



CAFEO 36

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POST-CONFERENCE WORKSHOP

ACCREDITATION AND ASSESSMENT IN ENGINEERING EDUCATION

15-16 November 2018 @ SUTD and SIT

ACCREDITATION WORKSHOP @ SINGAPORE UNIVERSITY OF TECHNOLOGY AND DESIGN (SUTD) THURSDAY 15 NOVEMBER 2018

09:00 - 10:30	Accreditation Framework Benchmarked to Washington Accord Er. Dr. Lock Kai Sang <i>Past Chairman, Engineering Accreditation Board, The Institution of Engineers, Singapore</i>
10:30 - 11:00	Morning Tea Break
11:00 - 12:30	Preparing Programmes for Outcome-Based Accreditation Prof. Pey Kin Leong <i>Associate Provost, Education, SUTD Academy & Digital Learning</i>
12:30 - 01:30	Lunch
01:30 - 03:00	Innovative Pedagogy and Design for Learning Outcomes Achievement Prof. Megat Johari Megat Mohd Noor <i>Founding Director, Engineering Accreditation Council, Board of Engineers Malaysia</i>
03:00 - 03:30	Afternoon Tea Break
03:30 - 05:00	Sharing of Lessons Learnt in Compiling, Analysing and Presenting Outcomes and other Accreditation Data for Accreditation Dr. Teo Tee Hui <i>Senior Lecturer, Engineering Product Pillar, SUTD</i>
05:00 - 06:30	Tour of SUTD Facilities

**ASSESSMENT WORKSHOP @ SINGAPORE INSTITUTE OF TECHNOLOGY (SIT)
FRIDAY 16 NOVEMBER 2018**

09:00 - 10:30	<p>Outcome-Based Education & Outcome-Based Accreditation Er. Dr Lock Kai Sang <i>Past Chairman, Engineering Accreditation Board, The Institution of Engineers, Singapore</i></p>
10:30 - 11:00	Morning Tea Break
11:00 - 12:30	<p>Design and Assessment of Learning Outcomes with Complex Engineering Problems Prof Wan Hamidon Wan Badaruzzaman, <i>Chairman, Smart and Sustainable Township Research Centre (SUTRA); Professor, Civil Engineering Programme, Faculty of Engineering and Built Environment, Universiti Kebangsaan Malaysia</i></p> <p>Ir. Liew Chia Pao <i>Principal Lecturer, Engineering and Technology, Tunku Abdul Rahman University College (TAR UC), Malaysia</i></p>
12:30 - 01:30	Lunch
01:30 - 03:00	<p>Learning Outcomes and Rubrics in Engineering Education Dr. Foo Yong Lim <i>Assistant Provost, Singapore Institute of Technology</i></p>
03:00 - 03:30	Afternoon Tea Break
03:30 - 05:00	<p>Developing Valid and Meaningful Assessment for Higher Order Skills Dr. Peter David Looker <i>Head, Teaching, Learning and Pedagogy Division, Nanyang Technological University</i></p>
05:00	End of Workshop

Who should attend:

- Engineering academic staff
- Program directors, administrators, HoDs
- Leaders of accreditation bodies
- Program evaluators (PEVs)
- Members of accreditation committee

Course Fee:

WORKSHOP	PRICE
ACCREDITATION WORKSHOP	SGD 400/pax
ASSESSMENT WORKSHOP	SGD 400/pax
ACCREDITATION + ASSESSMENT WORKSHOP	SGD 720/pax
GROUP BOOKING (5 OR MORE PAX)	SGD 360/pax

Registration:

Kindly visit www.cafeo36.com to register or contact charlotte.seah@iesnet.org.sg for further enquiries.

Workshop on Accreditation of Engineering Degree Programs

Thursday 15 November 2018

Engineering education is experiencing unprecedented transformation in producing graduates with new skills and abilities to meet the demands of the 21st century. For example, trans-domain and multidisciplinary knowledge and collaboration are an integral part of the transformation. Digital economy is reshaping the transformation and new skills.

What participants will learn:

- How to design and transform engineering education to meet the outcome-based assessment and accreditation based on Washington Accord's criteria
- How to prepare engineering degree programs for outcome-based accreditation
- Difficulties and challenges faced on soliciting and analyzing outcome-based data
- Lessons-learnt, new ideas and ways to collate and compile accreditation data and statistics
- Opportunities in formulating standards and expectations for accreditation under general engineering degree programs

A demonstration of recently concluded accreditation exercise on three multidisciplinary engineering degree programs at SUTD by the Engineering Accreditation Board of IES will be carried out.

