Flexible, live and interactive online learning
Learn from industry experts with real-world experience

WHAT YOU WILL GAIN:

• Skills and know-how in the latest advanced technologies in renewable energy technologies
• Credibility as an advanced practitioner in renewable energy technologies
• Ability to make independent judgments and high-level decisions in a variety of technical or managerial contexts
• The knowledge and skills to be actively involved in the planning, implementation and evaluation stages of a range of renewable energy power generation systems
• An EIT Vocational Graduate Certificate in Renewable Energy Technologies

Visit our website: www.eit.edu.au
Introduction

The Vocational Graduate Certificate in Renewable Energy Technologies is an advanced program. It is presented at a considerably higher level than the advanced diploma and Bachelor degree level programs and prospective students should be aware of the greater challenge. This Vocational Graduate Certificate has identical standing and level to that of a university graduate diploma, but is focused on the career outcomes of a professional engineer and technologist. As the title suggests, it has a greater vocational or ‘job related’ emphasis, and focuses more on developing practical skills that you can apply to the workplace, rather than theory alone.

A feature of this program is that in using web collaborative technologies, you will not only study and work with your peers around the world on various renewable energy design projects, but you will do this conveniently from your desktop using the latest techniques in live web and video conferencing. The Vocational Graduate Certificate in Renewable Energy Technologies focuses on the mainstream technologies such as photovoltaic, wind and small hydro, but also covers other less common technologies such as biomass, osmotic and tide power generation, among others. The program deals with practical issues of renewable energy that will confront an advanced practitioner in the field. For example, you will be exposed to the modeling and simulation of wind turbines, and the design of wind farms. You will also be expected to undertake advanced design and conceptualization work in which you will apply the calculations learned in less advanced programs. Some of the work and study you will be undertaking will involve pioneering technology and exploring new approaches. There is a definite ongoing need for highly qualified and skilled specialists in the renewable engineering field and this program caters for that need. Upon completing this program you will be able to show technical leadership in the field of renewable energy, and be recognized as an advanced practitioner in the field.

We provide a high level practical Vocational Graduate Certificate based on:

• Using outstanding electrical engineers and lecturers working in the industry
• Drawing on the best academics in the field to advise and design the program units
• Excellent practical program materials along with useful industry applicable theory
• State-of-the-art live lecturer led e-learning presentations

About Engineering Institute of Technology (EIT)

The key objective of the Engineering Institute of Technology (EIT) is to provide an outstanding practical engineering and technology education; from Diplomas and beyond. The finest engineering lectures and lecturers, with extensive real engineering experience in industry, are drawn from around the world. The learning is gained through synchronous, online (e-learning) technologies.

EIT offers awards in a growing array of engineering fields.

Many (perhaps, most) engineering faculties at universities and colleges experience a significant challenge delivering the program-work affordably and with excellence. The EIT achieves this using online based education - economical class sizes are attainable, international experts are engaged to instruct and remote laboratories and simulation software are employed.

EIT is a sister company of the well known and reputable engineering training organisation, IDC Technologies. IDC has been operating for over 20 years, from offices throughout the world, delivering practical short programs to well over 500,000 engineers and technicians.

To enrol please contact enquiries@eit.edu.au

EIT Program Delivery Methodology

Not all e-learning is the same. See why our methodology is so unique and successful.

Visit:

"If you want to improve career prospects and be trained by excellent trainers with a thorough knowledge of the industry then I would recommend this program."

Gary Burrowes, BHP Billiton

“This has been the best study process I have gone through and for advancing the career it is a must. The program content is extremely good and practical as I have baffled my engineers with some of the questions in the assignments making them question the content they actually studied.”

Henk Bamard
Accreditation & International Standing for Online Engineering Training

The EIT (and many individual programs) has received recognition, endorsement and/or accreditation as a training provider from authorizing bodies based around the world, including those listed below. Please ask us for specific information for your location.

