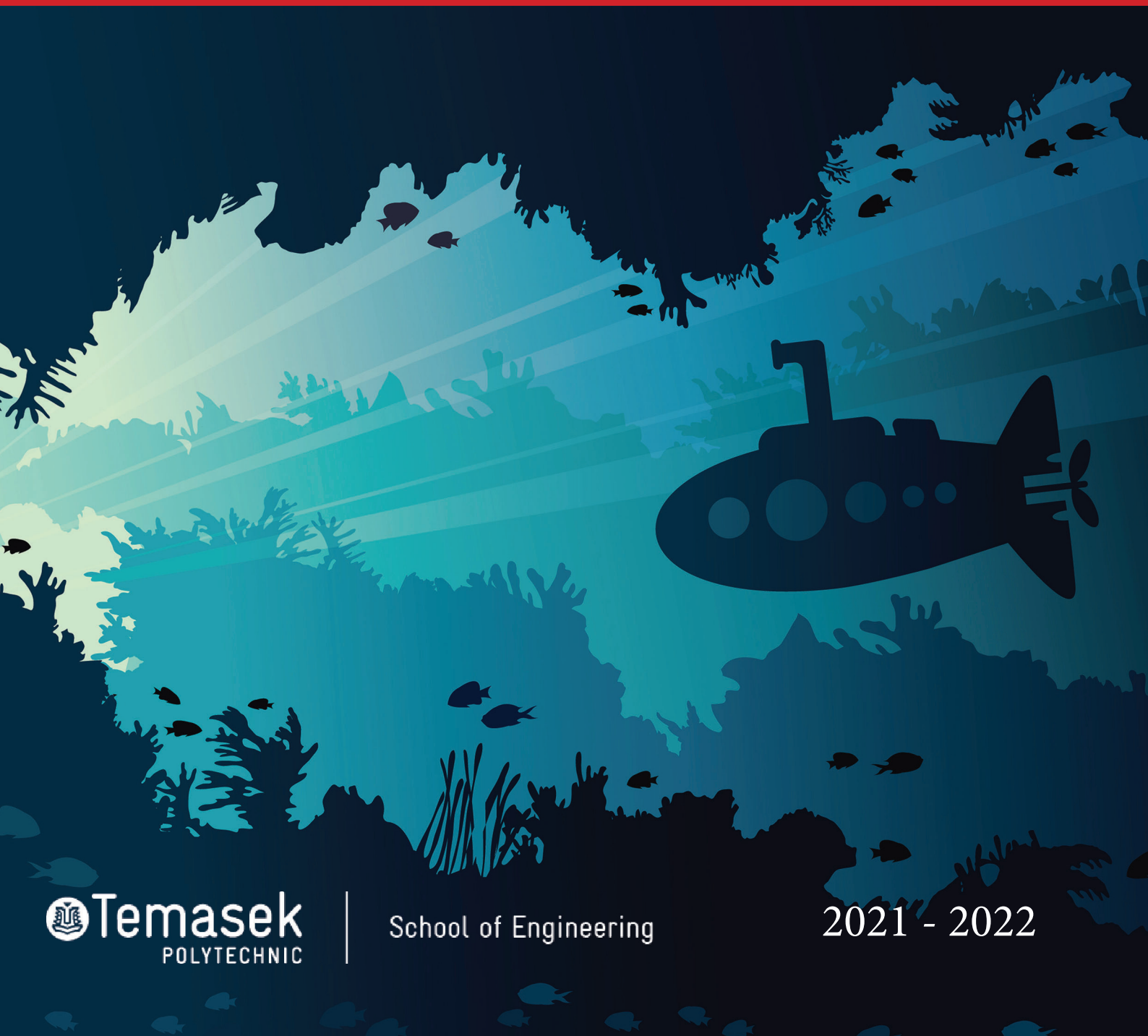
Discover Engineering

@ Temasek Polytechnic

Workshops / Short Courses / Center Visits



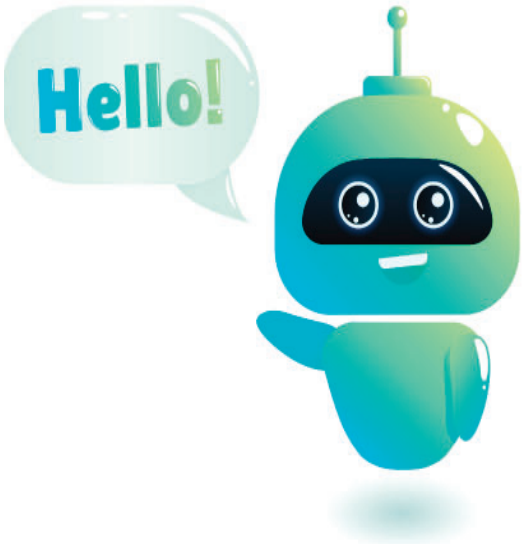
Temasek POLYTECHNIC | School of Engineering

2021 - 2022

Foreword

Our School of Engineering conducts enrichment activities such as workshops, short courses, or lab tours for secondary school students, to equip them with new skill-sets in the latest technologies in specific engineering domains.

Specially designed and pitched for upper secondary students, these activities may also benefit lower secondary students, as it gives participants a quick insight into the exciting world of engineering today!



Apart from the list of activities outlined in this catalogue, workshops, courses or tours can also be customised to meet the specific needs of secondary school students.

Do get in touch with our Co-ordinator, Ms Lily Sing, to arrange or discuss your 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: For short visits or lab tours during our school term time, Wednesday or Friday afternoons, when our students generally do not have lessons, would be preferred.

Workshops

Duration of these workshops is typically about 1.5hrs to 2hrs -- thus suitable as a fun and educational activity for students to learn some aspects of engineering. Conducted by lecturers from the respective fields, students can also find out more about the diploma courses during the workshop.

Built Environment Workshops

1. Introduction to Digital Architecture
2. Design Your Zero Energy Classroom
3. Fun with Light and Shadow Simulation
4. Peek into Sustainable Architecture & Engineering
5. Visualize Like a Built Environment Professional
6. Facility Management with BIM

Aerospace & Aviation Management Workshops

7. Introduction to Aviation Management
8. Appreciating Aviation & Aerospace

Healthcare & Biomedical Engineering Workshops

9. From Genome to Proteome
10. Healthcare Analytics – Basic Supervised Machine Learning
11. Make Your Own Paper Soap
12. Biomedical Online Simulation Games

Programming/Electronics/Robotics/Automation Workshops

13. Robotic Process Automation (RPA) – Build a Robot Responder
