

Foreword

At the School of Engineering, we provide professional development workshops for school teachers and organize enrichment workshops for students, to raise their awareness of the diverse opportunities in the field of engineering.

In addition to the activities listed in this booklet, learning journeys can also be tailored for different student groups.

Do get in touch with our co-ordinator, Ms Lily Sing, to arrange a visit!

Please contact:

Ms Lily Sing

Email: Lily_SING@tp.edu.sg

Tel: 6780 5406



See You!

*Outreach Team
School of Engineering
Temasek Polytechnic*

PS: Workshops and Centre Visits on Wednesday and Friday afternoons during TP's Term Time are most welcome -- as resources are more likely to be available.

Teachers' Workshop Series

The duration of these workshops typically spans half a day or a full day.

1. Model Your Physics Lessons
2. Augmented Reality for Beginners
3. Chatbot Development for Non-Programmers

Workshops for Students

These workshops typically require 1.5hrs to 2hrs

Architectural & Built-Environment Workshops

1. Introduction to Digital Architecture
2. Design Your Zero Energy Classroom
3. Visualize Like a Built Environment Professional
4. Facility Management with BIM

Aerospace & Aviation Management Workshops

5. Introduction to Aviation Management
6. Fueling Dreams, Igniting Careers in Aerospace

Healthcare & Biomedical Engineering Workshops

7. From Genome to Proteome
8. Healthcare Analytics – Basic Supervised Machine Learning

Sustainability & Climate Action Workshop

9. Experimenting with Renewable Energy

Data Analytics

10. Enabling Excellence in Data Management
11. Introduction to Python

Programming/Electronics/Robotics/Automation Workshops

12. Making Things Smart
13. Programming and Control Made Easy
14. Fun with Cobots
15. Fun with Electronics
16. Fun with Microcontrollers
17. Build a Rain Water Detector

Short Courses

1. Printed Circuit Board (PCB) Design (1~2-day course)
2. Build a Line-Tracking Robot (1~2-day course)
3. Applied Learning Modules (3-day course)
 - Behind the Scenes: The Making of Electronic Gadgets
 - Introduction to Aviation & Aerospace
 - Appreciating 3D Printing with Mechatronics
 - Smart IoT Devices and Virtual Reality
 - Sustainable Design and Management
 - Innovative and Fun Engineering

Centre Visits

Include a tour to one or two of our Centres of Excellence in your itinerary to learn about developments in the different technology areas. Visit to each centre takes about 20 to 30 mins.

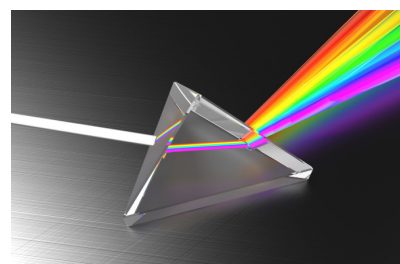
1. Enabling Technology Collaboratory
2. Clean Energy Research Centre
3. Healthcare Engineering Centre
4. Digital Fabrication and Additive Manufacturing Centre
5. Advanced Manufacturing Centre
6. Integrative Built Environment Centre
7. TP-Lufthansa Technical Training Centre

Teachers' Workshop Series

1. Model Your Physics Lessons

Physics, to some students, is a subject difficult to learn. This is usually because the students could not 'visualize' and relate the many concepts to their daily life. If educators can demonstrate the concepts and principles to the class, students would appreciate the subject a lot more.

In this half-day interactive hands-on workshop, participants will be introduced to several physics models/kits used to demonstrate concepts like reflection, refraction, total internal reflection, wave motion, etc. At the end of the workshop, participants can bring the back the models for their own use in the classroom.



Target Audience: All Secondary School Science (Physics) teachers, teaching assistants, TSOs

Duration: Half day

Course Dates: March/May/June/ July/ Sep/Oct/ Nov (Date is negotiable)

Pax: 12 **Cost:** FOC

2. Augmented Reality for Beginners

This workshop introduces participants to the use of immersive media especially Augmented Reality (AR) and the commonly used tools available in the market to develop the AR application (app).

