

# WORKSHOP GUIDE



## SCHOOL OF CIVIL AND ENVIRONMENTAL ENGINEERING (CEE)

S/N	TITLE	LEARNING OBJECTIVES	DETAILS	MAX NO. OF PARTICIPANTS	ESTIMATED DURATION
CEE/1	Water Purification	<p>Having access to clean drinking water is usually not easy in countries or rural areas which are short of clean water or treatment facilities. However, this may not be the case anymore, after attending this workshop.</p> <p>In this workshop, students will learn to use coagulant to purify surface water for drinking purpose, a technique that can be applied worldwide.</p>	<p>This workshop comprises:</p> <ol style="list-style-type: none"> <li>(1) Introductory talk <ul style="list-style-type: none"> <li>• Introduction of background, theory, principle and basic treatment technique</li> </ul> </li> <li>(2) Hands-on session <ul style="list-style-type: none"> <li>• Use of coagulant to purify surface water for drinking purpose</li> </ul> </li> <li>(2) Conclusion and review <ul style="list-style-type: none"> <li>• Reinforcement of concepts learnt in the workshop</li> </ul> </li> </ol>	20	3 hours

## SCHOOL OF COMPUTER SCIENCE AND ENGINEERING (SCSE)

S/N	TITLE	LEARNING OBJECTIVES	DETAILS	MAX NO. OF PARTICIPANTS	ESTIMATED DURATION
SCSE/1	System Developer in a Day	<p>This 1-day workshop is designed for students to appreciate the challenges involved in designing modern embedded systems that facilitated the conveniences of modern living. This workshop also aims to familiarise students on programming.</p>	<p>There are 2 components in this workshop:</p> <ol style="list-style-type: none"> <li>(1) Introductory talk <ul style="list-style-type: none"> <li>• Introduction of the school and theory of programming</li> </ul> </li> <li>(2) Hands-on session <ul style="list-style-type: none"> <li>• Programming the Evalbot to run through a maze and compete individually or in groups for the fastest run time</li> </ul> </li> </ol>	20 – 30	<p>1 day</p> <p>(weekend – Sat)</p>
SCSE/2	Android Development for Everyone	<p>This 1-day workshop is designed for students to appreciate the simple steps involved in android development. Students will learn a lot of programming fundamentals and develop 4 apps in this workshop.</p> <p>This workshop also aims to familiarise students on android programming and game development.</p>	<p>There are 2 components in this workshop:</p> <ol style="list-style-type: none"> <li>(1) Introductory talk <ul style="list-style-type: none"> <li>• Introduction of the school and theory of programming</li> </ul> </li> <li>(2) Hands-on session <ul style="list-style-type: none"> <li>• Development of 4 amazing apps</li> </ul> </li> </ol>	25 – 35	<p>1 day</p> <p>(weekend – Sat)</p>

## SCHOOL OF ELECTRICAL AND ELECTRONIC ENGINEERING (EEE)

S/N	TITLE	LEARNING OBJECTIVES	DETAILS	MAX NO. OF PARTICIPANTS	ESTIMATED DURATION
EEE/1	Programming Pong Game on ARM Microcontroller Board	<p>At the end of this workshop, students should be able to:</p> <ul style="list-style-type: none"> <li>Describe the architecture of a typical embedded RISC processor</li> <li>Learn to write programme in C programming language</li> <li>Learn to use the Keil's <math>\mu</math>Vision4 Integrated Development Environment (IDE)</li> <li>Learn to control a range of typical microcontroller peripherals (e.g. GPIO, ADC, Timers, etc.) of the MCBSTM32EXL Evaluation Board</li> <li>Write an interactive 'Pong' game, which is a classic 1970's computer game, using the available hardware on the Evaluation Board</li> </ul>	<p>This workshop consists of a talk and hands-on session.</p> <p>(1) Introductory talk</p> <ul style="list-style-type: none"> <li>Introduction to ARM Board</li> <li>Introduction to C programming language</li> <li>Introduction to Pong game</li> <li>Introduction to KEIL Software Programming Environment</li> </ul> <p>(2) Hands-on session</p> <ul style="list-style-type: none"> <li>C-programming Labs for implementing Pong Game on ARM Board</li> <li>Programme design and testing</li> </ul>	20 – 25	0.5 day to 1 day
EEE/2	Fly Your Very First Satellite – CanSat (Satellite in a Can)	<p>This workshop will expose students to the following related topics:</p> <ul style="list-style-type: none"> <li>Basic hardware skills which include wiring and soldering of components to form a simple circuit board</li> <li>Software skills- simple programming using Arduino</li> <li>Data acquisition via communication channel and analysis</li> <li>Product skin design</li> <li>General systems engineering approach</li> </ul>	<p>This 2-day workshop includes a talk and hands-on session.</p> <p>(1) Introductory talk</p> <p>(2) Hands-on session</p> <ul style="list-style-type: none"> <li>Work on both hardware and software parts of CanSat</li> <li>Assembly of CanSat and pre-launch tests</li> <li>Launch of CanSat and acquisition of real-time data through communication channel</li> </ul>	10	1 to 2 days

