

NUS ECE empowers you for a career in

## Renewable Energy and Electric Vehicles for Sustainability

Renewable energy sources such as solar, wind, bioenergy and tidal are growing at a very rapid rate. Global supply of renewable electricity could expand by 50% in the next five years, due to increasing environmental concerns. Electric vehicles will play a key part of the future sustainable transportation systems, given their potential to dramatically cut greenhouse gas emissions from this sector. This track examines electricity production from various forms of renewable energy, and provides a comprehensive overview of the techniques for promoting the advancement and use of economically and environmentally sustainable electrical energy systems. Students will learn how to integrate renewable energy sources and electric vehicles into the smart grid, and strategies for supply and demand side management for efficient resource utilisation.



Issues related to environmental impact of electrical energy generation will be discussed, and strategies for energy efficiency improvement through electric motor drives in full-electric or hybrid-electric vehicles will be covered. Students will learn about Power Electronic technologies and their application at the system level. This track will also discuss the integration of the energy storage devices both for transportation sector as well as electric power generation to match the supply and demand.

### Representative Modules

Students taking this track will learn about renewable energy and components, systems and grid technologies related to power and energy conversion, and propulsion and actuation for electrified and autonomous vehicles on land, sea and air. They will gain practical knowledge and advanced skills in the latest technologies for sustainable energy and transportation sector. Sample modules in this track are:

EE2029 – Introduction to Electrical Energy Systems  
EE4502 – Electric Drives for Transportation Electrification  
EE4511 – Renewable generation & Smart Grid  
EE4438 - Solar Cells and Modules  
EE4501 - Integration of Renewable Energy into Power Systems

EE4513 – Electric & Autonomous Vehicles  
EG4211 –Energy Storage Devices and Systems for EVs and Smart Grids  
EE4503 – Power Electronics for Sustainable Energy Technologies

Students who perform well in selected modules will obtain a **Certificate in Renewable Energy and Electric Vehicles for Sustainability**.

### Projects

Students will have the opportunity to work on exciting hands-on projects in power electronics, drives and autonomous vehicles. Examples of recent projects are Energy storage systems for improving grid resiliency, Stability assessment of power systems with high penetration of renewables, Data-driven estimated time of arrival and customer demands prediction for smart mobility-on-demand transportation system, Structural battery for e-mobility device, Portable PV energy source for outdoor use, Design and implementation of DC-DC converters for low voltage and high current applications, Fault diagnosis in rectifier transformers, and Integration of user preferences in EV charging using evolutionary multi-objective optimization.

### Internships

Examples of companies and organisations offering internships in these fields to NUS ECE students are Port of Singapore Authority (PSA), Land Transport Authority (LTA), Energy Market Authority (EMA), Singapore Power (SP), Keppel Electric Pte Ltd, Rolls Royce Singapore Pte. Ltd., Schlumberger, Sembcorp, and ST Engineering. Other than these, students can pursue internships overseas under the NUS Overseas Colleges (NOC) programme.

### Job Prospects

Excellent career prospects await those with a degree from NUS ECE with a certificate in Renewable Energy and Electric Vehicles for Sustainability. These jobs not only come with a good financial packages but the nature of the area invariably includes an important social component of sustainability and clean energy.

Visit NUS ECE website at <https://cde.nus.edu.sg/ece/> to find out more