14. Making Things Smart
15. Programming and Control Made Easy
16 Introduction to Python
17. Fun with Cobots
18 Fun with Electronics
19. Learn to Program a Micro-controller in 2 hours
20. Build a Rain Water Detector

At a Glance

Short Courses

We have courses that will give students a greater appreciation in seleted areas. Short courses typically require 1 to 4 days.

1. Printed Circuit Board (PCB) Design (2-day course)
2. Build a Line-Tracking Robot (1-day course)
3. Advanced Elective Module (AEM) (4-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

Center Visits/Lab Tours

Add a visit to one of our Centers or labs as part of your itinerary. Each tour takes about 20 to 30 mins.

1. Robotics and Innovation Center
2. Clean Energy Research Center
3. Healthcare Engineering Center
4. Digital Fabrication and Additive Manufacturing Center
5. Advanced Manufacturing Center
6. Physics Demo Lab
7. Engineering Demo Lab

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 also appreciate how the software tool facilitates architectural design.

Duration: 2hrs Class Size: 20~25 pax

Digital Architecture

2. Design your Zero Energy Classroom

Making buildings energy efficient is of interest to developers and buiding owners – not just to save costs but also to leave a smaller carbon footprint. The workshop culminates with a creative design activity where students design a classroom that requires zero energy!

Duration: 2hrs Class Size: 20~25 pax

Zero Energy

3. Fun with Light and Shadow Simulation

Architects use simulation extensively to study how attributes of a building, such as its orientation, building materials used and even the usual wind direction, affect the energy consumption even before it is built. In this workshop, students will get to perform simulations and analyze the results.

Duration: 2hrs Class Size: 20~25 pax

Fun with Light and Shadow

4. Peek into Sustainable Architecture & Engineering

Start your journey towards a Sustainable Future! This workshop introduces concepts of “Sustainable Engineering Design”. Students will get to brainstorm and propose ideas for their “Dream Green School”.