AUSTRALIA
The Engineering Institute of Technology (EIT) is a private Registered Training Organization (RTO) – provider number 51971. EIT is registered with and regulated by the Australian Skills Quality Authority (ASQA). ASQA is the national regulator for Australia’s vocational education and training sector. They regulate programs and training providers to ensure nationally approved quality standards are met. Many of the programs offered by EIT are nationally accredited and recognized qualifications and are listed on training.gov.au (TGA). TGA is the official National Register of information on Training Packages, Qualifications, Programs, Units of Competency and Registered Training Organizations (RTOs). EIT qualifications accredited to date can be viewed on EIT’s registration page on TGA under the “Scope” tab. You can find EIT on TGA by searching for our provider number – S1971. Programs listed on EIT’s scope have been approved for delivery in all Australian states and territories. Please note that many additional programs are also in the process of accreditation. Members of Engineers Australia (EA) - are entitled to claim CPD hours for private study, short programs, and learning activities at the workplace. CPD hours can be claimed for our programs in most cases, but we would always advise individual members to check with EA regarding specific programs.

NEW ZEALAND
The New Zealand Qualifications Authority recognizes individual qualifications gained overseas on a case-by-case basis, and the Levels in the NZQF are broadly comparable to those in Australia.

UNITED STATES
IEEE is the world’s largest professional association advancing innovation and technological excellence. EIT is an IEEE Continuing Education Provider. IEEE Continuing Education Programs are peer-reviewed by content experts. This peer review guarantees both quality of the technical content of learning materials, as well as adherence to IEEE’s strict criteria for educational excellence. All programs that pass this strict process are entitled to award IEEE Continuing Education Units (CEUs), recognized as the standard of excellence for continuing education programs in IEEE’s fields of interest. The International Society of Automation (ISA) is a leading, global, non-profit organization that sets the standard for automation around the world. ISA develops standards, certifies industry professionals, provides education and training, publishes books and technical articles, and hosts conferences and exhibitions for automation professionals. ISA has reviewed the curricula of the programs offered by EIT as they relate to the instrumentation, control and automation discipline and are enthusiastic about promoting their availability to the automation community.

UNITED KINGDOM
Nationally recognised qualifications that have been achieved at EIT can be compared by UK NARIC to the UK framework. UK NARIC is the UK’s national agency responsible for the recognition of qualifications from overseas and provides services for individuals and organizations to compare international qualifications against UK qualification framework levels. UK NARIC is managed by ECCTIS Ltd (see http://www.ecctis.co.uk/naric/Default.aspx) which administers the service for the UK Government. The Institute of Measurement and Control in the United Kingdom is Britain’s foremost professional body for the Automation Industry. The EIT Graduate Certificate is recognized by the Institute of Measurement and Control as contributing to the initial professional development / further learning required for Chartered Engineer and Incorporated Engineer registration. The Graduate Certificate is also approved by the Institute as providing CPD.

OTHER COUNTRIES
Students who successfully complete an EIT Graduate Certificate and other qualifications may be able to apply for recognition of their qualification within the local (home country) education system. In general most countries will recognise that a “graduate certificate” is a post graduate qualification that requires a high level of knowledge (beyond bachelor's degree). Many countries have a process for “recognition of foreign qualifications” which is utilised by new residents when they have qualifications earned overseas. You will be awarded an Australian qualification from the EIT (although you will be studying from your home country), so your EIT qualification may be able to be recognized as a “foreign qualification” if you apply through your local system. If you would like to find out more, please contact your local education authorities because it is not practical for the EIT to know the systems that apply in all countries. However, in many cases formal individual recognition within the home country may not be required because the international validity and accreditation of this credential is very sound. Members of other engineering organizations may be able to claim credit for professional development and are advised to check with their own organization.

For additional information please see http://www.eit.edu.au/international-standing.
Program Structure

The Vocational Graduate Certificate is an intensive part-time program, conducted over 6 months*. Unlike other universities or academic institutions, we operate almost all year round without extended breaks between semesters. The program is composed of 4 units.

- Unit 1 - Fundamentals and Balance-of-Plant Components
- Unit 2 - Small Hydro and Other Renewable Energy Technologies
- Unit 3 - Photovoltaic (PV) Systems
- Unit 4 - Wind Power Generation

*Please note: this does not include the program induction week, or examination weeks. Total time to complete the program may take up to 30 weeks.

