หลักสูตรสองภาษา กับ University of Sheffield

เนื่องด้วยในปัจจุบัน ภาษาอังกฤษมีความสำคัญมากขึ้น โดยเฉพาะอย่างยิ่งการที่ประเทศไทยจะเข้าสู่ประชาคมอาเซียน ในวันที่ ๓๑ ธันวาคม ค.ศ. ๒๐๑๕ หรือ พ.ศ. ๒๕๕๘ ที่มีข้อตกลงการเคลื่อนย้ายแรงงานมีฝีมือใน ๗ สาขา และการใช้ ภาษาอังกฤษเป็นภาษากลางในการทำงาน ซึ่งสิ่งที่คาดกันว่าจะเกิดขึ้นคือมีบริษัทต่างชาติมาลงทุนในภูมิภาคอาเซียน โดยใช้ประเทศไทยเป็นศูนย์กลางเชื่อมโยงไปยังประเทศอื่น จะทำให้เป็นโอกาสที่ดีสำหรับผู้ที่จบการศึกษาและมีความรู้ภาษาอังกฤษดี ที่จะสามารถเข้าทำงานกับบริษัทเหล่านี้ รวมทั้งสามารถไปทำงานในประเทศต่างๆ ได้ ทำให้ได้รับเงินเดือนในอัตราที่สูง

อีกประเด็นหนึ่งคือ ในปัจจุบันมีนักเรียนที่ศึกษาอยู่ในหลักสูตรสองภาษาหรือหลักสูตรนานาชาติมากขึ้น แต่เมื่อถึงระดับอุดมศึกษาแล้ว ยังมีหลักสูตรทางด้านวิศวกรรมศาสตร์ที่สอนเป็นภาษาอังกฤษอย่างมีคุณภาพน้อย ทั้งที่ยังมีความต้องการของตลาดอีกมาก บัณฑิตที่จบจะไม่สามารถแข่งขันกับบัณฑิตที่จบจากต่างประเทศหรือประเทศในอาเซียนที่ใช้ภาษาอังกฤษเป็นหลักได้ แต่การไปศึกษาระดับปริญญาตรีในต่างประเทศก็มีปัญหานอกจากค่าใช้จ่ายที่สูงแล้ว ผู้ปกครองเองก็ยังเป็นห่วงกับการที่จะให้บุตรหลานที่จะต้องไปอยู่ในต่างประเทศในขณะอายุน้อย อีกทั้งที่ผ่านมาก็พบว่านักเรียนมีปัญหาในการปรับตัวกับระบบการเรียนในต่างประเทศที่เข้มข้นมาก

มหาวิทยาลัยฯ เห็นถึงปัญหาดังกล่าว จึงได้ตกลงความร่วมมือกับมหาวิทยาลัย Sheffield ประเทศอังกฤษ ซึ่งเป็นมหาวิทยาลัยที่มีคุณภาพได้รับการจัดอันดับเป็น University of the year ปี 2011 จัดโดย Time Higher Education โดยได้เปิดหลักสูตรวิศวกรรมศาสตร์ 4 สาขาคือ วิศวกรรมไฟฟ้า วิศวกรรมเคมี วิศวกรรมโยธา และวิศวกรรมเครื่องกล โดยทางมหาวิทยาลัย Sheffield จะส่งอาจารย์มาร่วมสอนในบางเวลา เพื่อให้แน่ใจว่าการสอนมีเนื้อหาครบถ้วน ตามหลักสูตรของมหาวิทยาลัย Sheffield รวมทั้งการพิจารณาข้อสอบในทุกวิชา ระบบการสอนจะเหมือนกับที่ Sheffield มีอาจารย์ที่ปรึกษาเพื่อเตรียมความพร้อม เมื่อนักศึกษาจบชั้นปีที่ 2 และมีผลการสอบภาษาอังกฤษ IELT ตั้งแต่ 6.5 ขึ้นไป และมีเกรดเฉลี่ยเกิน 2.75 จะสามารถโอนย้ายหน่วยกิต ทั้งหมดไปที่มหาวิทยาลัย Sheffield เพื่อเรียนต่ออีก 2 ปีก็จะได้รับปริญญาของทาง Sheffield การเรียน 2 ปีแรกในประเทศไทยจะช่วยลดค่าใช้จ่าย ของผู้ปกครองแต่ยังคงมาตรฐานที่มหาวิทยาลัย Sheffield ยอมรับ และเมื่อไปศึกษาต่อในชั้นปีที่ 3 และ 4 นักศึกษาจะมีวุฒิภาวะพอที่จะสามารถดูแลตัวเองได้เป็นอย่างดีแล้ว เพื่อความสบายใจของผู้ปกครอง ค่าเล่าเรียนก็จ่ายโดยตรงตามระเบียบกับทางมหาวิทยาลัย Sheffield โดยไม่ผ่านมหาวิทยาลัยเทคโนโลยีมหานคร ทั้งนี้ทาง University of Sheffield กำลังพิจารณาในเรื่องการลดค่าเล่าเรียนสำหรับนักศึกษาจากมหาวิทยาลัยเทคโนโลยีมหานครในโครงการนี้