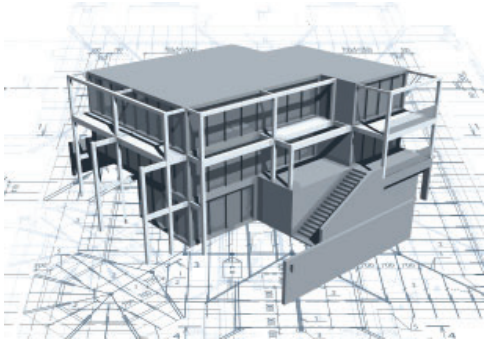
Duration: 2hrs Class Size: 20~25 pax

TP’s Building with Green Roof and Wall

5. 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: 20~25 pax



Architects vs Engineers

6. 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 in the real world.

Duration: 2hrs Class Size: 20~25 pax

Smart Design and Maintenance

Aerospace & Aviation Management Workshops

7. 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: 20~25 pax

Airlines, Airports, Airplanes

8. Appreciating Aviation & 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

Bird’s Eye View

Healthcare & Biomedical Engineering Workshops

9. 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 also learn in this workshop how genetic information in cells can be decoded by studying the protein composition using biomedical equipment.

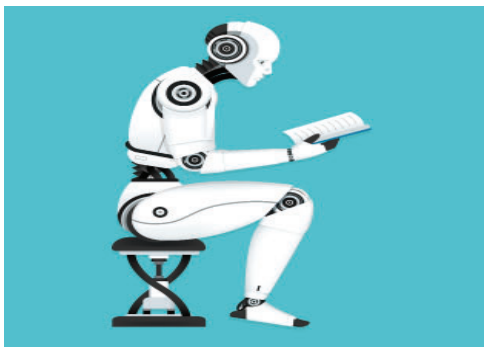
Duration: 2hrs Class Size: 20~25 pax

Genome to Protome

10. 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: 20~25 pax



Supervised Machine Learning

11. Make Your Own Paper Soap

Frequent hand washing helps to prevent the spread of infectious diseases. But sometimes, soap may not be readily available at the washrooms of shopping malls or food-court. In this workshop, you will learn how to make your own "paper soap" that is portable – so that you have soap whenever you need it.

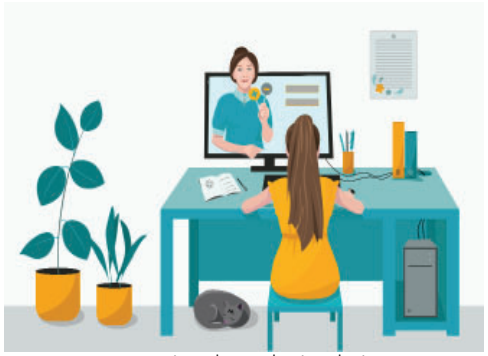
Duration: 2hrs Class Size: 20~25 pax

Washing with Paper Soap

12. Biomedical Online Simulation Games

Learn about biomedical engineering through online simulation games!

Duration: 2hrs Class Size: 20~25 pax



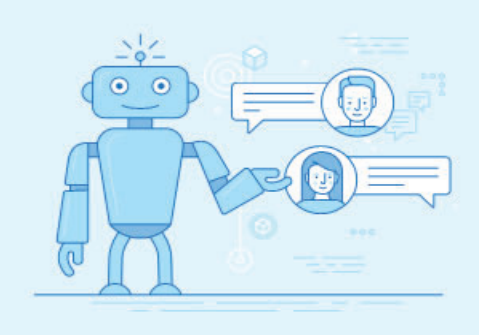
Learning through Simulation

Programming/Electronics/Robotics/Automation Workshops

13. Robotic Process Automation (RPA) – Build a Robot Responder

Through some hands-on activities, students will learn to use UIPATH to automate and eliminate repetitive tasks. Students will subsequently develop a "Robot Responder" that can provide answers when a user queries it with "Frequently Asked Questions".

