SINGAPORE-MIT ALLIANCE

Chemical & Pharmaceutical Engineering (CPE)
Singapore-MIT Alliance (SMA)

Established: November 1998

Alliance Universities:

- National University of Singapore (NUS)
- Massachusetts Institute of Technology (MIT)
- Nanyang Technological University (NTU)

Aim:

To create world-class graduate educational programmes and high-impact research initiatives.
A first rate full-time education
interaction with MIT
modern, innovative and specialised degrees
experience of entrepreneurship culture at MIT

Latest technology in interactive distance education
application sharing
real-time and archived lectures
web-based experiments

Top talent in the region
network of alumni comprising the very best talent

Fast growing economy in Singapore
well placed for jobs, business opportunities
& careers in R&D
Importance of Singapore’s Chemical and Pharmaceuticals Sector:

- S$ 14 billion/year
- 28% of Singapore’s Manufacturing Output in 2004
- 7.8% of Singapore’s GDP in 2004

Needs for Chemical and Pharmaceuticals Sector:

- Top Technical Leaders
- Innovative New Technologies

Objective: Educate Top Technical Leaders and Develop Innovative New High-Value-Added Technologies for Chemical and Pharmaceutical Industries
165 Pharmaceutical Companies in Singapore

Major Companies with whom we work include

• GSK
• Pfizer
• Schering-Plough
• Merck

Hundreds of Chemical Companies

Major Companies with whom we work include

• Dow Chemical
• Shell
Educational Programmes

- **Dual Masters Degrees** 18 month timeline:
  - **NUS Masters Degree**
  - **MIT Masters Degree** *(We offer only one type of Master’s Degree in ChE at MIT, and SMA-2 students are in the same degree program together with all other MIT ChE Master’s students.)*

- **Direct PhD** 4 year timeline:
  - **NUS or NTU PhD** (all dissertations will be jointly supervised by NUS/NTU faculty and MIT faculty)
## Highlights and Key Points

### Dual Masters Programme

- 18 Month programme starting July 1, 2009 leading to an MIT Master’s degree and an NUS Master’s degree
- Intensive coursework
- Through Practice School, intensive technical leadership and project experience in real settings, solving real problems
- GRE’s and TOEFL required for application
- Top grades in chemical engineering required, demonstrating ability of students to perform at the highest level
- Must have had extensive undergraduate course experience in chemical engineering, particularly, thermodynamics, kinetics and reactor design, and fluid mechanics and transport
- Indication of leadership and communication skills helpful
- Full fellowship, including tuition and stipend

### PhD Programme

- Four year programme starting July 1, 2009 leading to an NUS PhD degree and an SMA certificate
- Focus on research
- GRE’s and TOEFL *not* required for application
- Research interest required
- Could have undergraduate experience in any field related to research areas of program
- Extensive course background in chemical engineering *not* required
- Full fellowship, including tuition and stipend
![MIT logo](image1.png)

**MIT**

- **Mission:** “To advance knowledge and educate students in science, technology, and other areas of scholarship that will best serve the nation and the world in the 21st century.”

- MIT ranked **No. 1** in engineering by the U.S. News & World Report for its programs in aeronautics and astronautics, **chemical engineering**, computer engineering, electrical engineering, materials sciences and mechanical engineering.
Dual Masters Programme

- NUS coursework and research attachments
- MIT coursework and Practice School
SMA Dual Masters Programme

Semester 1
Fall at MIT

1. Thermodynamics
2. Transport
3. Mathematics
4. Applied Chemistry

Semester 2
Spring at NUS

4 Electives
Laboratory Attachments

June-Aug. Summer at NUS

Semester 3
Fall at Practice School

Company 1
Company 2

July/Aug. Summer at NUS

1. Reaction Engineering
2. Systems Engineering

Advanced Graduate-Level Coursework

Practice School projects instead of thesis research

Master of Science in Chemical Engineering Practice (MIT)
Master of Science in Chemical and Pharmaceutical Engineering (NUS)
The David H. Koch School of Chemical Engineering Practice

T. Alan Hatton, Director
Department of Chemical Engineering
Massachusetts Institute of Technology
Cambridge MA 02139
Tel: +1 617 253 4588 E-Mail: tahatton@mit.edu

http://web.mit.edu/cheme/graduate/practice/index.html
MIT’s Masters Program: The Practice School

- Students take core graduate courses during one semester at MIT and a second semester in Singapore
- In lieu of a Master’s thesis, students perform consulting projects at Practice School Stations located in Corporations and Research Institutes
- Focus is on leadership and problem solving
- MIT faculty resident on-site direct the Practice School Stations
- Alumni are leaders in the chemical and pharmaceutical industries
MIT Practice School

• Different Paradigm for Technical Education: Training Technical Leaders
  – Not a summer job or a traditional student internship/industrial attachment
  – Leadership oriented technical training
  – Project team focus to deliver solutions to company problems, as consultants
  – Station Director - Resident MIT faculty for programme management

• MIT Programme has 90-Year History of Success - Professional success of many alumni attributed to Practice School training:
  • Ralph Landau (Halcon International, Oxirane)
  • Gerry McAfee (CEO Gulf Oil)
  • David Koch (Koch Industries)
  • John Haas (Rohm and Haas)
  • Sam Bodman (Fidelity, Cabot, US Secretary of Energy)
  • Fred von Gottberg (Cabot, VP Research and Development)
  • Lloyd Johnston (Alkermes, VP)
## Practice School Projects

