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

Mechanical 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)

Course description:

This is the most flexible of our courses and covers all the essentials with an emphasis on modelling and design. You'll be introduced to the role of engineering in business and management, and can specialise in your area of interest. In the first five semesters, you'll study mathematics, applied dynamics, mechanics of fluids, mechanics of solids, applied thermodynamics, mechanical behaviour of materials, and electrical and electronic engineering. Other topics include computer-controlled systems and mechatronics.
At level three you'll complete a group design project, and an extended individual project at level four. You may be able to switch between our courses at the end of the first 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 aIELTS score of a least 5.5 or TOEFL score of least 550 PBT are eligible for admission without taking the English examination

Mechanical Engineering– B.Eng

1st year modules (Mahanakorn University of Technology)

1. 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; thermo chemistry; thermodynamics; electrochemistry; nuclear chemistry; organic chemistry.

2. Chemistry Laboratory

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. Introduction to Computer Programming

The concept of a computer; components of the computer; coordination between hardware and software; concept of data processing; software design and development process to solve engineering problems by using high level languages.

4. 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

5. Engineering Mechanics I

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

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. 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.

10. 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.

11. Mathematics III

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.

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. 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

14. 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.

15. General Science

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

Mechanical Engineering– B.Eng

2nd year modules (Mahanakorn University of Technology)

1. 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.

2. 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.

3. 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.

4. Mathematics III

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.

5. Engineering Mechanics II

Kinematics and kinetics of particles and rigid bodies; the Newton's second law of motion; principle of work and energy; impulse and momentum; introduction to dynamics applications.

6. Solid Mechanics

Forces and stresses; relation of stress and strain; bars under axial loading; torsion of shafts; straight beams under pure bending and transverse loading; transformation and Mohr's circle of plane stress; failure criteria under plane stress; shear and bending-moment diagram; defection of beams by integration and superposition method; buckling of columns.

7. Fluid Mechanics

Properties of fluid; fluid statics; momentum and energy equations; equation of continuity and motion; similitude and dimensional analysis; steady incompressible flow.

8. Thermodynamics

Basic of thermodynamics; properties of pure substance; heat and work; basic energy conversion; ideal gas; first law of thermodynamics; second law of thermodynamics; entropy; carnot cycle; introduction to heat transfer mechanisms.

9. Manufacturing Technology

Size and dimensions; tolerance limits; metal fabrication processes without scrap: casting, forging, hobbing, extruding, welding, etc.; metal fabrication processes with scrap: metal cutting, grinding, etc.; heat treatment processes; fundamental of plastic injection; relationship between materials and manufacturing processes; manufacturing cost estimation.

10. 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.

11. Mechanics of Machinery

Linkage, kinematic diagram; degrees of freedom in motion; equivalent linkages; velocity analysis; cam; gear train; gear train analysis; acceleration analysis; acceleration diagram; force analysis of mechanism system; linkage force; static force analysis; dynamic force analysis; balance of machines; static balance; dynamic balance.

12. Applied Solid Mechanics

Stress concentrations, plastic deformations, and residual stresses of bars, shafts, and straight beams; stresses in thin-walled pressure vessels; transformation and Mohr's circle of plane strain; impact loading and work-energy method; deflections of beams under unsymmetrical bending and curved beams by moment-area method; problem solving by energy methods.

13. Applied Fluid Mechanics

Partial differential equation of fluid motion; boundary layers, fluid flow about immersed bodies; fluid machinery; performance characteristics for pump, turbines and compressors; compressible flow.

14. Applied Thermodynamics

Power cycles and refrigeration cycles; thermodynamic property relations; energy change efficiency; gaseous mixtures and psychrometry; chemical reactions and combustion process analysis; phase equilibrium; compressible fluid flow.

15. Mechanical Engineering Laboratory I

Experimental studies via laboratory practices on dynamics, mechanical measurement and solid mechanics.

16. Mechanical Engineering Laboratory II

Experimental studies via laboratory practices on thermodynamics, fluid mechanics, and automotive technology.

17. General Statistics

Probability theory; random variables; statistical inference; analysis of variance; regression and correlation; applications of statistical methods in engineering; social and economic researches.

