seeNTU 2023
Module Synopses
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<td>SCSE/1</td>
<td>Python Programming on Raspberry Pi</td>
<td>Assoc Prof Nicholas Vun</td>
<td>9.30am – 5.30pm (inclusive of lunch break)</td>
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<td>SSS/1</td>
<td>Public Policy Making in the Digital Era</td>
<td>Assoc Prof Wu Wei</td>
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<td>CCEB/1</td>
<td>Introduction to Chemical Process Simulation in Aspen HYSYS</td>
<td>Dr Mukta Bansal</td>
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<td>MSE/1</td>
<td>Rediscovery of Metals and Their New Nanofrontiers</td>
<td>Asst Prof Tan Kwan Wee Asst Prof Wu Dongshuang</td>
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<td>Assoc Prof Alessandro Romagnoli Dr Khor Jun Onn Dr Yang Lizhong</td>
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<td>MAS/1</td>
<td>Discrete Mathematics and Statistics with Applications</td>
<td>Prof Bernhard Schmidt Dr Gary Royden Watson Greaves</td>
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<td>SoH/1*</td>
<td>A Journey to Chinese Culture 中华文化之旅</td>
<td>Mr Zhao Qi 赵琦先生 Ms Zhang Wenfang 张文芳女士</td>
<td>2.00pm – 5.30pm</td>
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<td>CEE/1</td>
<td>Dimensional Analysis in Hydraulics Engineering</td>
<td>Assoc Prof Lim Siow Yong</td>
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<td>31 May 2023 (Wed)</td>
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<td>Introduction to Aerial Robotics</td>
<td>Prof Xie Lihua Dr Yuan Shenghai</td>
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<td>Crash Course: Introduction to Singapore Politics</td>
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<td>Asst Prof Lum Guo Zhan</td>
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<td>1 June 2023 (Thu)</td>
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<td>Be a Molecular Detective for a Day – Theory and hands-on experience on a benchtop NMR Spectrometer</td>
<td>Dr Sumod Pullarkat</td>
<td>9.30am – 5.30pm (inclusive of lunch break)</td>
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<td>Chinese Etiquette 华人礼仪</td>
<td>Ms Zhang Wenfang 张文芳女士 Mr Zhao Qi 赵琦先生</td>
<td>9.30am – 1.00pm</td>
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<td>MSE/2</td>
<td>Introduction to Materials Selection using Cambridge Educational Software</td>
<td>Assoc Prof Oh Joo Tien</td>
<td>2.00pm – 5.30pm</td>
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*SoH/1 A Journey to Chinese Culture 中华文化之旅 and SoH/2 Chinese Etiquette 华人礼仪 will be conducted in Mandarin.
## School of Computer Science and Engineering  
**Module Code**: SCSE/1  
**Module Title**: Python Programming on Raspberry Pi  
**Description**: This module will introduce students to coding based on the Python programming language. The class will be conducted in a workshop style with hands-on programming exercises done on the Raspberry Pi board. Students with no prior programming experience will first learn about the basic concepts of developing a program, and be guided to eventually develop a fun game running on the Raspberry Pi board.  
**Lecturer**: Assoc Prof Nicholas Vun  
**Mode of Delivery**: Laboratory

## School of Social Sciences  
**Module Code**: SSS/1  
**Module Title**: Public Policy Making in the Digital Era  
**Description**: Public policy plays a crucial role in governing a society. It forms laws, sets guidelines, develops principles, and influences how other important political decisions are made. Public making has undergone dramatic changes in recent years, especially with the fast development of digital technologies. This module aims to give the students a basic understanding of the public policy making with a focus on the paradigm changes in the policy making process and mindsets in the digital era in which these students grow up. Specifically, this model will explain how the policy making has evolved from the top-down model to the bottom-up, from to inform to engage. It will then discuss the main causes driving these changes.  
**Lecturer**: Assoc Prof Wu Wei  
**Mode of Delivery**: Seminar
Module Code | CCEB/1
---|---
Module Title | Introduction to Chemical Process Simulation in Aspen HYSYS
Description | We all learn about the chemistry of reactions (rate equations, rate constant, order of reaction, equilibrium, etc.) in A-level Chemistry. Have you ever wondered where do chemical reactions fall in the scheme of things in a chemical plant? Do you know that the life of a Chemical Engineer can also be exciting? Chemical engineering is not just about experiments, but also about playing with simulation software.