**Semester 3 Stations**

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<tr>
<th>Company 1</th>
<th>Company 2</th>
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<tr>
<th>Project 1</th>
<th>Project 2</th>
<th>Project 3</th>
<th>Project 4</th>
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- **8 weeks at Company 1**
- **8 weeks at Company 2**

### Work performed for a Client
- Objectives clearly defined
- High value-added results (Up to Millions of dollars per year)

### Students work in teams of 2 or 3
- Designated team leader– Leadership training
- Students divide the work

### Four-Week schedule
- Designed for high output
- Work highly organized and planned
- Scheduled progress reports, oral and written
- Documentation, proprietary

### Supervision and monitoring
- MIT faculty on-site as Station Director
- Reporting to and consulting with client

6-9 students/session at field stations
# Practice School Project Calendar

## Project Cycle
- **Fall:**
  - Project 1
  - Project 2
  - Project 3
  - Project 4
- **Spring:**
  - Stations

## Company Orientation and Safety
- 8 weeks at Company 1
- 8 weeks at Company 2

## Presentations
- Draft Report
- Final Report
- Weekend Activities

## Project Execution
- Project Definition and Planning
- Practice School Project Calendar

### Weekend Activities
- Sun
- Mon
- Tues
- Wed
- Thurs
- Fri
- Sat
Recent Practice School Stations in the US

- Cargill Minneapolis MN
- Johns Manville Toledo OH
- PlugPower Schenectady NY
- Cabot Corp Billerica MA
- Alkermes/AIR Cambridge MA
- Novartis East Hanover NJ Suffern NY
- M&M Mars, Inc Hackettstown, NJ Elizabethtown, PA
- GE Plastics Mt. Vernon IN
- Masterfoods, Inc Vernon CA, Reno NV
- General Mills Minneapolis MN
  - Albuquerque NM, Buffalo NY
  - Cincinnati OH, Lodi CA
  - Cedar Rapids IA
Mitsubishi Chemical Corp.
Mizushima, Japan
Consortium of Companies
SMA, Singapore
Rhone Poulenc.
Lyon, France
BP Chemicals
Hull, U.K.
Grangemouth, Scotland
GSK
Harlow/Ware U.K.
Cork, Ireland
Novartis
Basle, Switzerland
M&M Mars, Inc
Students traveled to Europe and Australia
Mitsubishi Chemical Corp.
Mizushima, Japan
Independent Practice School Program
KMITT, Bangkok, Thailand
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Practice School Around the World
Novartis
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Harlow/Ware U.K.
Cork, Ireland
Practice School Around the World
Summary of Benefits

- Unique Technical Leadership Training Program
  - Has generated several generations of technical leaders in the chemical industry
  - Increases technical objectivity and sharpens communicative and supervisory skills
  - Shortens activation period for professional activity
  - Premier chemical engineering Masters program in the world!
SMA PhD Programme

• Top research in
  – Molecular Engineering
  – Pharmaceuticals
  – Microreactors
  – High performance computation
  – Biotechnology and Metabolic Engineering
Biotechnology Research in Singapore

- Many Centers and Institutes already established
  - Institute of Molecular and Cell Biology (1990)
  - Institute of Agriculture Biotechnology (1995)
  - Bioprocessing Technology Institute (1995)
  - Centre for Natural Product Research (1998, privatized 2002)

- BIOPOLIS: “city within city”
  - Started construction (2001); dedicated (2003)
  - Located close to National University of Singapore
  - Self contained environment: laboratories, incubators, living quarters, restaurants, entertainment, MTR station, etc.
Biopolis: “a Hot Bed for R&D”

Phase 1: 184,524 sqm
- Nov 2003 Completion
- Common areas include retail outlets, housing, and entertainment

Biomedical Complex
- Public R&D Centers (BII, BTI, GIS, IBN, IMB)
- Corporate R&D Centers

Shared R&D Facilities
- Shared R&D equipment
- Shared utilities
- Shared animal facility

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Please view Professors’ web sites for research interests
SMA Graduate Fellowship Support

SMA Graduate Fellowship provides full support for:

- Full tuition at both NUS/NTU, and MIT
- Housing allowance whilst resident at MIT
- Stipend
- Travel between Singapore and MIT, and between Singapore and Practice School stations
Benefits

- Stipend of S$1,500/S$2,000 per month
- Fully-subsidised tuition fee
- Bond-free SMA Graduate Fellowship
- Internship with industry
- Residency at MIT
- Additional living allowance of up to US$6,000 during residency at MIT
- Graduate Student Tutor / Teaching Assistant appointments for PhD students
- Top-up grant of S$500 per month for PhD students
- SMA certificate for direct PhD degree
- Invitation for Permanent Residence
- Individual cubicle with PC in each
- Interaction and activities
- Job placement
To apply to CPE, the following application forms must be submitted:

- MIT Application Form: Department of Chemical Engineering (to be submitted to MIT) Application deadline: January 2, 2009
- SMA Application Forms (to be submitted to the Singapore-SMA Office) Application deadline: February 15, 2009
- Fellowship Application Form (to be submitted to the Singapore-SMA Office) Application deadline: February 15, 2009

For more information, see:
- http://web.mit.edu/sma/students/programmes/cpe.htm