Duration: 2hrs Class Size: 20~25 pax

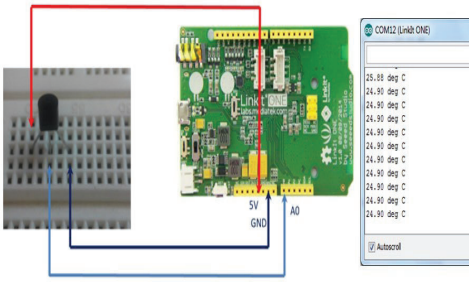


Chatbot

14. 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: 20~25 pax

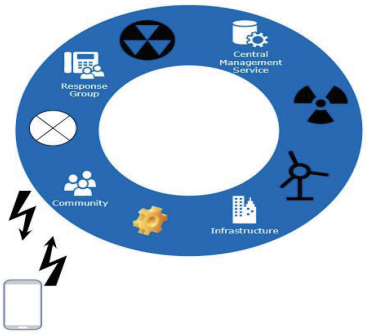


Smarter Things

15. 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: 20~25 pax

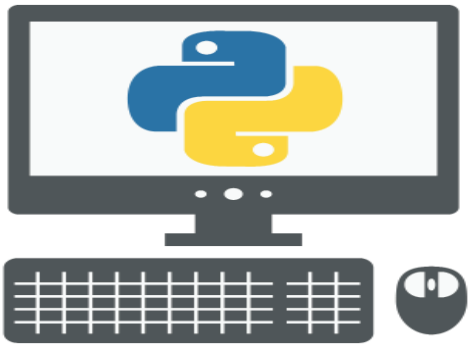


Equipping Things with Internet

16. 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 discover the reasons for her huge popularity. Students will be able to explore further on their own after the course.

Duration: 2hrs Class Size: 20~25 pax



Why Python?

17. Fun with Cobots

Cobots are robots designed to work safely alongside people. This workshop aims to introduce you to the world of Cobots. You will learn to program and operate these robots with a Teach Pendant (Tablet) and get to see the possibilities of using such robots at our TP Robotics and Automation Centre (RAC).

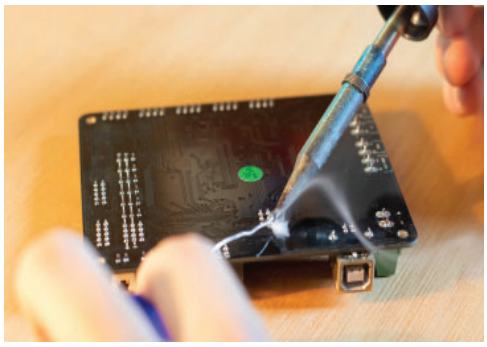
Duration: 2hrs Class Size: 20~25 pax

Fun with Cobots

18. 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.

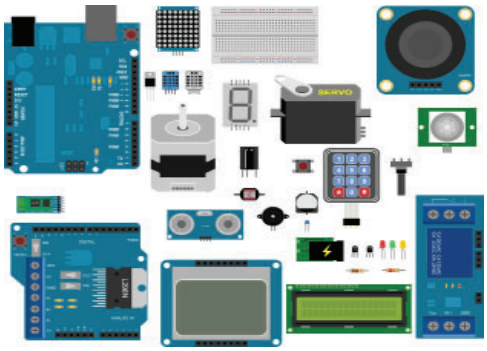
Duration: 2hrs Class Size: 20~25 pax


Fun with Electronics

19. Learn to Program a Micro-controller in 2 hours

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

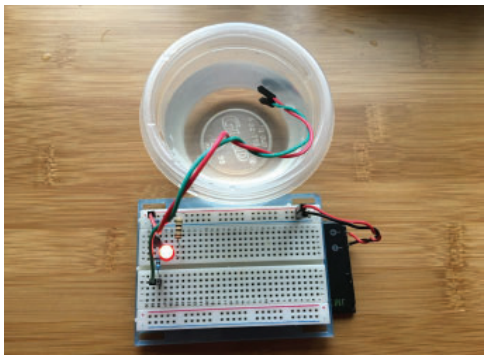
Duration: 2hrs Class Size: 20~25 pax


Fun with Micro-controllers

20. Build a Rain Water Detector

When it rains, some of you may need to bring in the laundry or close the windows. Won't it be nice if you have a gadget that can alert you when it rains? In this workshop, a simple transistor and a few other electronic components will be used. You will have hands-on practice to patch a circuit on a breadboard.