In this module, we shall look into various parts of a chemical plant. We shall employ the Aspen HYSYS modelling platform - a user-friendly and exciting tool - to simulate and understand the operation of different parts of chemical plants.

This module shall incorporate a combination of lectures and hands-on simulation sessions. The broad aim of this module is to give students a light appreciation of some core chemical engineering fundamentals with the aid of typically used simulation tools.

Lecturer | Dr Mukta Bansal
Mode of Delivery | Lecture / Laboratory

Module Code | MSE/1
---|---
Module Title | Rediscovery of Metals and Their New Nanofrontiers
Description | The epochs of civilization, such as Stone, Bronze and Iron Ages, have been defined by materials technologies and developments. As we continue to move forward in the 21st century and Industrial Revolution 4.0, materials science and engineering will continue to play key roles to enable materials' new properties and functions to improve daily lives in healthcare, sensing, separation, energy generation and storage, and many other emerging green and sustainable applications.

In this module, we will introduce you to the fascinating world of metals at different length scales: from seeing and touching with our hands, to the individual atoms, controlling their nanoscale properties, as well as how we innovate new approaches to enable new metal combinations and applications.

There will also be a hands-on laboratory and demonstration sessions for students to understand and appreciate materials process-structure-property correlations.

Lecturer | Asst Prof Tan Kwan Wee
Asst Prof Wu Dongshuang
Mode of Delivery | Lecture / Laboratory
School of Mechanical and Aerospace Engineering  
**Module Code**: MAE/1  
**Module Title**: CO2 decarbonization - A simpler overview  
**Description**: The global temperature has increased by 1°C since the 1950s due to human activities. If not taken adequate actions, climate change may lead to catastrophic consequences within a few decades, including rising sea levels, food and water shortage, and enormous economic losses. Carbon dioxide (CO2) is the main culprit behind climate change. CO2 emissions are mostly energy-related, primarily related to burning fossil fuels. Therefore, there is a strong push to activate all those best practices and green technologies which could offer a sustainable and durable pathway to zero emissions.

Renewables are one of the main contributors to decarbonization but also face some constraints and limitations. Alternative energy carriers – such as hydrogen – and their integration with the current energy system are fascinating and crucial to study and understand.

In this module, we provide a simpler overview of current and future solutions for energy decarbonization.

**Lecturer**: Assoc Prof Alessandro Romagnoli  
Dr Khor Jun Onn  
Dr Yang Lizhong

**Mode of Delivery**: Lecture

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School of Physical and Mathematical Sciences  
**Module Code**: MAS/1  
**Module Title**: Discrete Mathematics and Statistics with Applications  
**Description**: Students will be introduced to intriguing mathematical concepts that appear in discrete mathematics and statistics, through a wealth of hands-on examples and problems. An introduction to some basic and some advanced topics in discrete mathematics, optimization and statistics through examples, hands-on problems, and computer experiments will also be given. Real world applications, in particular, of linear optimisation, game theory and statistics, will be discussed.

The topics covered include:

- mathematical game theory  
- matrix games  
- mathematical models for games and computation of optimal strategies  
- linear programming and applications  
- common misconceptions in statistics  
- statistics in virus detection  
- statistical paradoxes  
- rental harmony  
- lottery investment strategy

**Lecturer**: Prof Bernhard Schmidt  
Dr Gary Royden Watson Greaves

**Mode of Delivery**: Lecture
School of Humanities

Module Code | SoH/1
Module Title | A Journey to Chinese Culture  中华文化之旅
Description | During the 3.5-hour lecture, the lecturer will bring you to appreciate the essence of Chinese culture. The engaging explanation of discovering oracle bone inscriptions will allow you to travel back to the Shang Dynasty more than 3,000 years ago with Wang Yirong, who was an old scholar in the late Qing Dynasty. In addition, you will understand how the living fossil — Chinese characters started, then you might not have any more complaints about the difficulty of Chinese characters!