For detailed information on the content and breakdown of units, see pages 10 to 14

Comprehensive eBooks and Associated Documentation

You will receive 10 of our up-to-date technical eBooks to add to your library. Together these texts contain over 3000 pages of valuable know-how distilled from years of experience in presenting these programs throughout the world. Titles include:

1. Wind and Solar Power - Renewable Energy Technologies
2. Practical Energy Efficiency, Design, Engineering and Auditing
3. Power Distribution
4. Power System Protection for Engineers and Technicians
5. Safe Operation and Maintenance of Circuit Breakers and Switchgear
6. Troubleshooting and Problem Solving of Ethernet Networks
7. Practical Power System Harmonics, Earthing and Power Quality - Problems and Solutions
8. Practical Power Quality: Problems & Solutions
9. Practical Project Management for Engineers and Technicians
10. Troubleshooting and Problem Solving of Industrial Data Communications

Please Note: Students who choose to pay upfront will receive all 10 e-Books in advance. If you opt to pay by installments you will receive eBooks periodically throughout the program.

eBooks are available in hard copy at 50% of the recommended retail price. Contact us for pricing details.

Presentation Format

The program features real-world applications and uses a multi-pronged approach involving interactive on-line webinars, simulation software and self-study assignments with a mentor on call. The program consists of 4 units delivered over a period of 6 months. Presentations and group discussions will be conducted using a live, interactive software system. For each unit you will have set reading assignments (which will be delivered to you in electronic format in advance of the online presentations). There will be coursework or problems to be submitted and in some cases there will be practical exercises, using simulation software and remote labs that you can easily do from your home or office.

Live Webinars

During the program you will participate in live interactive sessions with the lecturers and other participants from around the world. Each webinar will last approximately 60 to 90 minutes, and we take student availability into consideration wherever possible before scheduling webinar times. Contact us for details of webinar session scheduling. All you need to participate is an adequate Internet connection, speakers and a microphone. The software package and setup details will be sent to you prior to the first webinar.

Time Commitment for the Program

You will need to spend an estimated 8-10 hours per week. This includes the reading of the material prior to your attendance at each webinar and the time needed to complete assignments for submission. This time would be required to ensure the material is covered adequately and sufficient knowledge is gained to provide sound, enduring and immediately useful skills in engineering. The EIT operates almost all year long, so your studies will continue most weeks of the year to enable you to achieve the qualification in an accelerated time period when compared to a traditional semester-based system.

Hardware and Software Requirements

All you need in order to join the webinars once registered for the program is an adequate internet connection, PC, speakers and a microphone. The software package and setup details will be sent to you prior to the program.
Practical Exercises, Remote Labs and Assignments

You will participate in practical exercises using a combination of remote laboratories and simulation software, to ensure you get the requisite hands-on experience. This will give you a solid practical exposure to the key principles covered in the program and ensure you are able to put theory into practice.

As research shows, no matter how gifted and experienced an lecturer (and we believe ours are some of the best worldwide), no one learns from a lecture only. It is only by the additional activities of hands-on exercises using simulation software, remote laboratories, practically based assignments and interactive discussion groups with both your peers and the lecturer that you are able to internalise this knowledge, "take ownership of it" and apply it successfully to the real world. You should note that there is some degree of overlap between the practical sessions between the different units to reinforce the concepts and to look at the issues from different perspectives.

Traditional distance learning thus presents challenges in achieving these goals but we believe today with the modern e-learning technologies available combined with outstanding lecturers that we can give you an equivalent or indeed even better experience than on a traditional university campus.

Practical sessions may be added, deleted or modified by the lecturers to ensure the best outcome for students.

Benefits of Live E-learning

- Attend lessons in a live, virtual classroom with your lecturers and fellow students
- Upgrade your skills and refresh your knowledge without having to take valuable time away from work
- Receive information and materials in small, easy to digest sections
- Learn from almost anywhere - all you need is an internet connection
- Have constant support from your program lecturers and coordinator for the duration of the program
- Interact and network with participants from around the globe and gain valuable insight into international practice
- Learn from international industry experts
- Live interactive webinars, not just a 'book on the web'
- Receive an EIT Vocational Graduate Certificate in Renewable Energy Technologies

Why EIT?

