



BATANGAS STATE UNIVERSITY
Center for Innovation in Engineering Education

A background image showing a group of students in white shirts looking at a document. The image is overlaid with a semi-transparent gear and circuitry pattern. The text "ICIEE 2021" is prominently displayed in the center.

ICIEE 2021

A large orange gear icon with a white semi-circle cutout on its left side, positioned to the left of the main title text.

**International Conference on Innovations
in Engineering Education 2021**

**Engineering Educators:
Active Drivers of Innovation**

November 10-11, 2021

Leading Innovations, Transforming Lives



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Conference Brief

It's remarkable to see how quickly the world around us is changing. As the industry undergoes radical technological advancement, it is now the responsibility of the education sector to catch pace in producing future-proof graduates who will become professionals capable of meeting the industry's rising demands. This is especially true in engineering, a discipline encompassing broad societal and economic implications facing the demands revolving around the new technologies.

This generation's engineering students will become the inventors, innovators, and leaders of tomorrow; history showing that engineers who have been adequately educated and trained become invaluable members of society for their contributions in solving many of humanity's issues, driving the global economy, and enhancing key areas of human life. Thus, the goal is clear: engineering schools must focus on gearing their students up for the challenges of tomorrow. A greater responsibility now rests on the shoulders of academia to drive the undergraduate educational experience from a conventional pedantic curriculum to a wider fundamental experience that will prepare engineers for a lifetime of achievement.

As engineering moves forward, so must engineering education. Innovation is vital to our economic, social, and environmental future, and the present situation encourages urgent, collaborative investments on both the local and global levels necessary for the achievement of the 2030 Sustainable Development Goals (SDGs). Therefore, in its first year, this conference aims not only to spark intellectual discussions and refresh perspectives on the ways forward, but also to become a platform for sharing expertise, best practices, and experience that will benefit the academe, the industry, communities, the government, and other key sectors involved in nation- and world-building.

The core of this conference is active innovation, harnessing the power of virtual technology. Participants are from all over the world: guest speakers from various engineering education organizations, industry partners, and accrediting institutions, as well as researchers, practitioners, and educators. This virtual conference is organized and facilitated by Batangas State University's Center for Innovation in Engineering Education (CIEE) in celebration of 50 years of quality education in engineering.

In addition to the keynote speeches, plenary sessions, and master classes, this conference features the Innovation Challenge Competition, a thematic competition that challenges students of higher education institutions to ideate, innovate and pitch solutions addressing the SDGs. The top ten teams shall undergo an innovation program to improve minimum viable products, conduct validation activities, and prepare for a final demo and pitching scheduled on December 6 and 7, 2021 during the 5th International Research Conference on the Innovations in Engineering, Science and Technology (IRCIEST V).

Leading Innovations, Transforming Lives

Program at a Glance

Day 1: Big Ideas

09:00 AM - 09:30 AM	Opening Ceremony	Invocation and Philippine National Anthem	
		Welcome Remarks	Dr. Tirso A. Ronquillo President, Batangas State University
		Message from the Philippine Senate	Hon. Sen. Pia S. Cayetano (TBC) Chairperson, Committee on Sustainable Development Goals, Innovation and Futures Thinking Senate of the Philippines, 18th Congress
		Message from the Commission on Higher Education	Dr. J. Prospero E. De Vera III (TBC) Chairperson, Commission on Higher Education
09:30 AM - 10:10 AM	Keynote Address	Innovating Today towards the Engineering Mindset of the Future	Dr. Sheryl Sorby Immediate Past President & Fellow, American Society for Engineering Education (ASEE); Professor, Engineering Education Department, University of Cincinnati, USA
10:10 AM - 10:50 NN	Plenary	The Continuing Role of Engineering Education in the Attainment of the SDGs: UNESCO Engineering Report 2021	Jointly presented by Prof. Gong Ke President, World Federation of Engineering Organizations (WFEO), and the International Centre of Engineering Education (ICEE) Under the Auspices of UNESCO, Tsinghua University
10:50 AM - 11:30 AM	Plenary	Quality Assurance in Engineering Education	Dr. Sarah Ann Rajala At-Large Director (2021-2022), Accreditation Board for Engineering and Technology, (ABET); Dean Emerita, Iowa State University; Professor Emerita, North Carolina State University; IEEE Foundation Board of Directors, Director-at-Large
01:30 PM - 03:30 PM	Panel Discussion	Inclusion and Diversity in Engineering Education	Prof. Madya Dr. Syed Ahmad Helmi Syed Hassan Head, Research Group in Engineering Education (RSEE) & Fellow, Center for Engineering Education (CEE), Universiti Teknologi Malaysia (UTM) Engr. Yetunde Adeobola Holloway Chair, Women in Engineering, World Federation of Engineering Organizations (WFEO) Engr. Federico A. Monsada President, Philippine Technological Council (PTC) Engr. Dr. Cho Win Maw Acting President, Vice President, & Evaluator, Myanmar Engineering Council (MEC)