Coverage of the various workshop sessions and the profile of the respective speakers are given below.

Session 1: Accreditation Framework Benchmarked to Washington Accord

This session provides an insight on the organization and operation of the Washington Accord. Drawing from his on-the-ground experience, the speaker will explain the particular requirements for admission as a provisional member and the subsequent development of the accreditation system to achieve substantial equivalence with Washington Accord's benchmark to become a full signatory, including the program accreditation criteria.

Speaker Profile

Er. Dr Lock Kai Sang
Past Chairman, Engineering Accreditation Board, IES

Dr Lock is a Professor (Engineering) at the Singapore Institute of Technology (SIT), the new 5th government-funded university in Singapore. He is a Past President of the Institution of Engineers Singapore (IES) and he served as the Chairman of the Engineering Accreditation Board from 2002 to 2009, leading IES to become a signatory of the Washington Accord in 2006. He still actively contributes as a program evaluator or team chair for accreditation evaluation of engineering programs. He regularly conducts accreditation workshops for program evaluators and university faculty. He served as WA mentor to engineering accreditation board in India and Pakistan to help the two countries gaining full-signatory status in Washington Accord. He is currently mentoring the Institution of Engineers, Bangladesh, for both the Washington Accord and IPEA. He was appointed by Washington Accord as Chair of review team to South Africa, South Korea, USA, and China. He was also a review team member to ECUK in 2017.

He has served as a Board Member of the Professional Engineers Board, Singapore for over 11 years, and was chairman of its examination committee responsible for the implementation of the examination system for qualifying professional engineers in Singapore. He is a Fellow of Academy of Engineering Singapore, an Honorary Fellow of the Institution of Engineers, Singapore, an Honorary Fellow of the ASEAN Federation of Engineering Organizations, and a Senior Fellow of ASEAN Academy of Engineering and Technology.

He received both his B.Sc. (1975) and Ph.D. (1979) degrees in Electrical Engineering from the University of Strathclyde, UK. He was a faculty at the Department of Electrical Engineering, National University of Singapore for 17 years when he left to set up his consulting practice in 1997. He returned to the academia as a Professor at SIT in 2016 after 20 years in the industry.

Session 2: Preparing Programmes for Outcome-Based Accreditation

In this session, the speaker will provide the participants with SUTD's unique experience in preparing for outcome-based accreditation process. He will cover how the undergraduate engineering curricula were set up with forward looking Programme Educational Objectives (PEOs) and how the measurable outcomes of each of the subjects within each engineering programme come together to support the Student Learning Outcomes (SLOs). He will also share SUTD's journey of accrediting all 3 undergraduate engineering programmes, which are anchored on multi-disciplinary design, under General Engineering criteria.

Speaker Profile

Prof. Pey Kin Leong

Associate Provost, Education, SUTD Academy & Digital Learning

Kin-Leong Pey is currently the Associate Provost (Education, SUTD Academy & Digital Learning) and a Professor at the Singapore University of Technology and Design. Kin-Leong was appointed by the Singapore Ministry of Education to take up the current SUTD position in 2010. Kin-Leong received his Bachelor of Engineering (1989) and Ph.D (1994) in Electrical Engineering from the National University of Singapore. He has held various research positions in the Institute of Microelectronics, Chartered Semiconductor Manufacturing, Agilent Technologies and National University of Singapore. He was previously the Head of the Microelectronics Division, Director of the Nanyang Nano Fabrication Center and Director of the Microelectronic Centre in the School of EEE at the Nanyang Technological University.

Kin-Leong is a senior member of IEEE and has been the organizing committee member of IPFA since 1995. He was the General Chair of IPFA2001, Singapore and the co-General Chair of IPFA2004, Hsinchu, Taiwan. Kin-Leong was the Guest Editor of IEEE Transactions on Devices in and Materials Reliability in 2003-05 and 2007, and the Chair of the Singapore IEEE REL/CPMT/ED Chapter in 2004 and 2005, and served on the 2006-08 IRPS technical subcommittee, and the IPFA'02 to IPFA'06 and IPFA'08 technical committee, and the 2007 IEDM CMOS & Interconnect Reliability and 2008 IEDM Characterization, Reliability and Yield sub-committee. Kin Leong is a Fellow of the ASEAN Academy of Engineering & Technology. He is an Editor of IEEE Transactions on Devices and Materials Reliability.

Kin-Leong has published more than 202 international refereed publications, 194 technical papers at international meetings/conferences and 6 book chapters, and holds 38 US patents. Kin-Leong has contributed significantly to the CMOS gate dielectric reliability, especially in the areas of physical analysis of ultra-thin dielectric breakdown mechanism. Kin-Leong has graduated 32 PhD and more than 15 Master theses.