- Our lecturers are selected and recruited from amongst the top engineers/lecturers in their field - worldwide. These lecturers are highly skilled at presenting challenging concepts and ideas to students of varying levels and abilities.
- As shown in the detailed program prospectus, the programs are aimed at practising professionals giving hard-hitting practical know-how relevant to today’s market and is aimed at people working in industry. We design and select case studies and practical exercises in the program based upon real-world business requirements. Feedback from the students we have trained over many years has allowed EIT a unique understanding of real world business requirements and we have tailored the program accordingly.
- We have experience in training over 500,000 engineers and technicians throughout the world and have built up a library of outstanding reference materials which focus on what engineers and technicians need in their work today in industry and mining. The value of these references is considerable and they are a great asset to industry professionals. These reference materials are included in the cost of the program.

We are Flexible With Your Commitments

We recognize that personal circumstances can make it difficult to complete the program in the time available. We will be flexible about the time you require to complete the program. You can "pause and restart" by joining a subsequent intake (a re-joining fee may apply). We will allow up to 3 years from your original start date to complete the program. You can withdraw from the program at any time and receive a Statement of Attainment for the topics you have completed. However, successful completion of all 4 units will earn you the EIT Vocational Graduate Certificate in Renewable Energy Technologies.

For more information or to enrol, please contact us at enquiries@eit.edu.au
Vocational Graduate certificate in renewable energy technologies

Entrance Requirements
This Engineering Institute of Technology Vocational Graduate Certificate is an accelerated, practical, work-oriented program. It is designed for engineers and technicians who have some background in the field. This includes those who have technical or 'trade' qualifications who want to move to the next career step, those with substantial relevant work experience who need to formalise and enhance their achievements, and those with higher level qualifications in a related field who wish to develop specialist knowledge. Practical work experience in related areas of engineering would help enormously. It would not be suitable for a student with no relevant work experience. We will review your enrolment application and may recommend pre-program studies if required.

What is the Difference Between an Advanced Diploma and a Vocational Graduate Certificate?
An advanced diploma focuses on the fundamentals of a subject. From a qualification level perspective, an advanced diploma is pitched at the level below a bachelor's degree (as per the Australian Qualifications Framework) in engineering in terms of understanding but with a very strong practical (or vocational) bias focussing on applying your knowledge to the job as soon as possible. You will not be covering deep theoretical concepts, but be oriented to the fundamental application of the theory. You will focus on fundamental principles and complex techniques in relation to varied and specific functions. The entry level ranges from an engineering higher certificate or diploma to a bachelor's degree in engineering. You would benefit from the EIT Advanced Diploma if you are mature age (>25 years old) with good working experience. This program is not recommended for school leavers or individuals with limited practical experience as you will not have sufficient knowledge in engineering or technology.

On the other hand, Vocational Graduate Certificate programs are designed for individuals who may already have an undergraduate qualification such as a Bachelor’s Degree or Advanced Diploma, but are seeking to broaden or specialise in specific areas of knowledge. These programs involve more depth and complexity in varied specialised contexts. A Graduate Certificate is typically equivalent in level and duration of the first 6 months of a full-time Master degree in Engineering. It requires considerably more thinking (or cognitive) ability and it is far more challenging than an Advanced Diploma, and also requires a higher weekly time commitment. You will need at least an Advanced Diploma or Bachelor of Engineering or equivalent or, if you are lacking this, considerable demonstrated experience in the subject area combined with evidence of continuing professional development.

Suitable Candidates and Pre-Requisites
Applications are considered on a case-by-case basis. Potential students include:

- Practising engineers or technologists with advanced knowledge, experience and education [such as an advanced diploma, or undergraduate degree]
- Practising engineers or technicians with demonstrated competence
- Engineers or technologists from another discipline [such as mechanical and chemical engineering] wanting to up-skill in this area

It would not be suitable for a student with no relevant work experience. We will review your enrolment application and may recommend pre-program studies if required.

For more information applications or pre-requisites, please contact our program advisors at enquiries@eit.edu.au

To enrol please contact enquiries@eit.edu.au
What Our Students Have to Say

QUOTES FROM PAST STUDENTS

What made you choose an EIT program(s)?