Participants will be guided in the hands-on session to develop AR prototypes with the aim of introducing the technology into their own organisation.



Target Audience: Individuals keen to acquire competency in developing AR app. No or little programming background is required.

Duration: 1 day

Course Dates: Jun/ July/ Sep/ Nov (Date is negotiable)

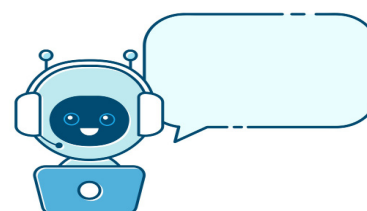
Pax: 12 **Cost:** FOC

3. Chatbot Development for Non-Programmers

Chatbots are computer programs that use Artificial Intelligence to answer queries. They can vary from a simple database of questions and answers to massively complex problems which use dynamic data.

They are more efficient and effective compared to static Q&A. They also reduce labor cost and improve productivity.

This workshop introduces participants to chatbot development using cloud service tools. Participants will be guided to develop a chatbot in a hands-on lab session and learn how to integrate the chatbot to 3rd party applications.



Target Audience: Any individual who is interested in creating a chatbot to assist in queries related to learning or customer experience. No programming background is required

Duration: 1 day

Course Dates: Jun/ July/ Sep/ Nov (Date is negotiable)

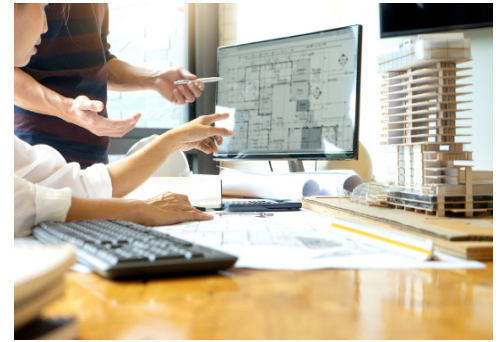
Pax: 12 **Cost:** FOC

Architectural & Built-Environment Workshops

1. Introduction to Digital Architecture

Students will learn to create and render a building design model using a Building Information Modelling (BIM) software. They will have hands-on to be an architect for a day.

Duration: 2hrs Class Size: ~20 pax



Digital Architecture

2. Design your Zero Energy Classroom

There are many ways to make buildings energy efficient so as to save costs and leave a smaller carbon footprint. This workshop culminates with a creative design activity where students attempt to design a classroom that requires zero energy!

Duration: 2hrs Class Size: ~20 pax

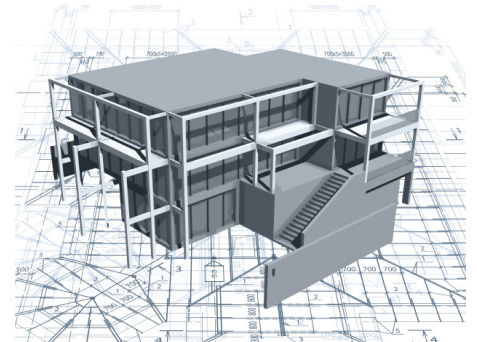


Zero Energy

3. Visualize Like a Built Environment Professional

What roles do engineers and architects have in the built environment industry? How do architectural drawings facilitate the communications between these 2 parties? Find out which role you are more inclined to.

Duration: 2hrs Class Size: ~20 pax



Architects vs Engineers

4. Facility Management with BIM

A SMART nation can be built using a model-based process called Building Information Modelling (BIM). Learn how facility managers use a BIM tool to design and maintain a small facility.

Duration: 2hrs Class Size: ~20 pax



Smart Design and Maintenance

Aerospace & Aviation Management Workshops

5. Introduction to Aviation Management

Students will be taken on a journey to get a glimpse of what they would learn in the course – from flight operations to airport management, and then to the basic flight controls of a plane.