สำหรับนักศึกษาที่ไม่ต้องการไปต่อที่มหาวิทยาลัย Sheffield ก็สามารถศึกษาต่อในชั้นปีที่ 3 และ 4 ที่มหาวิทยาลัยเทคโนโลยีมหานครได้จนจบการศึกษา

Chemical Engineering– B.Eng

Qualification : B.Eng (Bachelor of Engineering)
Duration : 4 years (2 years at Mahanakorn University of Technology and 2 years at The University of Sheffield)

Program description:

You'll learn about the design and operation of processes for making a wide range of products on which everyone's standard of living depends. These include food, fuels, medicines, plastics and the basic materials for high technology industries. Chemical Engineering is available as either a three-year BEng or a four-year MEng. Either of these qualifications will enhance your career prospects, but the MEng takes your study to a more advanced level. The first two years of all our courses are the same so you have the flexibility to switch courses, up to the end of the second year.

1st & 2nd year modules (Mahanakorn University of Technology)
3rd & 4th year modules (The University of Sheffield/Mahanakorn University of Technology)

Admission Requirements:

- Hold a M6 (Grade 12) certificate or its equivalent issued by the Ministry of Education, or equivalent certificates from local or overseas educational institutes recognized by the Ministry of Education.
- An application may not be suffer from any serious illness, mental disorder, and disability.
- An application must have no record of serious misconduct.
- An application must be proficient in English as determined from credentials and/or examination. The application who have a IELTS score of a least 5.5 or TOEFL score of least 550 PBT are eligible for admission without taking the English examination

Chemical Engineering– B.Eng

1st year modules (Mahanakorn University of Technology)

1. Introduction to Computer Programming

Fundamental programming concepts: programming paradigms, C programming and compiler; Programming style: top-down design, program design and organization concepts; Program testing and debugging; Memory representation of data; Systematic problem solving, program documentation and maintenances.

2. English Communication Skills I

This course incorporates all four skills in each unit, and follows on from the English learned in high-school. Activities are stimulating and motivating for students, and grammar is of an intermediate level. Speaking is an integral part of each lesson. Students' understanding of English is widened, and their ability to use the language for communicative purposes is extended.

3. Chemistry

Atomic structure; quantum theory and the electron structure of atoms; chemical bonding; chemical reactions; mass relationships; intermolecular forces; the gaseous state; chemical kinetics; chemical equilibrium; acids and bases; thermochemistry; thermodynamics; electrochemistry; nuclear chemistry; organic chemistry.

4. Chemistry Laboratory

Heat of reactions; rate of reactions; titration; electrochemistry; Galvanic cells; chemical equilibrium; acid-base indicators; displacement reactions; paper chromatography; semi-micro qualitative analysis.

5. Mathematics I

Algebra: complex numbers; vectors; linear equations; matrices; vector geometry.
Calculus: sets; inequalities; functions; limits; properties of continuous functions; differentiable functions; the mean value theorem and applications; inverse functions; curve sketching; integration; integration techniques; applications of integration; logarithms and exponentials; hyperbolic functions.

6. Introduction to Computer Programming

Fundamental programming concepts: programming paradigms, C programming and compiler; Programming style: top-down design, program design and organization concepts; Program testing and debugging; Memory representation of data; Systematic problem solving, program documentation and maintenances.

7. Physics I

Electrostatic; Coulomb's law; Gauss's laws; Biot & Savart's law; Ampere's law; Ohm's law; Basic DC circuits; Faraday's law; Maxwell's law; Alternating current; Basic electronics; Light and modern Physics

8. Physics Lab I

The experimental topics are as follows; speed of light and speed of sound, h and e/m measurement, resonance, charge and capacitor, magnetic field, diffraction and interference of light, spectrum of light, light, terminal velocity, and measurement of electricity.

