



本課程已納入
教青局
持續進修發展計

能源工程（機電系統）課程 Energy Engineering for E&M System Course

課程簡介 Course Introduction

課程的宗旨是加深機電建築專業人士在能源技術知識。課程將涵蓋節能方面行業最佳方案及測試量度、評估節能方案達至能源效益、有效經濟效益及各種有關能源方案。

The course is specially designed for those who want to widen and deepen their knowledge with the fundamental principles, skills and guidelines needed to carry out effective energy audits in accordance with the Building Energy Efficiency Best Practices. After taking the course, the participants would appreciate the approach to identify energy saving measures and perform quantitative analysis to predict the energy savings, environmental and economic benefits. Moreover, the participants should be able to measure and verify the performance of implemented energy saving.

課程大綱 Course Outlines

- 建築物能源效益條例/行業最佳方案簡介

Introduction to the Buildings Energy Efficiency Ordinance (BEEO) /Best Practices

- 條例架構 Legislative Framework
- 能源審核的規定 Requirements of Energy Audit
- 註冊能源效益評核人的資格和職責 Qualification and Duties of Registered Energy Assessors (REAs)

能源審計概覽

Energy Audit

- 能源審計管理程式：現場檢查，詳細的能源審計和確定能源管理方案(EMOs)

Management procedures for energy audit: walk-through inspection, detailed energy audit and identification of energy management opportunities (EMOs).

節能成效的測量和核證方法

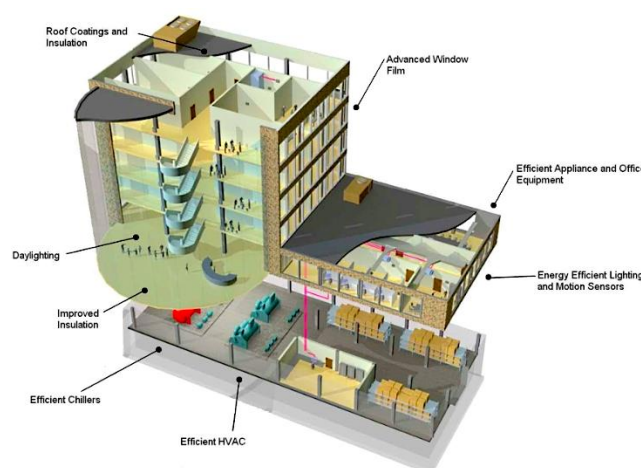
Energy Saving Measurement and Verification (M&V) Methods

- 國際節能成效測量和核證的協議；儀表和測量技術；基準線調較；錯誤和不明確分析；協力廠商認證 International Performance Measurement & Verification Protocol; instrumentation and measurement techniques; baseline adjustment; error and uncertainty analysis; third-party verification.

- 冷暖及通風空調系統(HVAC)

Heating Ventilating and Air-Conditioning (HVAC)

- 測量和評價冷水機組，水冷卻系統和空氣冷卻系統的能源效益；性能系數(COP) 的分析 Measurements and evaluation of energy efficiency of chillers, water-side systems and air-side systems; coefficient of performance (COP) analysis.
- 提供高效的舒適和良好的空氣質量的室內溫度 Provision of thermal comfort and good indoor air quality in an energy-efficient manner.



- 質量定性分析“冷暖及通風空調系統”的有效的能源管理，包括冷凍水供應和室內空氣的溫度的設定，保證建築物內設計達到總熱能傳送值(OTTV) 的要求，蒸發式冷卻冷凝器，變速泵，自動清洗設備，海水冷卻冷凝器，清新空氣的攝入量控制等

Qualitative analyses of effective energy management opportunities for HVAC systems, including temperature settings for chilled water supply and indoor air, building envelopes meeting the overall thermal transfer value (OTTV) requirements, evaporative cooled condensers, variable-speed pumps, automatic cleaning devices for seawater cooled condensers, Fresh air intake control and more.

- **配電系統及電力效能提升**

Electrical Systems and Power Quality Improvement

- 配電系統的能源效益，包括變壓器和電線

Energy efficiency for electrical distribution systems, including transformers and wires.



- 測量和改善由於低功率因數和/或高次諧波的影響(通常是由電子設備做成) 的建築物電能質量的程式
Procedures of measuring and improving power quality for buildings due to low power factor and/or high harmonics (typically caused by electronic equipment).

- 實驗測試合適用作評估電力系統的能源使用和找出任何電質量問題

Experimental tests suitable for evaluating energy use of electrical systems and for identifying any power quality problems.

- 計算由於改善電氣系統的性能和電質量的能源使用及節約成本

Calculation of energy and cost savings due to improvement in electrical systems performance and power quality.