Duration: 2hrs Class Size: 18~20 pax



6. Fueling Dreams, Igniting Careers in Aerospace

Want to know more about the roles that you can assume in the aviation and aerospace sector? Get enlightened on some of the “best jobs” and “hidden careers” in the industry! We will take you on a tour of our hangar to view some of our aircraft systems, share with you what makes a drone fly and then hand over the controls of a drone flight simulator to you!

Duration: 2hrs Class Size: 20~25 pax



Drones

Healthcare & Biomedical Engineering Workshops

7. From Genome to Proteome

You will learn the basics of genomics. Genes store a vast amount of information and gene activities can bring about illnesses and diseases. You will learn in this workshop how genetic information in cells can be decoded by studying the protein composition using biomedical equipment.

Duration: 2hrs Class Size: ~20 pax

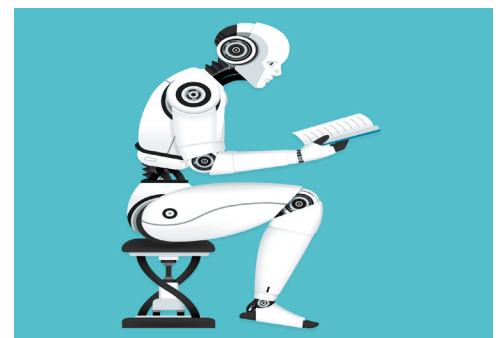


Genome to Proteome

8. Healthcare Analytics – Basic Supervised Machine Learning

In this workshop, you will learn the basics of supervised machine learning. You will learn about logistic regression and how to transform the “logit” function to the “sigmoid” function. You will then teach your machine to analyse data – such as a set of cancer data, so that whenever it is given a new data set, it is able to predict whether a tumour is likely to be malignant or benign.

Duration: 2hrs Class Size: ~20 pax



Supervised Machine Learning

Sustainability and Climate Action Workshops

9. Experimenting with Renewable Energy

Renewable energy sources, such as solar, wind, hydro, geothermal and bioenergy, have the potential to replace fossil fuels in future. Participants will have hands-on practice to generate electricity with solar panels and/or fuel cells. Participants will also have a chance to use instruments to measure voltage and current, and understand the parameters affecting the electrical output from these energy sources.

Duration: 2hrs Class Size: ~20 pax



Solar Panel & Fuel Cell

Data Analytics

10. Enabling Excellence in Data Management

In today's data driven world, the effective use of Microsoft Excel is crucial in ensuring datasets are accurate and meaningful, so that analysis of data can be carried out smoothly. Join our introductory workshop to hone your skills to prepare and clean data lists for efficient data management and gain hands-on experience in creating personalized dashboards using VBA macro coding.

Duration: 2hrs Class Size: ~20 pax

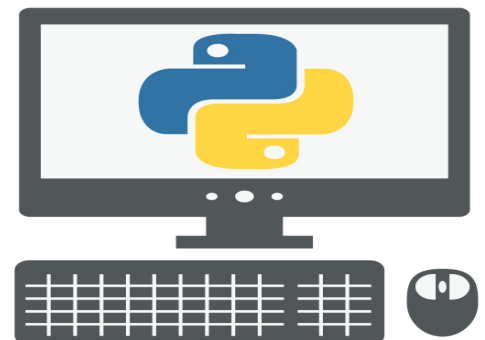


Data Management with Excel

11. Introduction to Python

This is a beginners' course to the Python language. Students will learn the basic syntax of the language, know where Python can be used and the reasons for her huge popularity. Students will be able to explore further on their own after the course.

Duration: 2hrs Class Size: ~20 pax

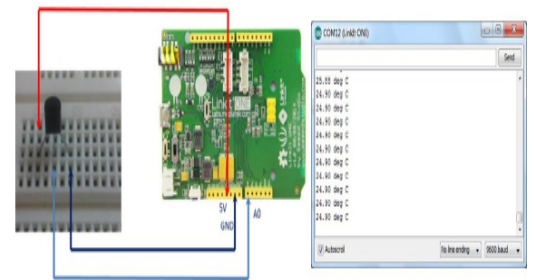


Why Python?