Duration: 1 hr Class Size: 20~25 pax
Remarks: Available as a virtual workshop as well.


Rain Water Detector Kit

Short Courses

1. Printed Circuit Board (PCB) Design

Anyone can design and fabricate PCBs easily these days. We will guide you through the process of Schematic Capture, PCB Layout and manufacturing data generation using Autodesk's Eagle software. You can then fabricate the design using our PCB milling machines. Finally, solder your own board and bring home a working gadget!

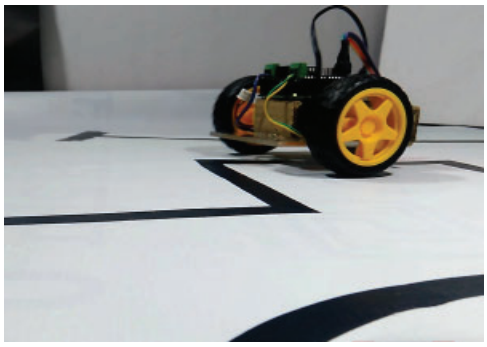
Duration:1 day Class Size: 20~25 pax

PCB Design

2. Build a Line-Tracking Robot

This is a hands-on workshop where students will be given a jump start to building a line tracking robot. Students will learn how every part of the robot - line-sensors, motors, driver and the micro-controller -- works, and how they should be integrated to make the robot toe the line.

Duration:1 day Class Size: 20~25 pax



Line Tracking Robot

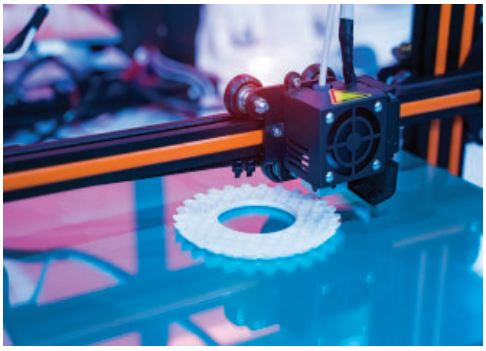
3. Advanced Elective Modules (AEM)

AEMs are offered by polytechnics to bring greater diversity to the secondary school curricula. 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 Managment
- Innovative and Fun Engineering

For a complete listing of AEMs, please refer to:
https://www.tp.edu.sg/landing/educators/aem.html

Duration: Typically 4 days Class Size: 20~25 pax



AEM- 3D Printing

Center Visits/Lab Tours

Here are some suggestions of Centers/Labs to visit:

1. **TP-HRG Robotics and Innovation Center**
The Center was set up in collaboration with HRG Singapore Holdings Pte Ltd. A wide variety of interactive robots are showcased here and a visit will surely inspire more ideas of what robots can do.

Hi! Look for me at TP-HRG RIC

2. **Clean Energy Research Center**
The Center carries out studies on the application of Hydrogen Fuel Cells and Power Monitoring Systems. Showcased at the Center is our eco-car that has taken the top spot in the annual Shell Eco-Marathon Race for the last few years.

3. **Healthcare Engineering Center**
The Center is focuses on developing BioMEMS (Biomedical micro-electro-mechanical systems) based healthcare devices and systems. Visitors would be introduced to some projects in progress on biosensors, microfluidics and wearable healthcare sensors.

4. **Digital Fabrication & Additive Manufacturing Center**
The Center houses some of the advanced machines used in the industry for carrying out scanning, additive manufacturing and post processing. You would be amazed by what can be designed and made here.

5. **Advanced Manufacturing Center**
Take a guided tour of our newest addition that houses advanced manufacturing technologies that is used to prepare students for Industry 4.0.

6. **Physics Demo Lab**
This Lab has a collection of gadgets and models to illustrate Physics principles and how some of these principles are applied in real life.

7. **Engineering Demo Lab**
A number of models and project have been curated in this lab to show what engineering students would learn and some of the works they have produced.

More information on our Centers can be found here:
https://www.tp.edu.sg/research-and-industry/centres-of-excellence/centres-under-school-of-engineering.html