Day 2: Focused Topics

09:00 AM - 09:20 AM	Opening and Synthesis		
09:20 AM - 10:00 AM	Plenary	Matching Future-Fit Engineering Education with the CDIO Framework	Aldert Kamp Co-Director, CDIO Initiative; Founder, Aldert Kamp Advies, The Netherlands
10:00 AM - 11:30 AM	Panel Discussion	Teaching and Learning in the New Normal: Best Practices in Southeast Asia	Dr. Helene Leong Co-Director & Regional Leader (Asia), CDIO Initiative; Director, Educational Development Department, Singapore Polytechnic Prof. Satish Narayana Namasivayam Assoc. Head, EGIS & Professor of Engineering and Science Heriot-Watt University Malaysia Campus Assoc. Prof. Dr. Natha Kuptasthien Council Member-At-Large (2017-2021), CDIO Initiative; Associate Professor, Department of Industrial Engineering, Faculty of Engineering, Rajamangala University of Technology Thanyaburi (RMUTT)

Parallel Master Classes

1:30 PM - 2:00 PM	<i>Advances in Integrated Learning Experiences Using Core Principles of Learning</i>		Sin-Moh Cheah Senior Academic Mentor & Head, Teaching and Learning Unit, School of Chemical and Life Sciences, Singapore Polytechnic
2:00 PM - 2:30 PM	<i>Assessment Methods in Education: "How Do I Know What They Know?"</i>		Dr. Jennifer Culver Educational Consultant, Texas International Education Consortium (TIEC), USA
2:30 PM - 3:00 PM	<i>Innovation of Engineering Education for the Future Universities</i>		Prof. Haydn H.D. Chen Founding Vice President, The Asian Society for Engineering Education (AsiaSEE)
3:00 PM - 3:30 PM	<i>Redesigning Learning for Effective Engagement in the Virtual Learning Environment</i>		Dr. Lim Chee Leong Director, Learning Innovation and Development (LID), Centre for Future Learning, Taylor's University (Malaysia)
3:30 PM - 3:45 PM	<i>Innovation Challenge Competition</i>	<i>Announcement of Top 10 Winners</i>	Assoc. Prof. Albertson D. Amante Vice President, Research, Development & Extension Services, Batangas State University
3:45 PM - 4:00 PM	<i>Conference Closing</i>		

1. Innovating Today towards the Engineering Mindset of the Future

Keynote Address: **Dr. Sheryl Sorby**, Immediate Past President & Fellow, American Society for Engineering Education (ASEE); Professor, Engineering Education Department, University of Cincinnati, USA

With the new times come new hurdles in engineering education and a call for innovations in teaching and learning. As drivers of said innovations, educators now realize the urgency to develop a roadmap towards developing the Engineering Mindset of the Future.

What is needed is a global perspective exploring the current state of engineering education with the goal of effectively identifying the direction in which it appears to move, the shifts that it undergoes, and the impact of changes to it, so that the drivers of innovative change become more vigilant and adaptable as they navigate into the future today.