9. Engineering Design

Design composition; Evolution and history of design; different facets of design; problem solving and problem formulation; design process: concept design, detail design, analysis and manufacturing; reverse engineering; impact on environment and society; hands-on assignments to enhance the learning outcome; written and oral presentation skills.

10. Mathematics II

Ordinary Differential Equations.
Linear Algebra : linear equations and matrices; vector spaces; linear transformations; Gram-Schmidt; least squares; QR factorisation; determinants; eigenvalues; eigenvectors and diagonalisation; symmetric and Hermitian matrices; Jordan forms; matrix exponentials; systems of ordinary differential equations.

11. Engineering Materials

Importance and application of engineering materials such as metals, plastics, polymers, semiconductor, concrete, cement, asphalt and wood etc; phase diagrams and meaning; properties testing of engineering materials and meaning; study of microstructure and macrostructure relating with property of engineering material; production processes of engineering materials and applications of such engineering materials in engineering work.

12. Chemistry Laboratory

Heat of reactions; rate of reactions; titration; electrochemistry; Galvanic cells; chemical equilibrium; acid-base indicators; displacement reactions; paper chromatography; semi-micro qualitative analysis.

13. English Communication Skills II

This course incorporates all four skills in each unit, and continues on directly from ENGL7101. There is more in-depth treatment of grammar, and a systematic vocabulary syllabus. Students' understanding of English is again widened, and their ability to use the language for communicative purposes is extended as accuracy, fluency and correct pronunciation are incorporated. Report writing and oral presentation tasks are also provided.

14. Physics II

Electrostatic; Coulomb's law; Gauss's laws; Biot & Savart's law; Ampere's law; Ohm's law; Basic DC circuits; Faraday's law; Maxwell's law; Alternating current; Basic electronics; Light and modern Physics

15. Physics Lab II

The experimental topics are as follows; speed of light and speed of sound, h and e/m measurement, resonance, charge and capacitor, magnetic field, diffraction and interference of light, spectrum of light, light, terminal velocity, and measurement of electricity.

Chemical Engineering– B.Eng

2nd year modules (Mahanakorn University of Technology)

1. Chemistry for Chemical Engineers

Nature of physical chemistry; gas, liquid and solid; state of matters and the properties of gases; phase equilibrium of single substances and mixtures; the topics also include chemical equilibrium, electrochemistry, and fundamentals of chemical kinetics. Fundamental of analytical chemistry; applications of quantitative and qualitative analysis; gravity and titrimetry; acid-base equilibria and titrations; electro analytical methods based on electrolysis; principles and instruments of spectrophotometer and chromatography such as molecular fluorescence spectroscopy, atomic spectroscopy, UV spectroscopy, gas chromatography and high performance liquid chromatography.

2. Chemistry Laboratory for Chemical Engineering I

Laboratory investigations of analytical chemistry concepts including: quantitative and qualitative analysis, potentiometric, electrolysis, buffer, spectroscopy and separation techniques; selected topics in physical chemistry such as the properties of gases and liquids, thermochemistry, and phase diagram are also included.

3. Chemical Engineering Principles and Calculations

Introduction to chemical engineering principles and calculations, unit and dimesions, chemical reaction and stoichemetry; fundamental of mass and energy balances with and without chemical reactions for single and multiple systems in steady and unsteady state processes; Recycle, bypass, and purge calculations; P-V-T properties of gases and gas-vapor mixtures; Use of physical, chemical, phase equilibrium and themodynamic data for chemical industry processes.

4. Chemical Engineering Thermodynamics I

Thermodynamic relationship, Maxwell relation, and Clapeyron equation; general relations for internal energy change, enthalpy and entropy; mixture properties calculation, law of aggregation and mixing, partial molar properties, fugacity and activity concepts; phase equilibria, phase rule, and phase diagram; phase equilibrium data and analysis by Raoult's and Henry's laws; phase equilibrium analysis for non-ideal solution; flash calculation, chemical equilibrium, and chemical reaction; effect of temperature on equilibrium constant; chemical equilibrium for homogeneous, heterogeneous, and multi-reaction systems; an introduction of thermodynamic cycles.