Session 3: Innovative Pedagogy and Design for Learning Outcomes Achievement

Pedagogy is the method, practice, or principles of teaching. Different pedagogies are based on different theories of learning, and it is the intents that matters. Innovation in pedagogy is taking existing ideas, tools or practices to bring new ways to solve problems. Academics are largely resistant to new and innovative pedagogy as change is often seen as burdensome. The choice of pedagogy is normally based on the experience encountered by these academics. Teaching is not merely transferring of content. Particular pedagogical approaches if used may promote different types of learning; contents or knowledge, psychomotor or skills, and affective or values and habits. As an example, an engineering teacher in teaching a design course to students may employ “spaced learning” and “learning by doing” to maximize the chances that students will commit them to long-term memory. If it is communication skills that is also required, a considerable class time practising communication has to be implemented. Each of the pedagogical approaches would lead to the outcomes expected, as the result of the learning outcome “ability to design” in this case. The activities undertaken in a single course is unlikely to bring about a large impact at the programme level, unless they are consistently practiced in other courses as well. Teachers of a programme need to adopt a communal pedagogy to achieve the discipline centric goals and other goals as determined by the curriculum in order to attain knowledge, skills and affective goals. Innovative pedagogy calls for students to take charge of their learning. A constructive alignment of the learning outcomes, method or delivery, and assessment would lead to the demonstration of the learning outcomes. The author intends to expound on the relationship of learning outcomes and innovative pedagogies, and share how these pedagogies may be applied, combining discrete teaching to achieve discipline goals, and combining approaches to meet long-term goals.

Speaker Profile

Professor Megat Johari Megat Mohd Noor
Founding Director, Engineering Accreditation Council, BEM

Dr Megat is a Professor in Ecological Engineering at Malaysia Japan International Institute of Technology (MJIT), Universiti Teknologi Malaysia (UTM). He was the founding Dean of MJIT and a former Director of Quality & Risk Management Centre at UTM. Currently, he is a Board member of the Board of Engineers Malaysia (BEM), and chairing its Examination & Qualification Committee. He was the founding Director of Engineering Accreditation Council (EAC) of the BEM, and was responsible for the BEM in attaining the Washington Accord signatory status. Megat Johari is also the serving President of Malaysian Society for Engineering and Technology (MySET) and Vice President of the Federation of Engineering Institutions of Islamic Countries (FEIIC), and a former Vice President of the Institution of Engineers Malaysia.

Session 4: Sharing of Lessons Learnt in Compiling, Analysing and Presenting Outcomes and other Accreditation Data for Accreditation

This session provides first-hand knowledge of setting up accreditation framework for a ‘start-up’ university which offers non-traditional multi-disciplinary engineering curricula. Speakers will share their very own experience in mapping outcomes of individual subjects to Student Learning Outcomes (SLOs) as well as creating links among various subjects within each programme. They will also explore SUTD’s unique way of assessing the achievements of SLOs and PEOs. Their experience in using of technology to compile and present accreditation data will also be of great interest to the participants.

Speaker Profile

Dr. Teo Tee Hui

Senior Lecturer, Engineering Product Pillar, SUTD

Dr. Teo graduated with Master of Engineering and Ph.D. from National University of Singapore and Nanyang Technological University in 2000 and 2009 respectively in Electrical & Electronic Engineering. Since 1996, he was with Sharp, ST-Microelectronics, Intelligent Micro-Devices (Matsushita), and etc. as a senior Integrated Circuits (IC) designer, prior joining Institute of Microelectronics, Agency for Science, Technology and Research (A*STAR), Singapore as principle investigator in advanced IC design R&D. In 2010, he joined education sector for setting up both Analog and Digital IC design courses and laboratories for Technical University of Munich, Asia. He is currently with Singapore University of Technology and Design. His research interest are IC design, device characterization & modelling and design science education. He is a Senior Member of IEEE, and Fellow of IES (Institution of Engineers Singapore).

Mr. Toe Oo Zaw MIET

Senior Manager, Accreditation, SUTD

Mr. Toe graduated with Bachelor of Engineering (Electronic Engineering) and MSc (Intelligent Systems and Robotics Engineering) from Yangon Institute of Technology and Universiti Putra Malaysia in 1993 and 2003 respectively. He has spent more than 20 years in the education industry working as a lecturer, programme manager, academic quality manager and accreditation manager. He collaborated with MIT Mapping Lab to develop a virtual mapping system for SUTD undergraduate programmes. He is a professional member of The Institution of Engineering and Technology (IET).