Mechanical Engineering– B.Eng

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

- The University of Sheffield

1. Group Design Project

The module demonstrates the principles of engineering design by providing a viable solution to a relevant general engineering problem. The module examines the role of marketing, design and manufacture in a business environment. Students work in groups to generate possible solutions to the problem and then concentrate individual effort on different aspects of the problem. Throughout the project the group is assessed on its organisational skills and how effectively it communicates ideas.

2. Advanced Engineering Thermodynamic Cycles

The module consolidates and expands the fundamental and general background to Thermo-Fluids engineering, developed during first and second year Thermo-Fluids modules, by practice and the study of fluid machines, devices and their application. Sizing of devices and design of simple circuits is taught. The module aims to introduce students to real energy conversion and power production processes. Use of irreversibility to analyse plant. Examination of reheat and heat recovery. To look at total energy use by means of combined gas and steam and combined heat and power cycles. Pinch point analysis is also introduced.

3. Experiments and Modelling

This unit allows students to perform three experiments and model them using appropriate software. There will be a thermofluids, a solids/materials and a dynamics/control experiment for each student to engage with. The experiments will teach the students about the difficulties of acquiring meaningful results. Students will learn about validation and the issues involved in producing a useful model of an experiment. Each student will be required to produce three full laboratory reports and a unifying document.

4. Integrated Design Skills

The module aims to integrate the design and mechanical elements of the students' engineering learning of the previous two years by studying the theory and practice of machine element design. The module will discuss the design and selection of power transmission components and systems, including shafts, gears, brakes, clutches, couplings and hydraulic transmission units. Students will work in teams to design solutions for typical power transmission problems.

5. Integrity of Materials and Components

To bring together knowledge gained of engineering science aspects of stress, deformation analysis, and material strength, and to apply them to engineering components. The module will broaden students' perspectives by introducing the 3D nature of stress, plastic analysis, high temperature response and tribology. Practical aspects will be introduced by the use of a case study and life cycle analysis.

6. Manufacturing Systems

The module examines the relationship between design and manufacture in the business environment and demonstrates techniques which can be used to enhance product quality and reduce manufacturing costs. The module also examines the organisation of manufacturing processes and the concepts underpinning JIT and optimised production technology. The objectives for this module are as follows: to examine the relationship between design and manufacture in the business environment and to introduce the techniques of variety control and value analysis; to demonstrate the use of the above techniques in the development of a manufacturing strategy; to introduce methods of enhancing and controlling product and process quality and reliablility; to demonstrate the use of reliability in the development of a maintainance strategy; to introduce the various forms of production and methods of organising and designing a manufacturing facility; to introduce manufacturing logistics and examine the relationship between group technology and cellular manufacture; and to introduce the concepts of optimised production technology and JIT and identify the key system requirements.

7. Mechatronics

Mechatronics is defined by describing the design process and providing examples of successful applications. Material from MEC206 is extended to consider the control of dynamical systems using digital computers. Root locus techniques are applied to analyse both continuous and sampled-data systems. Bode diagram techniques are applied to continuous systems. Finally, case studies involving successful applications of mechatronics are investigated.

8. Sensors, Actuators and Controllers

The module introduces the student to the key components which are used to implement feedback control of a physical process: sensors, actuators and controllers. The student is introduced to these elements through the language of classical control systems modelling. Emphasis will be placed on electrical, mechanical and electro-mechanical systems but reference will be made to the much wider applicability of the techniques. Also the use of analogue electronics in control will be discussed in some detail. Comprehensive case studies will illustrate the wide range of applications of control techniques.

- Mahanakorn University of Technology (Coming soon)

Mechanical Engineering– B.Eng

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

- The University of Sheffield

1. Individual Project

The student will conduct an Investigative Project over the academic year under the supervision of an approved examiner. The student is expected to demonstrate the ability to acquire and apply new knowledge for the execution of the project and to appreciate its wider engineering significance. The project encourages initiative, project planning, management and organisational skills, and personal skills. The student will present their work for assessment by a dissertation, and by an oral presentation and examination where they will be examined by a panel of approved examiners.

1. The Professional Responsibility of Engineers

The module introduces students to the wide range of professional and ethical issues that they are likely to encounter in their profesional life as mechanical engineers and provides them with the principle mechanisms for resolving ethical issues.

- Mahanakorn University of Technology (Coming soon)