12. Making Things Smart

Students will learn to build a smart system that can gather data from different sensors and then make an intelligent decision.

Duration: 2hrs Class Size: ~20 pax

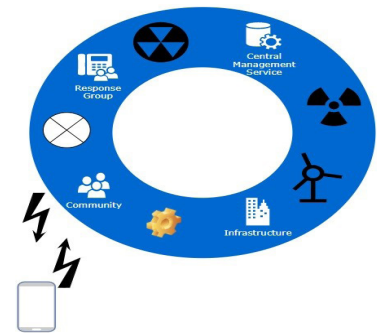


Smarter Things

13. Programming and Control Made Easy

In this workshop, students will be given an overview of microcontrollers and Internet of Things (IoT). Students will be guided to program their microcontroller and enable their “Thing” to communicate through the Internet.

Duration: 2hrs Class Size: ~20 pax



Equipping Things with Internet

14. Fun with Cobots

Cobots are special type of robots designed to work alongside human workers in collaborative applications. This workshop aims to introduce you to the world of Cobots. You will have fun learning to operate and program them. You will also get a chance to see Social Robots and Industrial Robots in action at various Centres under our School of Engineering.

Duration: 2hrs Class Size: 20~25 pax

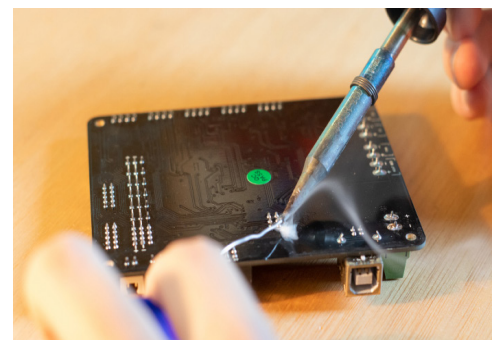


Fun with Cobots

15. Fun with Electronics

Students will have hands-on practice to assemble their own electronic circuit by soldering components onto a Printed Circuit Board. Students will learn to read circuit schematics, identify the different electronic components and acquire awareness of product development.

Duration: 2hrs Class Size: ~20 pax

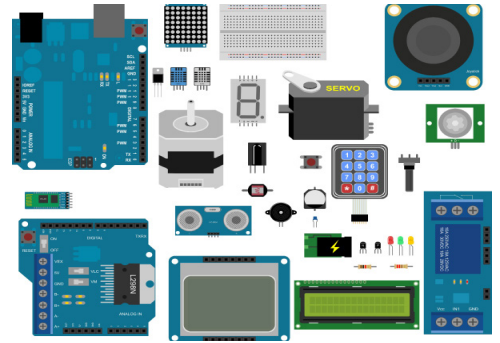


Fun with Electronics

16. Fun with Microcontrollers

This is an introductory workshop to micro-controllers. Students will learn to write simple programs for the Arduino Uno board to control motors, capture readings from sensors and move a simple robot.

Duration: 2hrs Class Size: ~20 pax

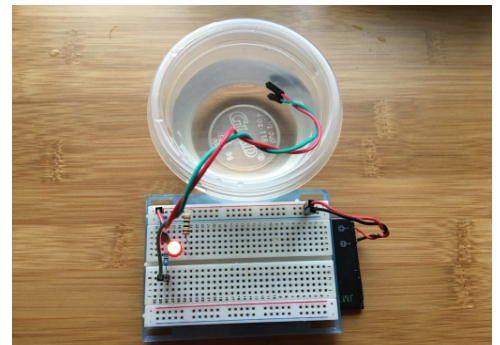


Fun with Micro-controllers

17. Build a Rain Water Detector

Do you have to bring in the laundry or close the windows whenever it rains? This gadget will alert you to do just that. You will learn how a transistor and a few other electronic components should be used. You will have hands-on to patch a circuit on a breadboard.