Workshop on Assessment of Learning Outcomes

Friday 16 November 2018

The foundation of Outcome-Based Education and Outcome-Based Accreditation is the system of effective and authentic assessment of the student learning outcomes. Globally, the set of 12 Washington Accord Graduate Attributes generally forms the baseline of learning outcomes for accreditation of engineering degree programs.

This workshop will deliver the essential tools and guidance that participants will need to implement a successful assessment process in the context of outcome-based education in engineering. It provides an overview on outcome-based education and outcome-based accreditation, and focuses on designing program educational objective, making student learning outcomes measurable, creating rubrics, analyzing assessment data for improving the course and curriculum design.

What participants will learn:

- Outcome-based education and outcome-based accreditation
- Design and assessment of learning outcomes with complex engineering problems
- Learning outcomes and assessment rubrics in engineering education
- Using assessment results to improve course and curriculum design

Coverage of the various workshop sessions and the profile of respective speakers are given below.

Session 1: Outcome-Based Education & Outcome-Based Accreditation

This session discusses the broad concept of outcome-based education and then focuses on the narrower requirements of outcome-based accreditation. The breadth and depth of learning outcomes attainment required to demonstrate equivalent benchmark to Washington Accord's graduate attributes will be illustrated.

Speaker Profile

Er. Dr Lock Kai Sang
Past Chairman, Engineering Accreditation Board, IES

Please refer to speaker profile provided under Accreditation workshop.

Session 2: Design and Assessment of Learning Outcomes with Complex Engineering Problems

This session discusses the design and assessment of learning outcomes with Complex Engineering Problems (CEP). The distinctive roles of engineers, technologists and technicians are defined by the range of problem solving. The aims of this workshop are to discuss the characteristics of Complex Engineering Problems (CEP) according to the Washington Accord (WA), and how CEP can be implemented in engineering curriculum. The examples of actual implementation of CEP that take into account the Knowledge Profile of WA will be shared with participants.

Speaker Profile

Prof Wan Hamidon Wan Badaruzzaman
Chairman, Smart and Sustainable Township Research Centre (SUTRA)
Professor, Civil Engineering Programme, Faculty of Engineering and Built Environment, Universiti Kebangsaan Malaysia

Prof. Dato' Ir. Dr. Wan Hamidon Wan Badaruzzaman is currently the Chairman and Professor of the Smart & Sustainable Township Research Centre (SUTRA), Universiti Kebangsaan Malaysia (UKM) since 2017. He was the Director of the Engineering Accreditation Department (EAC), Board of Engineers Malaysia (BEM) (2014–2016); Chairman of the working group of the first OBE-based EAC Engineering Programme Accreditation Manual (2006); EAC Council member (2006); EAC Associate Director (Accreditation) (2006–2013); Curriculum Board member for Polytechnics Courses and Training Programmes (2017–present), BEM Accreditation Consultative Panel (ACP) member (2017–present); Universiti Teknologi Petronas Accreditation Council (UTPAC) member (2017–present); Programme Advisory Panel (PAP), Bachelor of Civil Engineering (Honours) Programme, Tunku Abdul Rahman College (TARC) (2017–present); External Examiner, Civil & Construction Engineering programme, Curtin University Sarawak; Advisor, City University (2017–present); Advisor, Manipal University (2017–present); International Advisor, Limkokwing University (2018–present); External Examiner, Civil Engineering programme, USM; Independent Evaluator, Promotion to Associate Professor, UPM (2017–present). He was also the founder Chief Executive Officer (CEO), UKM Perunding Kejuruteraan & Arkitek Sdn. Bhd. (UKMPKASB) (2006–2011); Deputy Director of the Advanced Engineering Centre, UKM (1999 – 2000); and Head of the Civil Engineering Department, UKM (2002 – 2005). At the international level, Prof. Wan had been appointed External Examiner for engineering programmes at Sohar University, Oman (2013); Committee Member, Civil Engineering Periodic Programme Review, Sohar University, Oman (2017). He is also appointed as a Washington Accord mentor for the Board of Accreditation for Engineering and

Technical Education (BAETE), Bangladesh (2017-present). Prof. Wan has won numerous research awards including the Winner of CIDB Construction Innovation and Design Award (2001), Gold Medal for 26th International Exhibition of Inventions, Geneva, Institute for Industrial Patents of Switzerland (Association Suisse des Conseils Propriete Indust) (1998), International National Inventor's Award, MOSTE (1998), Gold Medal for the Best Overall Invention, MINDEX/INNOTEX Design & Invention Exhibition, WIPO (1997), and Design & Invention Exhibition, MOSTE, SIRIM, and MINDS (1997). Prof. Wan's research specialises in composite structural system where he has his own patented Industrialised Building System (IBS), known as the 'Profiled Steel Sheeting Dry Board (PSSDB) System'. He has published around 200 papers in journals and conference proceedings.