2. The Continuing Role of Engineering Education in the Attainment of the SDGs: UNESCO Engineering Report 2021

Plenary Session: **Prof. Gong Ke**, President, World Federation of Engineering Organizations (WFEO) and Spokesperson TBA, International Centre for Engineering Education (ICEE)

The goal is still the same, but the playing field has changed. The achievement of SDG 4 can be seen as a core and integral part of achieving all other SDGs: education and awareness in sustainable development are key for further progressing the rest. Good quality engineering skills are needed to build a sufficient workforce (SDG 8) that will develop the infrastructure to enhance the living standards of people (SDG 9) and address global issues such as affordable energy (SDG 7), resilient cities and settlements (SDG 11), with adequate water and sanitation facilities (SDG 6). The role that engineering education plays in attaining the UN SDGs is growing in importance, now more than ever.

3. Quality Assurance in Engineering Education

Plenary Session: **Dr. Sarah Ann Rajala**, At-Large Director (2021-2022), Accreditation Board for Engineering and Technology, (ABET); Dean Emerita, Iowa State University; Professor Emerita, North Carolina State University; IEEE Foundation Board of Directors, Director-at-Large

How is quality measured in the virtual space? More importantly, how is it sustained? The quality of engineering education and accreditation of engineering programs are closely connected with the recognition of engineers' degrees and professional competencies—preconditions for the international mobility of engineers. This session aims to help the engineering education community prepare for accreditations by becoming an avenue to learn about new processes and procedures, different quality assurance practices among Higher Learning Institutions (HEIs), the issues and challenges facing quality assurance today from the global perspective, and the various strategies and techniques to help in the development and institutionalization of effective 21st-century quality assurance approaches.

4. Inclusion and Diversity in Engineering Education

Panel Discussion:

- **Prof. Madya Dr. Syed Ahmad Helmi Syed Hassan**, Head, Research Group in Engineering Education (RGEE) & Fellow, Center for Engineering Education (CEE), Universiti Teknologi Malaysia (UTM)
- **Engr. Yetunde Adeobola Holloway**, Chair, Women in Engineering, World Federation of Engineering Organizations (WFEO); Chair, Women in Engineering (STC), Federation of African Engineering Organisations (FAEO)
- **Engr. Federico A. Monsada**, President, Philippine Technological Council (PTC)
- **Engr. Dr. Cho Win Maw**, Acting President, Vice President, & Evaluator, Myanmar Engineering Council (MEC); Vice-President & Chair, Chemical Engineering, Food, Pharmaceutical, and Biotechnology and Nuclear Technical Divisions, Myanmar Engineering Society (MES)

The importance of diversity and inclusion in engineering education has gained prominence in recent years due to the increased need for global collaborations and industry partnerships. Engineers of today are expected to work in diverse teams and within different cultures; thus, initiatives in engineering education aim to tear down divisions in gender, ethnicity, national origin, economic status, and physical and cognitive ableness. This panel discussion is a shared platform among global leaders allowing for the exchange of best practices and efforts toward achieving international learning outcomes in collaborations and bridging the industry-university gaps, thereby maximizing learning opportunities and stakeholder value all across.

5. Matching Future-Fit Engineering Education with the CDIO Framework

Plenary Session: **Aldert Kamp**, Co-Director, CDIO Initiative; Founder, Alder Kamp Advies, The Netherlands; Immediate Past Director of Education, Faculty of Aerospace Engineering & 2014-2020 Leader of 4TU.Centre for Engineering Education, Delft University of Technology

Conceiving, Designing, Implementing, and Operating: The CDIO framework has been proven to be a robust methodology in curriculum planning and outcome-based assessment. How will the engineering education framework weather the challenges introduced by the new normal? How adaptive is the CDIO framework—not only to today's education setting but to tomorrow's as well?

