design and control, and applying them to creative solutions for modern mechanical systems.

The skill set developed will enable you to design and analyse aerospace systems, automotive vehicles, biomedical instruments, energy conversion systems, fluidic and thermal systems, industrial machinery, manufacturing equipment, robotics and more. You will also be exposed to the frontiers of modern research in ME, including clean energy, advanced materials, micro/nanotechnology and biomechanics.

Graduating from the ME track, you will be very versatile and have career options in a broad spectrum of industries, including aerospace, automation and control, automobile, biomedical instrumentation, computer-aided design (CAD)/ computer-aided manufacturing (CAM), manufacturing, mechanical design and consulting, oil and gas technology, pharmaceutical manufacturing, robotics, semiconductor manufacturing, thermal and power engineering and others.



TRACK SUBJECTS

- Fluid Mechanics

ELECTIVES

- Dynamics
- Thermal Systems for Power and Environment
- Machine Element Design
- Introduction to Materials Science
- Entrepreneurship
- Design and Fabrication of Microelectromechanical Systems
- Advanced Feedback and Control
- Topics in Biomedical and Healthcare Engineering
- Micro-Nano Projects Laboratory
- Theory and Applications of Robotics

ROBOTICS

Designing robots requires multi-disciplinary knowledge and expert skills in fabrication, mechanical, electronics, and electrical engineering, art, and user studies. With the emergence of service robotics industries and recent boom in the traditional industrial robotics market, this track aims to provide you with knowledge of robotics fundamentals, skills in modelling, design and development of robotic platforms, an insight into their theoretical essentials and the expertise to apply these methods to real world problems.

Your skill set allows you to design and realise novel robotic mechanisms, sensing and control strategies for mobile robots and build human interactive robotic systems. The Robotics track will also expose you to the frontiers of modern research, including bio-inspired designs, nano-robots, wearable systems and next generation industrial robotics. A series of tailor-made projects are seeded into the track providing opportunities for you to demonstrate skills related to simulation, design and implementation of industry-specific robotic platforms and research problems.

Specialising in this track, you will have exciting careers in robotics, automation, research agencies, manufacturing, aerospace, maritime, oil and gas, consumer electronics, biomedical, defence research and more.



TRACK SUBJECTS

- Electromagnetic and Applications
- Theory and Applications of Robotics

ELECTIVES

- Digital Systems Lab
- Dynamics
- Machine Element Design
- Entrepreneurship
- Digital Signal Processing
- Advanced Feedback and Control
- Topics in Biomedical and Healthcare Engineering
- Wireless Communication

TRACKS¹

With nine tracks, including a Self-Directed Track, the EPD curriculum offers you the flexibility to customise it to suit your interests and aspirations. When you complete a track, it will be indicated on your transcript so that future employers can recognise this expertise.

ELECTRICAL ENGINEERING

Electrical Engineering (EE) covers the study, application and product design of electrical, digital, as well as electromagnetism in the field of analog and digital electronics, power engineering, communication systems, control systems, signal processing and wireless technology.

As an EE graduate, you will have a wide range of career opportunities, from consumer electronics design, power and energy management systems engineering, manufacturing, electrical and electronics engineering to high-end research and development, and more.



TRACK SUBJECTS

- Electromagnetic and Applications
- Power Electronics
- Electric Power Systems Analysis and Design

ELECTIVES

- Microelectronic Circuits and Devices
- Digital Systems Lab
- Entrepreneurship
- Introduction to Materials Science
- Design and Fabrication of Microelectromechanical Systems
- Digital Signal Processing
- Advanced Feedback and Control
- Wireless Communication
- Theory and Applications of Robotics
- Digital Integrated Circuits Design
- Topics in Biomedical and Healthcare Engineering

MATERIALS SCIENCE

Materials Science and Engineering is a broad field which embraces ceramics, metallurgy, polymer science and solid state physics. It reaches down into the microscopic world of atoms and bridges the condensed state of matter to the macroscopic world of material function.

The Materials Science and Engineering track equips you with a strong foundation in the design, synthesis, processing, characterisation and application of materials to solve engineering problems and meet societal needs. You will develop skills to manipulate how atoms or molecules are arranged in materials so as to change the way materials behave, creating materials with unique electrical, magnetic, mechanical, optical, or thermal properties. You will be exposed to the frontiers of advanced materials research for aerospace, clean and renewable energy, environmental protection, microsystems, micro/nanoelectronics and water treatment.

Graduating from this track, you will have career options in many industries including aerospace, biomedical technology, clean and renewable energy, consumer products, materials research, medical device development, microelectronics manufacturing, pharmaceutical manufacturing, water treatment and many others.

TRACK SUBJECTS

- Introduction to Materials Science

ELECTIVES

- Dynamics
- Microelectronic Circuits and Devices
- Entrepreneurship
- Design and Fabrication of Microelectromechanical Systems
- Micro-Nano Projects Laboratory
- Fluid Mechanics
- Electromagnetic and Applications



[Above image] Nanowires (left) that look like frosty pine needles (right). Research led by Assistant Professor Yang Hui Ying.

¹Tracks offered in a year are subject to changes.

BIOMEDICAL ENGINEERING

Biomedical Engineering is a discipline that applies the design concepts and principles of engineering to medicine.

The track provides you with problem solving skills of engineering and appreciable knowledge connecting engineering and medical fields to advance medical treatment and diagnosis. You will be equipped to design and analyse surgical tools, surgical robots, lifesaving equipment, biomedical instruments for treatment and diagnosis, physiological parameter monitors using sensors, biomechanics (cardiovascular, musculoskeletal), biomedical imaging, medical devices, cell and tissue engineering and more, with various medical applications.