- **升降機及自動梯系統**

Lift and Escalator

- 允許的最大電力需求 Maximum allowable electrical power requirements.
- 升降機及自動梯系統的能源消耗測量 Energy consumption measurements of lift and escalator Systems.
- 電機驅動系統的總諧波失真和功率因數 Total harmonic distortion and power factor of motor drive systems.
- 節能設計 Energy efficient designs.

照明系統

Lighting Systems

- 光度和光測量 Photometry and light measurements.
- 白熾燈，熒光燈，電磁鎮流器，高頻電子鎮流器

Incandescent lamps, fluorescent lamps, electromagnetic ballasts, high-frequency electronic ballasts, light-emitting diode (LED).

教學對象 Target Audience

執業機電工程師及建築屋宇裝備專業人士
E & M Engineers and Building Services professionals

授課語言 Medium of Instruction

以廣東話講授，筆記以英文為主輔以中文資料 Delivered in Cantonese with notes mainly in English

報名地點 Venue for Enrollment

澳門氹仔偉龍馬路澳門科技大學 O 座 2 樓 持續教育學院

SCS, 2/F Block O, Macau University of Science and Technology, Avenida Wai Long, Taipa, Macau

上課地點 Venue for Class

澳門氹仔偉龍馬路澳門科技大學（**確實地點將於確認開課時以手機短訊通知**）

Macau University of Science and Technology, Avenida Wai Long, Taipa, Macau

(Classroom number will be notified after the course is confirmed to commence.)

上課日期 Course Date & Time

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|------------------------------------|----------------------|---------------------------------------|-----------------------------|
| 課程編號 Course Code : 1810280003-0 | 22 Jun ~ 13 Jul 2019 | 週六 Sat 10:00-13:00; 14:00-18:00 | 總課時 28 小時 Total 28 hours |
|------------------------------------|----------------------|---------------------------------------|-----------------------------|

課程費用 Tuition Fee MOP5,500

收生名額 Class Size 30 人

*** 報名注意事項 Enrollment Notes ***

報名時間：星期一至五(9:00 - 20:00)、星期六(9:00 - 13:00) [公眾假期除外]

1. 首次報讀本院短期課程者，請先登入**網上報名系統**（網址：<https://scs.must.edu.mo/oasc/PersonalInfo.do>）或掃描以下的 QR Code，選擇 **<工程學和工程行業>** 類別，預先登記個人資料（不需上傳身份證），填妥資料後，帶備身份證正、副本至本院辦理報名。

For those who enroll for our courses for the first time, please go to <https://scs.must.edu.mo/oasc/PersonalInfo.do> or scan the QR Code below, choose the category of **<Engineering>**, and input personal information (no need to upload ID copy). After registration online successfully, please come to our school to make payment. You should bring along with your ID card and copy.

2. 報讀者可以現金/本票或劃線支票（抬頭請寫“澳門科技大學持續教育學院”或“SCHOOL OF CONTINUING STUDIES MACAU UNIV. OF SCIENCE AND TECHNOLOGY”）繳付學費及材料費，**現金收費上限為澳門幣/港幣 5,000 元**。
Tuition fee and materials fee (if any) should be paid by cash or by cheque/Cashier Order (Please make payable to “SCHOOL OF CONTINUING STUDIES MACAU UNIV. OF SCIENCE AND TECHNOLOGY”). **Cash is accepted for payment of not more than MOP5,000.**

3. 所有費用一經繳交，恕不退還（本院取消開辦該課程除外）或轉讓。
All payment made is not refundable (except that the course is cancelled by the School) or transferable.

4. 如課程報名人數不足，本院保留課程取消或延期的權利。
The School reserves the right to cancel or postpone the courses if minimum class size is not reached.

**查詢 Enquiries**

Tel: 8796 1998 Email: scs@must.edu.mo

Website: <http://www.must.edu.mo/scs/diploma-certificate-programs>

持續教育學院致力開拓終身學習機會，如欲收到本學院之課程資料，可發電郵至 scs@must.edu.mo，並提供閣下之電郵地址，標題主旨為“加入通知群組”。

The School of Continuing Studies develops life-long learning opportunities. Should you wish to receive information on our programs / courses, please send us an email (to scs@must.edu.mo) stating your email address in your email and “Join the mailing list” in the Subject line.

我們亦為機構/政府部門/學校等提供內部培訓，按各機構不同之要求(主題/時間/地點/對象)而訂定培訓內容。請與我們聯絡。

We also offer in-house training for corporations/Government Departments/schools, tailor-made with respect to your choices of topics, time, place, and group of attendees. Please contact us for more information.