After the above, you will witness a colourful world — the world of ancient Chinese clothing, which is known as Hanfu in Chinese. The lecturer, who is wearing a long robe from the late Qing Dynasty, will explain to you the fashion of the Chinese in different periods in ancient times. Another female lecturer, who is in Chinese Hanfu will be there, too! You will have the chance to interact with them and even take a picture with them!

To take a break from the ancient fashion, let us listen to Faye Wong's "Prelude to Water Melody" and Sa Dingding's "Spring Blossoms on The Moonlit River". These two poems will bring you a quick journey through ancient Chinese literature.

Finally, the lecturer will discuss with you on traditional Chinese etiquette. Everyone will use the traditional farewell ceremony to bid farewell to one another.

Lecturer | Mr Zhao Qi  赵琦先生
Ms Zhang Wenfang  张文芳女士

Mode of Delivery | Lecture  讲堂课
Dimensional Analysis (DA) is a fundamental method in hydraulics to collate experimental and field data into useful formulae for practical application. For example, the frictional resistance in water supply pipeline to households needs to be accounted for in design and it depends on many variables such as the size and shape of the pipe (circular, rectangular, triangular, etc.), types of pipeline material (cast iron, steel, concrete, brass, etc.), and the fluid to be transported (water, oil, etc.).

We will discuss how DA is applied to correlate the thousands of laboratory data available into a unifying trend called the Moody Diagram. We will also discuss interesting applications using DA in sediment transportation engineering (think in terms of how we compute the quantity of sand particles movements in rivers) and erosion problems (think in terms of why bridges collapsed when subject to flood flow or how big the scour hole when water jets shoot on a sand bed).
## School of Electrical and Electronics Engineering

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<tr>
<td>Module Title</td>
<td>Introduction to Aerial Robotics</td>
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| Description | Students will be introduced to a UAV called Tello and trained to control the Tello drone using python scripts. The learning environment is a friendly, hands-on session where students can play with the drone all the time in small groups. There will be instructors there to answer any questions.

There are a few five minutes briefing sections in between the modules to introduce the concept and share the sample code. There will be a competition in which students can demonstrate what they learn and have cool demos. |
| Lecturer | Prof Xie Lihua  
Dr Yuan Shenghai |
| Mode of Delivery | Lecture / Laboratory |

## School of Social Sciences

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<th>Module Code</th>
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<tr>
<td>Module Title</td>
<td>Crash Course: Introduction to Singapore Politics</td>
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| Description | The module will be an extremely brief introduction to Singapore politics, covering the basic facets of Singapore's political system. This includes the parliamentary system, electoral system, the reasons for PAP's longevity, and Singapore's core values and principles.