"Good reputation, had attended good full-time programs previously."  Worley Parsons

"Program facilitator CV, ...reputation, e-learning flexibility."  SMK, New Zealand

"Content tends to practical and targeted."  MIPAC, Australia

"Non-vendor specific training and lower program costs with online training capabilities."  Worley Parsons

"The content of the program and the way the program was broken down were the key factors."  GEA Group

"I can do those programs at my own free time which made it more convenient for me."  Iluka, Australia

"Content was applicable to my job and industry. Taught by industry experts not academics. E-room delivery mode. Accreditation in various nations."
Sanofi Pasteur, Australia

"Because it is specialist, and so many available programs."  Kacst, Saudi Arabia

"Covered all my criteria and gave me recognised qualifications on completion."
Netafim

"I took a previous program, IDC [associated organisation] is professional."  Cat Group

"I have done other programs with IDC [associated organisation] and was happy with the service provided."  GHD

"Had completed programs previously. Good content."  Woodside

"I understood from friends that it is good quality."  Rio Tinto

"Better choice of topic."  Rockwell RA

"Believed to be good quality based on previous training programs I have done in person."
BHP Billiton, South Africa

"It was referred to me by a colleague and I have attended seminars run by IDC before. The program that I am currently enrolled in also had all the outcomes I was looking for to further my career."
Rio Tinto

"The program content was relevant to my work environment and practical."
Alcoa

"I have done a few IDC programs in the past and found them to be very good and delivered by people with practical knowledge of the subjects."
Kalgold

"It provides good online program delivery including its quality support structures."
OneSteel

"Program interest and content."
ABB, Australia

"The fact the I could do it online and it was in line with furthering my knowledge for work."
CAED, Australia

"It ticked all the boxes ... quality, suitability, depth, length."
Powerco, New Zealand

"Better choice of topic."
Rockwell RA

"Program was visible and relevant."
Schneider Electric, UK

"Convenience."
Rio Tinto

"To be perfectly honest with the small amount of research on various programs I did the programs are generally the most relevant to my area of work. That's not to say they are perfect but they seem to be superior to others readily available in this part of the world."
WEL Networks, New Zealand

"Program content seems practical and applicable. I already have a BSc where the focus is on the theory."
BHP Billiton, South Africa

"Industry recognition and recommendation by colleagues."
Rio Tinto

"Seemed the most convenient option, and it was!"
CPIT, New Zealand

"Program content ease of study option."
Nestle, South Africa

"The content of the program made up my mind."
Transportadora de gas del Norte, Argentina

"Their programs are standard and program material as well as lecture are okay."
Shell, UK

"Its international recognition with body endorsing certification. Easy to attend lessons after work hours. Easy way of program payment."
Kinyara Sugar Ltd, Uganda

"The most practical and technical offerings by the most qualified lecturers for distance learning."
Encana Natural Gas

"On line references, price, and various time frames available to sit in on the class. Also, one more important item was being able to converse with the lecturer and class instead of working totally on my own."
Mitchell Technical Institute

"Program content. Accreditation of the training institution. Cost."
MODEC

"Offer the correct program, timing and affordable cost."
Folec, Brunei

"Possibly the most recognised online institution within my industry."
DRA, South Africa
Frequently Asked Questions

What are the advantages of studying online?
We know that many potential students have part or full-time employment as well as family commitments, so finding the time to study a classroom-based program is not always possible. Many students also have geographical, travel and time limitations and do not have an accessible institution or training provider. We have taken this into consideration and developed an affordable, flexible, online approach to training. This means that you can study from anywhere, with minimum downtime from work—but still have the necessary interactive learning experience. The software we use does not require very fast internet connection or a sophisticated computer. A basic connection and hardware are sufficient.

What are the fees?
The EIT provides distance education to students located almost anywhere in the world—it is one of the very few truly global training institutes. Program fees are paid in a currency that is determined by the student’s location.

To find out the fees for your location, contact us at enquiries@eit.edu.au.

What do I need?
An adequate Internet connection, speakers and a microphone. A headset is recommended. The necessary software and program materials are provided by us.

Doesn’t it get boring? How can an e-Learning program be interactive?
Boredom can be a real risk in any form of learning; however, we use an interactive approach to our e-Learning—with live sessions (instead of recordings) for most presentations. The webinar software allows everyone to interact and involves participants in group work, including hands-on exercises with simulation software and remote laboratories where possible. You can communicate with text messages, or live VoIP speech, or can even draw on the whiteboard during the sessions. This all helps to keep you motivated and interested.

