BACHELOR OF ENGINEERING WITH HONOURS IN

PHARMACEUTICAL ENGINEERING
PROGRAMME INFORMATION

SIT’s Pharmaceutical Engineering (PharmE) programme is the first in Singapore. This programme is built on an interdisciplinary curriculum that intersects engineering, life science and chemistry, with the aim of delivering a rigorous education that will produce graduates who are both theoretically grounded and industry-ready for the knowledge-intensive pharmaceutical industry and related sectors.

The PharmE programme is distinguished by a curriculum that is strongly girded with cutting-edge, industry-compliant concepts and know-how. Students will be trained in core competencies in the development and manufacture of the two largest classes of pharmaceutical drugs, i.e. (i) biologics and (ii) small molecule drugs.

The curriculum’s strong grounding in both engineering and science will underpin the programme’s foundation, upon which students will be trained in the full spectrum of skill sets pertinent to drug manufacturing, ranging from drug development and production to process development, operations, validation, regulation, and compliance.

Modules to develop students’ business and management acumen will also be offered to add breadth to the technical specialisation of the programme, allowing students to gain an understanding of the expectations of commercial environments and productivity management. The translational nature of PharmE’s curriculum will allow students to readily apply their science and engineering knowledge in the highly advanced and regulated pharmaceutical manufacturing environment, thus grooming graduates who can make impactful contributions to industry from day one.

CURRICULUM STRUCTURE

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<th>TRIMESTER 1</th>
<th>Fundamentals</th>
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<td>1. Engineering Math I</td>
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<td>2. Statistics</td>
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<td>3. Chemistry</td>
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<td>4. Mass and Energy Balance</td>
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<td>5. Biomolecular Science I</td>
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<th>TRIMESTER 2</th>
<th>Core I</th>
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<td>1. Engineering Math II</td>
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<td>2. Organic Chemistry</td>
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<td>3. Organic Chemistry Lab</td>
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<td>4. Programming for Pharmaceutical Engineering</td>
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<td>5. Engineering Principles I</td>
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<th>TRIMESTER 3</th>
<th>Core II</th>
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<td>1. Engineering Math III</td>
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<td>2. Engineering Thermodynamics</td>
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<td>3. Engineering Thermodynamics Lab</td>
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<td>4. Biomolecular Science II</td>
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<td>5. Engineering Principles II</td>
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### Year 2

#### Trimester 1
- Core III
  1. Operational Excellence
  2. Current Good Manufacturing Practice
  3. Technical Writing and Communications
  4. Engineering Principles III
  5. Career and Professional Development

#### Trimester 2
- Break

#### Trimester 3
- Biologics Specialisation I
  1. Expression Engineering
  2. Bioprocess Engineering
  3. Molecular Biology and Fermentation Lab
  4. Bioseparations I
  5. Foundations of Finance
- SMD Specialisation I
  1. Medicinal Chemistry
  2. Unit Operations I
  3. Unit Operations II
  4. Downstream Processing I
  5. Foundations of Finance

### Year 3

#### Trimester 1
- Biologics Specialisation II
  1. Bioanalyticals
  2. Bioseparations II
  3. Bioseparations Lab
  4. Biosafety
  5. Process Automation, Monitoring and Control
- SMD Specialisation II
  1. Analytical Chemistry
  2. Downstream Processing II
  3. Unit Operations and Downstream Processing Lab
  4. Process Safety
  5. Process Automation, Monitoring and Control

#### Trimester 2
- Integrated Work Study Programme (IWSP) and Capstone Project

#### Trimester 3
- Integrated Work Study Programme (IWSP) and Capstone Project

### Year 4

#### Trimester 1
- Operations Management
  1. Process Validation
  2. Plant Design and Operations
  3. Quality by Design in Pharmaceutical Development
  4. Project Management

#### Trimester 2
- GRADUATE
PROGRAMME HIGHLIGHTS

Strong industrial alignment

• Strong industry partnership in curriculum development and industrial case-study sharing.
• Students can obtain industry-endorsed competency-based certifications upon the completion of certain modules of the programme, allowing them to obtain industry-validated skills that are attuned to employers’ needs.
• Students will complete capstone projects that are centred on solving industry problems, with an emphasis on innovation.

INTEGRATED WORK STUDY PROGRAMME (IWSP)

For IWSP, students will be involved in two trimesters of uninterrupted work placement which is a graduation requirement of the degree programme. The IWSP is an avenue to undertake work, and develop their career and professional skills in the pharmaceutical manufacturing and related sectors.

Students will gain hands-on experience in operating manufacturing processes on an industrial scale, complementing and reinforcing classroom theory and concepts. They will also complete a capstone project that is focussed on solving real industry problems.

OVERSEAS STUDY TRIP

During the trimester break, students may opt to embark on a short training attachment at pharmaceutical manufacturing facilities overseas. They will have the opportunity to work with modern industrial-scale unit operations in Good Manufacturing Practice (GMP) or GMP-simulated pharmaceutical manufacturing environments, and pick up best industry practices. Students will also have the opportunity to learn state-of-the-art analytical technologies for pharmaceutical product monitoring and certification.

ADMISSION REQUIREMENTS

Diploma holders and A-level students are welcome to apply. Subject to approval, diploma applicants may be granted module exemptions, based on the modules taken during their diploma. Exemptions may also be considered for relevant professional or industrial certifications.

CAREER OPPORTUNITIES

SIT’s PharmE programme aims to nurture and groom skilled professionals for the pharmaceutical industry in Singapore. The rigorous engineering training provided in this programme also provides fundamental grounding and a unique opportunity for students who are interested in pursuing careers in other relevant industries, including the chemicals, biotechnology, life science, nutraceutical, as well as flavours and fragrances sectors. In-depth training across the full value stream of pharmaceutical manufacturing will allow graduates to directly apply their knowledge in advanced and regulated manufacturing environments, giving them a distinct competitive advantage in the market.
INDUSTRY ADVISORY COMMITTEE

The Industry Advisory Committee members for this programme are:

**Mr Kevin LAI**
Executive Director
Biomedical Sciences and Consumer Businesses
Singapore Economic Development Board

**Mr LIM Hock Heng**
Vice President and Managing Director
Glaxo Wellcome Manufacturing, Singapore

**Mr Carlos PEREIRA**
Site Head
Novartis PharmOps Singapore

**Mr Jose SANCHEZ**
Director
Head of Mammalian Operations
Lonza Singapore

**Mr Juergen WAGNER**
Plant Director for Bioscience Manufacturing
Baxter BioScience Manufacturing, Singapore

For the most up-to-date information, please visit [SingaporeTech.edu.sg](http://SingaporeTech.edu.sg).
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