The module will be interactive seminar-styled, as student participation will be vital. |
<p>| Lecturer | Asst Prof Walid Jumblatt Abdullah |
| Mode of Delivery | Seminar |</p>
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<th><strong>Module Code</strong></th>
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<td><strong>Module Title</strong></td>
<td>Small-Scale Magnetic Robots</td>
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<td><strong>Description</strong></td>
<td>Here we will introduce magnetic miniature robots, which are a new paradigm of robots that have unprecedented abilities, to the students. In this course, we will briefly explain the physics of these robots before inviting the students to fabricate and control these robots in our lab. We aim to make this module interactive so that the students can gain first-hand experience with these small-scale robots.</td>
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<td><strong>Lecturer</strong></td>
<td>Asst Prof Lum Guo Zhan</td>
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<td><strong>Mode of Delivery</strong></td>
<td>Lecture / Tutorial / Laboratory</td>
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<tr>
<td><strong>Module Title</strong></td>
<td>Be a Molecular Detective for a Day – Theory and hands-on experience on a benchtop NMR Spectrometer</td>
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<td><strong>Description</strong></td>
<td>Nuclear Magnetic Resonance (NMR) Spectroscopy (a cousin of the Magnetic Resonance aka MRI Imaging technique used in hospitals) is a very powerful and advanced method which allows scientists to understand the structure and purity of compounds. It is used extensively in scientific research in the fields of chemistry, materials science and biology as well as in medicine, and various industries. In this module, during the morning session, you will be introduced to the basic theory behind NMR spectroscopy (only basic knowledge of the atomic structure and a very preliminary understanding of types of simple molecules such as alcohols, amines, ethers and esters is required). During the afternoon hands-on session, you will get to identify unknown compounds using the theory you have learned. You will get to use a new type of portable NMR spectrometer called a benchtop NMR and learn to acquire and interpret the data.</td>
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<td><strong>Lecturer</strong></td>
<td>Dr Sumod Pullarkat</td>
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<td><strong>Mode of Delivery</strong></td>
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<td><strong>Module Code</strong></td>
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<td><strong>Module Title</strong></td>
<td>Chinese Etiquette 华人礼仪</td>
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| **Description**      | Chinese "rituals" as a social system have a history of nearly 3,000 years. Therefore, Chinese people value the practice of "etiquette".

During the 3.5-hour lecture, you will learn about the similarities and differences between Singapore Mandarin and China Putonghua, including pronunciation, words, and grammar, etc. It also includes cultural differences between the Singaporean Chinese and the Chinese people from China, such as taboos, social systems, and mindset. Knowing these differences will make it easier for us to fully understand the "face" issue in China, which emphasizes "humanity" and "modesties", and recognize the importance of maintaining good guanxi (relationship) with the Chinese people.

Then the lecturer will introduce a traditional etiquette, known as ‘Zuoyi’, which has multi functions and how it can protect us from viruses due to its non-physical contact nature.

Finally, the lecturer will wrap up the lecture by sharing the different elements of a banquet, where students will learn about the culture of alcohol in China, practice the seating arrangements and experience the drinking etiquette.

华人的“礼”作为一种制度, 已拥有近3000年的历史, 因此我们华人也最注重“礼仪”。

在这3.5小时的课堂上, 同学们会了解到新中两国华人之间的一些差异, 包括语言方面的, 即新加坡华语和中国普通话之间的异同, 比如说发音方面, 用词方面以及语法方面; 也包括新中两国华人在文化方面的差别, 比如说忌讳, 社会制度以及思维方式。基于上述差异, 我们就更容易理解中国人好“面子”, 讲“人情”, 崇尚“谦虚”的特点, 从而认识到跟他们处好“关系”的重要性。

讲师还会讲解传统礼节“作揖礼”如何古为今用, 一礼多用, 甚至具备预防病毒传染的功能。

最后, 讲师会以宴席上有趣的座位安排以及饮酒礼仪来结束本课。

**Lecturer**
Ms Zhang Wenfang 张文芳女士
Mr Zhao Qi 赵琦先生

**Mode of Delivery**
Lecture 讲堂课
The design of a device such as a handphone, an aircraft or even a microprocessor requires the selection of the optimal materials for its components. The objective of the design is to optimize the use of materials such that the device is functional and economical. In addition, due to the increasing affluence of the consumer and the effect of climate change, the designer must consider the following critical factors:

- Durability such as corrosion resistance, physical impact, etc.;
- Impact on the environment such as recyclability of the materials;
- Eco-Impact such as the effect on the environment by carbon release;
- Aesthetic aspect of the design.

The challenge facing the designer is the selection of materials. There are more than 200,000 types of engineering materials and there is a need to perform the selection efficiently.

In this module, students will be introduced to materials selection in the design of products using Cambridge Educational Selection EduPack™ software developed by Professor Mike Ashby of Cambridge University. This aids in the understanding of relationships between materials process, structure and properties, as well as materials selection tools to support the design of engineering devices.

**Lecturer**
Assoc Prof Oh Joo Tien

**Mode of Delivery**
Lecture / Laboratory