You will have research opportunities in biomaterials, drug delivery, biomechanics (hard and soft tissue), mechanobiology, sports engineering, cellular and tissue engineering, neuroscience and engineering, computational biomedical engineering, new DNA sequencing methods (genetic engineering) and more.

Graduates from the biomedical engineering track are multi-disciplinary (spanning engineering and medicine) and you will have career opportunities in medical regulatory authorities, medical devices and bioinstrumentation, imaging and diagnostic services (e.g. X-Ray, MRI, infusion pumps), medical robotics, implant design and fabrication, animal trails, hospital management and consultancy.



TRACK SUBJECTS

- Topics in Biomedical and Healthcare Engineering

ELECTIVES

- Digital Systems Lab
- Microelectronic Circuits and Devices
- Introduction to Materials Science
- Entrepreneurship
- Digital Signal Processing
- Design and Fabrication of Microelectromechanical Systems
- Electromagnetic and Applications
- Fluid Mechanics
- Micro-Nano Projects Laboratory

ALTERNATIVE ENERGIES

The rapid growth in the global energy consumption is putting a strain on the world's energy resources. In addition, there is an urgent need to reduce greenhouse gas emissions to slow down the effects of global warming. Therefore, sustainable alternative energy sources are currently actively sought after to replace fossil fuels.

The Alternative Energies track gives you a strong foundation in energy conversion processes, thermodynamics, fluid mechanics, electronics, and global issues in energy, empowering you to create novel solutions for alternative energies. The skill sets developed enable you to design and analyse alternative energy technologies including but not limited to wind and solar systems. You will also be exposed to micro/nanotechnology and its application to energy conversion and storage.

Due to the broad-based training, you are suited not just for the energy-related industry, but also well-positioned for careers in the aerospace, manufacturing, government, consulting, oil and gas, semiconductor industry and many others.



TRACK SUBJECTS

- Thermal Systems for Power and Environment
- Power Electronics

ELECTIVES

- Microelectronic Circuits and Devices
- Entrepreneurship
- Design and Fabrication of Microelectromechanical Systems
- Sustainable Engineering
- Electric Power Systems Analysis and Design
- Micro-Nano Projects Laboratory
- Electromagnetic and Applications
- Fluid Mechanics

COMPUTER ENGINEERING

Computer Engineering is the application of mathematical and scientific principles to the analysis, design, configuration and operation of computer-related systems.

The track provides you with solid and applicable knowledge of computer architecture, computer science, electronic engineering, programming, network system, database management, information storage, enabling you to develop creative solutions for computer and network systems. You will be prepared for the design and analysis of personal computers, electronic circuits, microprocessors, Field Programmable Gate Array (FPGA), computer networks, network servers, embedded systems, operating systems and software with various applications, and more. The Computer Engineering track gives you research opportunities in computer software and hardware design, including visual and interactive computing, algorithms and analytics, computational intelligence, compilers, Very Large-Scale Integration (VLSI) design, and distributed computing.

You will be very versatile and have career opportunities in software development, computer architecture, electronics design, digital system, data analysis, software quality assurance, telecommunications, transportation, manufacturing, computer-aided design (CAD), hardware and software project management, consultancy, web-based applications development, network systems, and others.

AEROSPACE TECHNOLOGY

Aerospace Technology is the application of scientific knowledge to the analysis, design, manufacture, control, testing, maintenance and operation of devices or systems in the aerospace and aeronautical industries. The track prepares you for the conception, design, implementation and development in either electrical, electronic, mechanical devices or systems, and also to acquire an understanding of the major technical challenges and considerations of the transportation industries.

You will gain knowledge, skills and experience in transportation technologies, digital control, signal processing, wireless communication, electronics design, machine design and engineering design. It will also expose you to advanced and future concepts in transportation.

Graduating from this track, you will have career options in a broad spectrum of transportation industries which include, but are not limited to the aerospace, shipping, railway and automotive sectors.

SELF-DIRECTED TRACK

You will also have the option of working with faculty mentors to create your own track, based on personal interests and a chosen unique theme. The Self-Directed Track gives you the opportunity to focus on a specific interest other than those in the offered tracks or that spans multiple tracks. You will be equipped with a skill set in innovation and systems-level thinking, as well as in-depth technical fundamentals and a focus in your area of interest. Besides careers in your theme area, you are well-prepared to be designers and problem solvers in diverse fields, including engineering, finance, consulting, entrepreneurship, and government organisations.



TRACK SUBJECTS

- Electromagnetic and Applications
- Digital Systems Lab

EPD ELECTIVES

- Microelectronic Circuits and Devices
- Power Electronics
- Entrepreneurship
- Digital Signal Processing
- Digital Integrated Circuits Design
- Wireless Communication

ISTD ELECTIVES

- Introduction to Information Systems and Programming
- Computation Structures
- Introduction to Algorithms
- Machine Learning
- Elements of Software Construction
- Computer System Engineering
- User Interface Design and Implementation

Please visit epd.sutd.edu.sg for more ISTD electives

TRACK SUBJECTS

- Dynamics

ELECTIVES

- Introduction to Materials Science
- Machine Element Design
- Thermal Systems for Power and Environment
- Entrepreneurship
- Digital Signal Processing
- Advanced Feedback and Control
- Wireless Communication
- Propulsion
- Electromagnetic and Applications
- Fluid Mechanics
- Aerodynamics
- Theory and Applications of Robotics





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