What do live webinars involve?
These are live, interactive sessions over the Internet. You will join the lecturer and other participants from around the world in an online ‘virtual classroom’ where you are able to watch a presentation, and communicate with the lecturer and other students via audio, text messaging or drawing on the whiteboard. Each webinar is 2 hours in duration and the sessions may be scheduled at 2 or 3 different times during the presentation day, depending on class size. This allows you to select the session which is most convenient. most convenient.

What if I cannot join or I miss a live webinar?
Webinars are recorded and available to students upon request. One requirement of the program is that you join at least 70% of the live sessions. The live webinars offer the opportunity to interact with the lecturer and other participants from around the globe—an essential yet enjoyable part of the learning process.

Circumstances such as on-site work can make attendance difficult at times. These situations need to be clearly communicated with your e-learning coordinator. Feedback from the recordings may be required and assignment submission maintained.

When will the sessions take place? When will I receive a webinar schedule?
The webinar schedule is not put together until after registrations close. The reason for this is that the program is promoted globally and we often have participants from several time zones. When you enrol you will receive a questionnaire which will help us determine your availability. When all questionnaires are returned we create a schedule which will endeavour to meet everyone’s requirements.

Each webinar may run 2 or 3 times during each presentation day and we try our best to ensure that at least one session falls into your requested time frames. This is not always possible, however, due to the range of locations of both lecturers and students. If you are unable to attend the webinars scheduled, we do have some options available. Contact the EIT for more details.

Can I complete the program in less time?
No, our programs actually require ‘attendance’ and participation at the live webinars. The interaction which takes place is an important part of the learning process. Our experience has shown that the interactive classes work exceptionally well and students are far more likely to stay motivated, enjoy the program, and complete the program successfully. See also ‘What if I cannot join or I miss a live webinar?’ In addition, accelerating the program would be quite onerous for most students.

How much time do I need? How long is the program?
The program reading and assignments may consume anywhere from 8 to 10 hours per week. This will vary depending on the program subject matter and your existing knowledge.

The EIT does not use a traditional semester-based system, which means that you can complete the qualification faster without long breaks. The vocational graduate certificate program runs over approximately 6 months. We do break for about 4 weeks per year for traditional festive seasons.
Faculty

Your lecturers are drawn from experts in their field. They will work closely with you for the duration of the program. Please note: Lecturers are subject to change. Students will be notified in the event new lecturers join the faculty.

LECTURER  
Terry Cousins  BSc (Elec Eng)
Terry Cousins was educated at La Salle College in Discovery, and obtained a BSc Electrical Engineering degree from Wits in 1977. He has over 30 years of experience in electrical power and distribution systems in various South African industries including the mining and steel sectors, with national companies such as ISCOR and Chamber of Mines Research.
He is currently a director of TLC Engineering Solutions who develops a wide range of instrumentation and measurement systems for industry. He also presents numerous programs on electrical power distribution and power quality, both in South Africa and abroad.
Terry is a Senior Member of the SAIIE, and a Member of the IEEE (USA) and has also served on the South African National Standards committee for power quality instruments (SANS 1816). Terry is an accredited professional with the Green Building Council of Australia, and has BComm and MBl degrees from UNISA.

With his extensive experience electrical engineering, you will walk away from this program with valuable know-how that you can apply immediately to your work.

LECTURER  
Robert Holm  PhD, MIEEE
After completing his studies in Electrical and Electronic Engineering (MEng) and Applied Mathematics (BSc Hons) in 1997, Robert worked in industry as a Power Electronics Design Engineer. The design of electrical machines was his next pursuit, and he completed a PhD at TU Delft in the Netherlands on this subject. His thesis project was not only an academic study, but very practical: a high-speed Permanent-Magnet Synchronous Machine (PMSM) was built from his design and mounted as part of a flywheel in a passenger bus in Eindhoven, where it was in active service for several years.