Duration: 1hr Class Size: ~20 pax



Rain Water Detector Kit

Short Courses

1. Printed Circuit Board (PCB) Design

Everyone can design and fabricate PCBs easily these days. We will guide you through the process of producing the Schematic, the PCB Layout and the manufacturing data using selected PCB Design software. You would then have hands-on practice assembling a PCB by soldering to produce a working prototype.

Duration: 1~2 days Class Size: ~20 pax

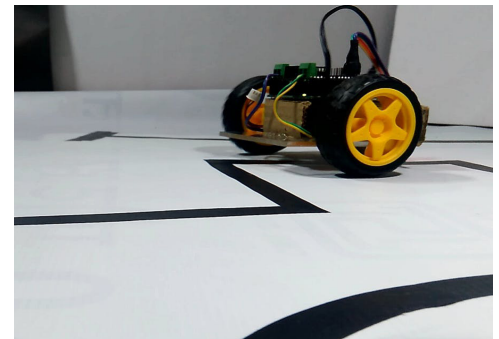


PCB Design

2. Build a Line-Tracking Robot

In this workshop, students will be given a jump start to building a line tracking robot. Students will learn how the different parts of the robot works and learn how to code a robot to track a line.

Duration: 1~2 days Class Size: ~20 pax



Line Tracking Robot

3. Applied Learning Modules@Poly

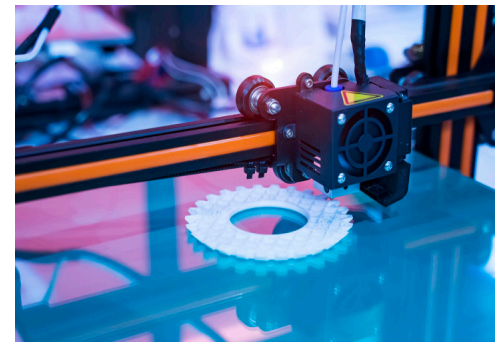
School of Engineering currently offers the following courses:

- Behind the Scenes: The Making of Electronic Gadgets
- Introduction to Aviation & Aerospace
- Appreciating 3D Printing with Mechatronics
- Smart IoT Devices and Virtual Reality
- Sustainable Design and Management
- Innovative and Fun Engineering

For a complete listing of ApLM@Poly, please refer to:
<https://www.tp.edu.sg/landing/educators/aplm.html>



Duration: 3 days Class Size: ~20 pax



AEM- 3D Printing

Here are some suggestions of Centres to visit:

- 1. Enabling Technology Collaboratory**
Learn how core enabling technologies, such as Artificial Intelligence, Machine Learning, Internet of Things and Immersive Media, are applied to solve industry problems at our test-bedding facility.
- 2. Clean Energy Research Centre**
Learn about Hydrogen Fuel Cells, Solar Cells, Power Monitoring Systems and even Electric Vehicles. Check out TP's eco-car that has taken the top spot in the annual Shell Eco-Marathon Race the last few years.
- 3. Healthcare Engineering Centre**
What are BioMEMS (Biomedical micro-electro-mechanical systems) based healthcare devices and systems? Learn about biosensors, microfluidics and wearable healthcare sensors here.
- 4. Digital Fabrication & Additive Manufacturing Centre**
Need to do 3D scan of objects and then replicate them? You will find all the necessary equipment here. Need to replicate a tooth? You can always 3D-print one here too.
- 5. Advanced Manufacturing Centre**
You will see high speed, configurable production lines and warehousing system. And from start to finish, everything can be remotely and intelligently monitored and controlled. Be ready for Industry 5.0!
- 6. Integrative Built Environment Centre**
Digital technologies are widely used in architectural design and systems monitoring. Learn how buildings can be designed to be energy efficient and how installations in facilities can be monitored.
- 7. TP-Lufthansa Technical Training Centre**
Students hone their hand skills to the industry's standards here. Get to know what their training involves and then visit the hangar to see some of our aircraft systems.



Man & Machine

More information on our Centres can be found here:

<https://www.tp.edu.sg/research-and-industry/centres-of-excellence/centres-under-school-of-engineering.html>