Ir. Liew Chia Pao

Principal Lecturer, Engineering and Technology, Tunku Abdul Rahman University College (TAR UC), Malaysia

Ir. Liew Chia Pao is a Principal Lecturer in the Faculty of Engineering and Technology, Tunku Abdul Rahman University College (TAR UC), Malaysia. Currently, he is an Associate Director (Electronic Engineering) of the Engineering Accreditation Department, Board of Engineers Malaysia. He has a number of years of teaching and academic experience, and managing engineering programmes; and programme evaluator's experience in more than 60 programmes in Malaysia and Spain. He regularly conducts workshops to new evaluators and universities on accreditation of engineering programmes, outcomes-based assessments and complex engineering problem solving; and published accreditation videos on YouTube and some technical papers. Prior to joining TAR UC, he was a practitioner with over 10 years of experience as an R&D Engineer and Project Manager in powerline communication. He is the external examiner of the Bachelor of Electrical and Electronic Engineering degree programmes at Xiamen University Malaysia Campus and KDU University College, Malaysia. He obtained his Diploma from TAR UC (1996) and a Master of Science from University of Hertfordshire, U.K. (1998), and passed the Engineering Council U.K. Examinations. His research areas are complex engineering problem solving and engineering programme outcome assessment.

Session 3: Learning Outcomes and Assessment Rubrics in Engineering Education

This session will discuss the learning outcomes and assessment rubrics within the context of a constructively aligned curriculum and assessment practice. Clearly defined outcomes form the basis for selecting appropriate content, learning activities, and assessment measures. It also communicates clearly the intended result of the learning rather than what form the instruction will take (teaching). The session will also discuss the appropriate use of rubric as a scoring and judgement tool that explicitly represents the performance expectations in an assessment.

Speaker Profile

Dr. Foo Yong Lim

Assistant Provost, Singapore Institute of Technology

Dr Foo is Assistant Provost (Applied Learning) at the Singapore Institute of Technology (SIT), the new 5th autonomous university in Singapore. Dr Foo had put in place key processes and support framework to imbue good learning and teaching practices for all degree programmes right at the onset, with clear intentions and directions to develop the SIT graduate attributes. He had also put in place key teaching and learning policies e.g. Assessment Policy that drives the overall teaching and learning agenda at the institution. He had launched several training programmes for faculty, professional officers, and

associate faculty, and also introduced the Teaching Excellence Award to recognize outstanding teachers. He is responsible for formulating strategies and providing directions to raise SIT's profile as a thought leader and leading practitioner in applied learning. He also oversees the operations of Centre for Learning Environment & Assessment Development, as well as the Centre for Communication Skills at SIT.

He received his B.App.Sci in Materials Engineering (1997) from Nanyang Technological University and Ph.D. in Materials Science and Engineering (2003) from the University of Illinois at Urbana-Champaign.

Session 4: Developing Valid and Meaningful Assessment for Higher Order Skills

The aim of this workshop is for participants to get hands-on experience of creating valid and meaningful assessment that is aligned to learning outcomes pitched at higher cognitive levels and so-called soft skills, or graduate attributes. Too often, exams and other forms of assessment are designed only to capture lower level understanding, and do not challenge students to synthesise the knowledge, apply it to new situations, or to be creative.

Participants will gain experience of determining high level grading criteria using the SOLO Taxonomy as a way of raising expectations of students and think about the kinds of learning activities they might employ to achieve learning outcomes.

The workshop specifically takes into account EAB accreditation criteria and how those criteria might be met through genuinely meaningful, valid and reliable assessment.

This workshop is not a lecture. Participants will work both individually and in groups to produce an outline of an assessment plan that will satisfy the EAB accreditation criteria.

Speaker Profile

Dr Peter David Looker
Head of the Teaching, Learning and Pedagogy Division
Nanyang Technological University

Peter Looker is currently Head of the Teaching, Learning and Pedagogy Division at NTU and has been working in learning and teaching development since 2002, after being an Associate Professor in English Literature for 16 years. He has worked at the Australian National University, UNSW (Canberra and Sydney), UNSWAsia, University of Newcastle, and as a learning and teaching consultant at City University, Hong Kong. He has several awards related to learning and teaching development from the Australian Learning and Teaching Council. His main areas of interest are in the development of sustainable learning and teaching cultures, policy development, learning space design and student assessment.