## SCHOOL OF ELECTRICAL AND ELECTRONIC ENGINEERING (EEE)

S/N	TITLE	LEARNING OBJECTIVES	DETAILS	MAX NO. OF PARTICIPANTS	ESTIMATED DURATION
EEE/3	Wonders of Light-Emitting Diodes – LEDs offering unique hands-on experience in the wonderful world of light	Students will learn how a LED is produced from a blank wafer to a commercial LED chip at the end of this 1-day workshop.	<p>This workshop features:</p> <p>(1) A series of interactive demonstrations</p> <ul style="list-style-type: none"> <li>Participants will be introduced to various high efficiency LED lightings developed by the research team, and learn how these high efficiency lightings outperform commercially-available fluorescent and LEDs present today</li> </ul> <p>(2) Hands-on session</p> <ul style="list-style-type: none"> <li>Characterisation of new LED wafers, fabricated chips and packaged chips</li> </ul>	20	0.5 day to 1 day
EEE/4	A Hands-on Experience with Brain Waves	Students will learn about biomedical signals, the analysis and interpretation of these signals.	<p>This workshop features a hands-on session comprising the following:</p> <ul style="list-style-type: none"> <li>Recording of Electroencephalogram (EEG) signals using Emotiv EEG headsets</li> <li>Analysis and interpretation of the signal recordings</li> <li>Playing an EEG based game using the Emotiv EEG headset</li> <li>Analysis of clinical EEG signals (from Alzheimer's Disease patients) and building of a simple EEG-based diagnostics test</li> </ul>	15	0.5 day to 1 day

## SCHOOL OF MATERIALS SCIENCE AND ENGINEERING (MSE)

S/N	TITLE	LEARNING OBJECTIVES	DETAILS	MAX NO. OF PARTICIPANTS	ESTIMATED DURATION
MSE/1	Introduction to Biomaterials	<p>In this workshop, students will be introduced to the world of biomaterials and learn about:</p> <ul style="list-style-type: none"> <li>• Applications of various biomaterials</li> <li>• Synthesis of drug delivery carrier in the form of alginate bead</li> <li>• Encapsulation of chemical agent into the beads</li> </ul>	<p>This workshop consists of a talk and a hands-on session.</p> <p>(1) Introductory talk</p> <ul style="list-style-type: none"> <li>• Introduction on the types of biomaterials, applications of various biomaterials such as drug delivery and the various synthesis methods of biomaterials for drug delivery purposes</li> </ul> <p>(2) Hands-on session</p> <ul style="list-style-type: none"> <li>• Synthesis of alginate beads as drug delivery carriers and encapsulation of chemical agent into these beads</li> <li>• Quiz on the theoretical and practical concepts learnt</li> </ul>	20	3 hours
MSE/2	Nanotechnology and renewable energy	<p>At the end of this workshop, students should be able to understand:</p> <ul style="list-style-type: none"> <li>• Nanotechnology as a tool</li> <li>• Fuel cell technology</li> <li>• Synthesis of nanomaterials</li> <li>• Semiconductor in solar cell</li> <li>• Carbon nanoparticles</li> </ul>	<p>This workshop includes a talk and a hands-on session.</p> <p>(1) Introductory talk</p> <ul style="list-style-type: none"> <li>• Introduction on how nanoparticle catalysts save cost in fuel cells and how nanostructured electrodes improve the performance of batteries</li> <li>• Illustration with examples of simple chemistry to make semiconductor and carbon nanomaterials</li> </ul> <p>(2) Hands-on session</p> <ul style="list-style-type: none"> <li>• Assembly and testing of nanomaterial based supercapacitors</li> <li>• Demonstration on fuel cell cathode reaction and water splitting reactions through nanomaterials</li> </ul>	20	3 hours

## SCHOOL OF MATERIALS SCIENCE AND ENGINEERING (MSE)

S/N	TITLE	LEARNING OBJECTIVES	DETAILS	MAX NO. OF PARTICIPANTS	ESTIMATED DURATION
MSE/3	Introduction to Materials Processing and Testing	<p>This workshop exposes students to:</p> <p>(1) Tensile testing of engineering materials</p> <ul style="list-style-type: none"><li>• Understand the different mechanical properties of materials</li><li>• Observe how different types of materials behave in their mechanical properties under the tensile and bend test</li><li>• Understand the major factors which determine those mechanical properties</li></ul> <p>(2) Composite materials processing</p> <ul style="list-style-type: none"><li>• Understand what is composite material and how to fabricate them</li><li>• Appreciate the applications of composite materials in daily life</li><li>• Appreciate the mechanical properties of composites</li></ul>	<p>This workshop features 2 hands-on experimental sessions:</p> <p>(1) Tensile testing of engineering materials</p> <ul style="list-style-type: none"><li>• Testing the tensile strength of 4 different types of metal and polymer materials using lab equipment</li><li>• Comparison of all the four curves in one frame of axes and discussion on the differences</li></ul> <p>(2) Composite materials processing</p> <ul style="list-style-type: none"><li>• Fabrication of a fibre-reinforced composite</li></ul>	20	3 hours

# REPLY SLIP

Please indicate the workshop(s) you are interested in and send your reply slip to the email address below.

Email: [outreach-coe@ntu.edu.sg](mailto:outreach-coe@ntu.edu.sg)

## WORKSHOP APPLICATION

(Please tick the appropriate circle(s)):

CEE/	<input checked="" type="radio"/> 1			
SCSE/	<input checked="" type="radio"/> 1	<input checked="" type="radio"/> 2		
EEE/	<input checked="" type="radio"/> 1	<input checked="" type="radio"/> 2	<input checked="" type="radio"/> 3	<input checked="" type="radio"/> 4
MSE/	<input checked="" type="radio"/> 1	<input checked="" type="radio"/> 2	<input checked="" type="radio"/> 3	

## CONTACT DETAILS

Name:.....

School:.....

Designation:.....

Contact Number:.....

Email:.....