5. Mathematics I

Several Variable Calculus: vectors and vector calculus; functions of several variables; partial derivatives; gradients; extreme values; differentials; double and triple integrals; line integrals; surface integrals.
Complex Analysis: basic topology functions and mappings; limits; continuity and differentiability; analytic and harmonic functions; exponential, trigonometric and hyperbolic functions; principal logarithms and complex exponents; arcs, contour integrals and antiderivatives; Cauchy-Goursat theorem and Cauchy integral formula; Taylor and Laurent series; evaluating integrals; singularities and residues; real improper integrals; trigonometric integrals.

6. Engineering Mechanics

Force system, resultant force, equilibrium of particle and rigid body in 2 and 3 dimensions, basic structural analysis, truss, frame, machine, friction, center of gravity, moment of inertia of area and mass, virtual work, stability of structure

7. English for International Communication I

The aims of this course are to encourage students to analyse the systems of the English language; to expose them to a variety of challenging and interesting texts in the reading activities and to stimulate them to give their own opinions when participating in discussions. IELTS-style reading and writing tasks are also included.

8. Biology for Chemical Engineers

The basic of biology including cell types and function, cell chemistry, proteins; applications of the existing knowledge in biology for chemical engineers.

9. Chemical Engineering Thermodynamics II

Thermodynamic relationship, Maxwell relation, and Clapeyron equation; general relations for internal energy change, enthalpy and entropy; mixture properties calculation, law of aggregation and mixing, partial molar properties, fugacity and activity concepts; phase equilibria, phase rule, and phase diagram; phase equilibrium data and analysis by Raoult's and Henry's laws; phase equilibrium analysis for non-ideal solution; flash calculation, chemical equilibrium, and chemical reaction; effect of temperature on equilibrium constant; chemical equilibrium for homogeneous, heterogeneous, and multi-reaction systems; an introduction of thermodynamic cycles.

10. Organic Chemistry for Chemical Engineers

Study the fundamental of fermentation process, fermentation kinetics, cell and enzyme immobilisation, fermenter design, agitation and aeration, sterilisation, product recovery and purification; applications of fermentation processes and case studies.

11. Chemistry Laboratory for Chemical Engineers II

12. Unit Operation I

Physical properties of fluid, dimensional analysis, fluid statics and applications of partial and fully developed turbulent flow in pipe; type of flow and friction loss, fluid transpotation, flow measurement, mixing, particle motion in fluid flow, size reduction, and particle characterisation; application of momentum transfer theory in chemical engineering units, such as; fluid flow in packed bed, fluidisation, filtration, mixing and agitation, sedimentation, and cyclone.

13. English for International Communication II

This course provides comprehensive coverage of the grammatical and lexical systems of English, so that students can express themselves with precision, and with a good command of idioms and collocation.

14. General Statistics

Probability and Statistics: probabilities and probability rules; conditional probability and Bayes' rule; descriptive statistics; random variables; discrete random variables; mean and variance of discrete random variable; binomial, Poisson, geometric, exponential and normal distributions; sampling distributions; the central limit theorem; inferential statistics; linear regression; analysis of variance.

Chemical Engineering– B.Eng

3rd year modules (The University of Sheffield or Mahanakorn University of Technology)

The University of Sheffield

1. Process Design Project

The students work as a group to produce an outline solution to a chemical engineering problem in the form of a joint process proposal document, and a poster. The students work as a team to work out the details of the process. Each student produces an individual report including the design of items of process equipment, and also a topic of relevance to the project overall, such as safety, economics, energy integration, effluent treatment. Students make use of skills and facilities such as computer software taught earlier, and also reinforce their learning of topics taught in the same year. The aim is to produce professional standard documents giving sound technical solutions, with a proper appreciation of the environmental, commercial and human context.

2. Advanced Chemical Engineering

In the Transport Processes part of the module, humidification and drying theory with application to design are introduced. The unit also considers balance equations for heat and mass transfer and their solution, and examines the case of momentum transfer with a number of fluid mechanical examples introducing the Navier-Stokes equation and a number of limiting case solutions. In the Reaction Engineering part, the course extends the treatment of chemical reactors given in CPE2002. It covers multiple reactors, the way in which real reactors deviate from idealised ones, the concept and use of residence time distribution rather than a single residence time and consideration of chemical rate processes in multiple reactions and autocatalytic processes. It introduces reactions in which interaction between a fluid and a solid phase is the controlling factor. This can be a solid-fuel reation or a fuel reaction catalysed by a solid.

3. Chemical Engineering Design

The course covers the selection and design of process equipment found on a chemical plant, including aspects of control, scale-up methods and short cut design procedures. The unit also provides an introduction to process safety and loss prevention from industrial processes and will enable students, with further experience in industry, to carry out activities involved in the safety review of proposed and existing plants. Areas covered include hazards, incidents, hazard identification, risk assessment, fault trees, risk control methods, human factors and appropriate case studies and legislation.