6. Teaching and Learning in the New Normal: Best Practices in Southeast Asia

Panel Discussion:

- **Dr. Helene Leong**, Co-Director & Regional Leader (Asia), CDIO Initiative; Director, Educational Development Department, Singapore Polytechnic
- **Prof. Satesh Narayana Namasivayam**, Associate Head, Energy, Geoscience, Infrastructure and Society School & Head, Lab Operations, Heriot-Watt University Malaysia Campus
- **Assoc. Prof. Dr. Natha Kuptasthien**, Associate Professor, Department of Industrial Engineering, Faculty of Engineering, Rajamangala University of Technology Thanyaburi (RMUTT); Council Member-At-Large (2017-2021), CDIO Initiative

Much is shared among the nations of Southeast Asia: cultures, economies, and technological capacity. To an extensive degree due to geographic and socio-cultural elements, the ASEAN countries also share many of their concerns; one being engineering education. How does engineering education in the different SEA nations thrive in the new normal? What commonalities and differences exist in the implementation and reception of new modes of education? Which practices are shareable? To move forward as individual peoples, it may be beneficial to look at progressing as one Asian region. An interregional benchmark is necessary for sharing innovations in engineering teaching and successful adaptable practices.

7. Advances in Integrated Learning Experiences Using Core Principles of Learning

Master Class: **Sin-Moh Cheah**, Senior Academic Mentor & Head, Teaching and Learning Unit, School of Chemical and Life Sciences, Singapore Polytechnic

Educators who practice integrated programs in engineering create lessons and activities that engage students in lessons, projects, and other learning tasks that focus on the connections between the skills and content taught in the regular curriculum. These educational activities combine academic learning and practical application of a discipline in the workplace. The goal is for engineering students to have the ability to integrate their learning through a mix of academic and professional activities; and in the development and instruction of integrated learning, blended learning has proven to be beneficial. Integrated learning will have to adapt and reconstruct itself in response to changes in instructional modality.

8. Assessment Methods in Education: "How Do I Know What They Know?"

Master Class: **Dr. Jennifer Culver**, Educational Consultant, Texas International Education Consortium (TIEC); Sr. Academic Technology Services Director, Simmons School of Education and Human Development, & Manager, Online Production Services, Southern Methodist University, USA

Assessments are used to track student progress and allow them to demonstrate that they have acquired a course's prescribed target knowledge and aptitude levels. This lecture covers how to design more effective assessments that are accurately linked with the targeted learning outcomes. As an always relevant topic in education, several studies have shown that education and sustainability are inextricably tied. As a result, designing and implementing the appropriate performance assessment for students' skill development and achievements is important for attaining long-term learning.

9. Innovation of Engineering Education for the Future Universities

Master Class: **Prof. Haydn H.D. Chen**, Founding Vice President, The Asian Society for Engineering Education (AsiaSEE); Professor Emeritus, Department of Materials Science and Engineering, University of Illinois Urbana-Champaign, USA

Engineering is a discipline that requires a significant amount of analytical skills, technical knowledge, and intuitive understanding. The quality of students produced by engineering institutes heavily depends on the quality of education. Academic institutions are instrumental in the creation of engineers with the requisite skill set to enter the modern world of work.

A critical consequence of passing up the opportunities to future-proof teaching and learning methodologies is stifling the development of high-quality engineers. Engineering education innovation thus ensures that degree programs attract students and produce graduates who are well prepared for future engineering practice, incorporating new science and technology while being adapted to changing socioeconomic and environmental circumstances.

10. Redesigning Learning for Effective Engagement in the Virtual Learning Environment

Master Class: **Dr. Lim Chee Leong**, Director, Learning Innovation and Development (LID), Centre for Future Learning, Taylor's University (Malaysia)

Educators are increasingly using digital internet-based tools and resources to support and enhance their classroom instruction. There is a definite rising trend in the availability and variety of online learning alternatives accessible to students of all ages, independent of the transition to online learning as a consequence of the 2020 events. The question begged is to what extent does the virtual learning environment (VLE) truly enhance learners' engagement throughout their learning journey. An exploration of this topic will help engineering educators reflect on upskilling academic competency in online delivery while learning about some best practices in learning design principles based on industry standards to ensure VLE maintains consistency and high quality.