Upon his return to South Africa, Robert worked in teaching and research at two universities: University of Johannesburg (UJ) and North-West University (NWU). While at NWU, he designed three more high-speed PMSMs for industrial and research applications. He was also involved with solar, wind and hydrogen energy systems. Next, Robert ventured into the gold mining industry by working for Gold Fields Mining Innovations as Electrical Engineer, where he completed novel electromechanical and power electronics designs for mining robots.
His experience in mining robotics then lead him to the South African Council for Scientific and Industrial Research (CSIR), where he currently works in field robotics software development. His current activities include power electronics, drives and power systems for robots, control systems, software engineering, mathematical modeling, computer vision, localization, mapping, sensors and systems engineering. Robert's previous career experience includes proficiency with transformers, switchgear, power systems and other high-power electrical engineering, electrical machines, electronics, embedded design, industrial power systems and renewable energy.
You will learn how to:

1. Define concepts related to renewable and sustainable energy
2. Evaluate the fundamental principles of solar irradiation
3. Evaluate wind characteristics and perform wind measurement
4. Detail the characteristics of Direct Current (DC) and perform simple voltage and current calculations using Ohm's and Kirchoff's Laws
5. Evaluate Alternating Current (AC) characteristics and distinguish between single-phase and three-phase power
6. Examine the significance of key power electronics components
7. Evaluate the fundamentals of power generation
8. Examine considerations with regard to layout, configuration, protection and safety of mini-grids
9. Evaluate requirements related to switchgear and cabling, their ratings, sizing and standards
10. Define basic transformer theory, detail transformer constructional features and assess transformer protection and safety requirements

Overview

In view of the depletion of coal reserves and public resistance to nuclear power, the move towards environmentally friendly power generation is inevitable. The use of renewable energy resources is also often the only viable solution for isolated individuals or communities. This unit deals with the nature of sunlight and wind as resources. It also covers common topics such as electricity basics, power electronic and common Balance-of-Plant (BOP) components such as distribution grids and transformers.
You will learn how to:

1. Describe the concepts, components and implementation of small hydro installations
2. Evaluate the fundamentals of hydraulic engineering
3. Evaluate the potential of water resources in relation to power generation
4. Design hydraulic structures for small hydro installations
5. Assess the need for turbines and other related equipment for small hydro installations
6. Describe the working of generators and other related equipment for small hydro installations
7. Evaluate low head and cold water considerations
8. Undertake site exploration and feasibility assessment
9. Evaluate the fundamentals of geothermal and biomass technologies
10. Examine the basics of wave and tidal power systems, including the various capture and take off systems
11. Explain the concepts related to biofuels and related fuel cell technologies
12. Explain the concepts and methods involved in generating osmotic and wind-diesel power

Overview

Although sunlight and wind-powered renewable energy installations are very common, some parts of the world enjoy an abundance of all-year-round water flow. In this case hydro-electric power generation might be considered. The bulk of this chapter deals with small hydro, but other sources of energy such as geothermal power, biomass, wave and tide power, biofuel, hydrogen, osmotic power and hybrid wind-diesel systems are also covered.
You will learn how to:

1. Evaluate the fundamental concepts of photovoltaic power generation and detail the economic and cost considerations of PV systems.
2. Assess the behaviour of solar cells.
3. Assess the design criteria for photovoltaic cells and evaluate their properties.
4. Evaluate the basics of PV module operation, fabrication and cell interconnection.
5. Design a suitable battery bank for a given PV system.
6. Assess the selection criteria of chargers, for a given battery bank.
7. Select an appropriate inverter for a given grid-interactive PV system.
8. Evaluate the electrical design considerations of a PV panel array for delivering a specific output.
9. Evaluate the mechanical design considerations of a PV panel array for delivering a specific output.
10. Detail the installation, commissioning and maintenance considerations for a PV system.

Overview

Sunlight is one of the most abundant energy resources on our planet. This unit deals with the theory and practice of PV (Photovoltaic) power generation for domestic, RV (Recreational Vehicle) and marine applications. It covers standalone and grid-connected systems, as well as the balance-of-plant equipment associated with PV systems.