4. Crystal Science and Engineering

The key objective of this course is to introduce students to basic crystallographic concepts and the description of the fundamental processes by which atoms, ions or molecules can be transformed into crystals and hence into products. For this purpose, the concepts such as crystallography, structural defects, phase equilibrium, solution and solubility, unsaturated, saturated and supersaturated solutions, metastable zone width, nucleation and crystal growth mechanisms, polymorphism and enatiomorphism have been considered. These concepts illustrate integrity and complexity of cystallisation process and how this process can be changed in a controllable manner in order to engineer particles with desired physical properties. These properties are: shape of particles, defect content, polymorphism, mechanical properties, bioavailability, impurity content, degree of crystallinity, filterability, particles with a desired state of surface properties, etc. Throughout the course two major attempts have been made: (a) to link the above properties with fundamental aspects of molecular self-assembly through particle formation in a comprehensive and accessible way, and (b) to emphasise significance and practical role of particle engineering in processing industries. The aim of the course is: to understand the basic features of Crystal Science and Engineering; to introduce the key principles of engineering of small crystalline particles; to understand the essence of phase diagrams and enable a student to use them for a rational selection of most appropriate crystallisation technique; to understand polymorphism on a molecular level and being able to recognise its importance in food, cosmetic and pharmaceutical industries; to introduce students to the basic concepts of crystallography and related X-ray experimental techniques to characterise newly designed solid state products; to make students aware of a role of crystals in formulated products.

5. Environmental Protection

This unit provides an introduction to the concerns and responsibilities for the environment to engineering students. The environment is now an integral part of industrial operation and management with the requirements in industry enshrined in law and financial imperatives, and graduates require an understanding of their professional responsibilities and of the influence of environmental concerns on industrial function and development. The module includes an introduction to and history of environmental protection & sustainability, Environmental Law, Environmental Impact Assessment, environmental audits, life cycle analysis, environmental assessment and recycling and conclusions placing the environment in the global business economics. The module aims to provide students with a background of understanding of the interaction of industry with the environment by providing a knowledge of the interactions between industry, society and the environment, environmental legislation and issues of global and local sustainability. The unit also aims to provide students with the tools to understand and carry out environment management techniques and to enhance their team working and presentation skills.

6. Process Dynamics and Control

The broad aims are that the student should: ¿ be able to model and analyse the behaviour of typical processes and the impact of feedback upon these behaviours. ¿ be able to develop models of cause and effect (input-output) relationships, to produce block diagrams to represent behaviour and to be able to define Controlled Variables, Manipulated Variables, Disturbance Variables. ¿ understand the essential functionality of feedback control loops and the circumstances in which their potential benefits may be realised. ¿ have an awareness of the functionality of typical proprietary (for example DCS, SCADA and PLC) systems from the perspective of the operator. The broad aims are that the student should: ¿ be able to model and analyse the behaviour of typical processes and the impact of feedback upon these behaviours. ¿ be able to develop models of cause and effect (input-output) relationships, to produce block diagrams to represent behaviour and to be able to define Controlled Variables, Manipulated Variables, Disturbance Variables. ¿ understand the essential functionality of feedback control loops and the circumstances in which their potential benefits may be realised. ¿ have an awareness of the functionality of typical proprietary (for example DCS, SCADA and PLC) systems from the perspective of the operator.

7. Project Management and HRM for Engineers

The module is designed to introduce some of the key elements of the discipline of project management including planning and scheduling, the allocation of resources projects, risk assessment, and mechanisms for monitoring, controlling, evaluating and terminating projects. At the same time the module well develop an aware of the importance of human resource management for successful delivery of projects in practice, including recruitment, organisation, team working, performance measurement and appraisal of human resources as well as developing an understanding of the theories of worker motivation and leadership. Through a series of parallel running lectures in these two areas, the module will provide a working knowledge of how they impinge on engineering practice. There will be a heavy emphasis on group working, report writing and presentation as part of the assessment supplemented by online exercises and an individual portfolio.

Mahanakorn University of Technology (Coming soon)

Chemical Engineering– B.Eng

4th year modules (The University of Sheffield or Mahanakorn University of Technology)

The University of Sheffield

We do not currently have any module information available for this year of the course.

Mahanakorn University of Technology (Coming soon)