THE PROGRAM

Topic 1: PV Technology Overview
- PV power generation concept
- Standalone, grid-interactive and hybrid systems
- Load compatibility issues
- Power quality issues
- Battery health monitoring
- Line disturbances
- Radio frequency interference
- Generator compatibility

Topic 2: Economics of PV Systems
- Total installation costs
- Electricity price
- Feed-in tariffs
- Energy payback time (EPBT)
- Government incentives

Topic 3: Behavior of Solar Cells
- Light absorption
- Recombination
- P-N junctions
- I-V curves
- Effect of light
- Spectral response
- Effect of temperature and parasitic resistance

Topic 4: Cell Design and Properties
- Efficiencies
- Optical losses
- Recombination losses
- Top contact design
- Lab cells vs. industry requirements
- Laser grooved vs. buried contact solar cells

Topic 5: Module Fabrication and PV Cell Interconnection
- Module and circuit design
- Identical vs. non-identical cells
- Non-identical modules
- Hot-spot heating
- Module structure
- Environmental protection
- Thermal considerations
- Electrical and mechanical considerations

Topic 6: Batteries
- Deep cycle (traction) vs. SLI batteries
- Battery ratings
- Gel, AGM, VRLA and wet cell batteries
- Series/parallel connection and safety precautions
- Battery location and enclosures
- Battery protection equipment
- Lightning issues
- Installation

Topic 7: Chargers
- Multi-stage charging
- PWM chargers
- Maximum Power Point Tracking (MPPT)
- Temperature sensing
- Design calculations
- Auxiliary battery charging

Topic 8: Inverters
- Square wave, modified square and true sine wave inverters
- Solid-state vs. rotary inverters
- Typical input and output voltages
- Inverter stacking
- Islanding
- Cabling and installation
- Grid tie considerations

Topic 9: Electrical System Design
- Assessment of electricity demand
- Assessment of sunlight availability
- PV array design
- Battery bank design
- Standalone configuration
- Grid-interactive configuration with battery backup
- Applicable standards, design guidelines and design software

Topic 10: Mechanical System Design
- Basic requirements for PV array mounting
- Mounting options
- Trackers and RV mounting systems
- Materials for mounting systems
- Control and battery cubicles

Topic 11: Practical PV System Implementation
- Basic principles to follow
- Installation labor effort
- Cost reduction incentives
- Estimating electricity savings
- Supplier and system qualifications
- Overall project coordination
- Project phases
- Installation, commissioning and maintenance

DURATION: 6 WEEKS
You will learn how to:

1. Evaluate the fundamentals of wind turbine technology and the economics involved
2. Assess considerations in regard to the available wind energy, turbine location and expected generator output for a given site
3. Describe the operation of synchronous and asynchronous generators for wind systems
4. Describe the transmission system in wind turbines and assess issues related to grid connection and power quality
5. Examine the theory associated with wind turbine blade design and power output
6. Evaluate SCADA and simulation concepts for wind turbines
7. Evaluate all aspects related to wind turbine control
8. Assess the design criteria for towers and turbines
9. Examine issues related to wind turbine system installation and maintenance, including environmental impact.
10. Examine all aspects related to the implementation of practical wind turbine systems
11. Evaluate the design considerations for wind farms
12. Design smaller wind turbine systems for home, marine and RV applications

Overview

Wind is one of the most abundant renewable energy resources on the planet. This unit addresses the theory, construction and deployment of Wind Turbine generators. Although the emphasis is on large capacity Wind Turbines, the design and installation of smaller devices for home and marine use is also be covered.
**Unit 4: Wind Power Generation continued**

**THE PROGRAM cont.**

**Topic 10: Practical Wind Turbine System Implementation**
- Obtaining and analysing GIS wind data
- Site selection and local wind data analysis
- Confirming amount of power that can be generated annually
- Selection of turbine, generator and auxiliary equipment
- Tower placement, height and construction
- Overall system design and component sourcing
- Economic analysis and specifications
- Selection of contractor

**Topic 11: Wind Farm Design**
- Turbine placement
- Site preparation
- Electrical network
- Selection of sizes; low voltage equipment
- Selection of sizes, distribution voltage equipment
- Electrical losses
- Protective relays
- Wind farm costs

**Topic 12: Smaller Systems for Home, Marine and RV Applications**
- Generator types
- Power control
- Electrical and mechanical shutdown
- Power take-off
- Battery bank management
- Regulation and grid connection
- Rectification
- Grid connection