

[Download Webinar Recording Here](#)



Studying for the Jobs of the Future

Biomedical Engineering

PRESENTED BY

Dr Kerry Newlin | Lecturer

Mr Bruce Morrison | Lecturer

Sharon Bowler | Learning Support Officer

Agenda

1 Welcome

2 About EIT

3 Biomedical Engineering, the Industry & Job Trends

4 EIT Programs, Unique Delivery Methodology & Student Support

5 Q & A

We are dedicated to ensuring that you receive a world-class education and gain skills that you can immediately implement in the workforce.



World-Class Australia Accredited Education

Our vocational programs and higher education degrees are registered and accredited by the Australian Government. We have programs that are also recognized under three international engineering accords.



Engineering Specialists

EIT is one of the only institutes in the world specializing in Engineering. We deliver professional certificates, diplomas, advanced diplomas, undergraduate and graduate certificates, bachelor's and master's degrees, and a Doctor of Engineering.



Industry Experienced Lecturers

Our lecturers are highly experienced engineers and subject specialists with applied knowledge. The technologies employed by EIT, both online and on-campus, enable us to source our lecturers from a large, global pool of expertise.



Industry Oriented Programs

Our programs are designed by industry experts, ensuring you graduate with cutting-edge skills that are valued by employers. Our program content remains current with rapidly changing technology and industry developments.



Unique Delivery Model

We deliver our programs via a unique methodology that makes use of live and interactive webinars, an international pool of expert lecturers, dedicated learning support officers, and state-of-the-art technologies such as hands-on workshops, remote laboratories, and simulation software.



Dr Kerry Newlin

EIT Biomedical Engineering Lecturer

Dr Kerry Newlin is an enthusiastic lecturer and assessor working with EIT since 2016. Kerry is a nurse practitioner by background with a Doctor of Science degree in healthcare reform and global medicine. Her career spans the globe from her native United States to Central America, Africa, Timor Leste and now Australia. Kerry has spent much of her career instructing and mentoring people in the healthcare profession and considers it a privilege to be able to share her knowledge with students in the field of biomedical engineering.



Mr Bruce Morrison

EIT Biomedical Engineering Lecturer

Mr Bruce Morrison is an online lecturer with EIT working to develop the next generations of biomedical engineering technicians within the Advanced Diploma in Biomedical Engineering. Bruce has over forty years' experience in clinical engineering as both a manager and an engineer. He has worked extensively in public hospitals in NSW and in developing countries with long periods spent in Papua New Guinea and Timor-Leste, and several shorter periods in Pacific Island Countries. Bruce is advising NSW Health Infrastructure on major medical equipment being planned and installed in hospitals and healthcare facilities across NSW.

What is Biomedical Engineering?

The application of engineering principles and design concepts to medicine and biology for healthcare purposes, i.e. monitoring, diagnosis & treatment

In other words ...

Applying principles of physical sciences to the life sciences



Popularity of Biomedical Engineering

- Biomedical engineering is one of the fastest growing fields of engineering – gender balance is heading for 50/50
- Many articles on Biomedical Engineering in Engineers Australia’s “create” journal
- Biomedical champions emerging in recent times,
 - Dr Karl
 - Stefan Mauger
 - Jordan Nguyen
 - Cochlear
 - Resmed
- Covid-19 influence



<https://leverageedu.com/blog/biomedical-engineering/>

Biomedical Engineering is a broad discipline including:

- Clinical Engineering
- Rehabilitation Engineering
- Biomechanics
- Biomaterials and Tissue Engineering
- Biomechanics and Computational Bioengineering
- Biomedical Images and Signal Processing
- Biosensors
- Medical Devices and Instrumentation
- Biomedical Robotics and Surgical Technology
- Neuroengineering

Biomedical Engineering Graduates with an Advanced Diploma will most likely work in:

Branch of BME	Likely Work Scenario
Clinical Engineering	Hospital based – repair & maintenance, tendering, purchasing, commissioning medical equipment
Rehabilitation Engineering	Specialised units within health systems – assistive technology, customised seating, one-off designs
Biomedical Images and Signal Processing	Medical imaging companies
Medical Devices and Instrumentation	Hospital based - repair & maintenance Equipment manufacturers or vendors – design, product support, field service
Biomedical Robotics and Surgical Technology	Hospital based possibly in specialised units Product support for these systems

CLINICAL ENGINEERING

- Graduates with an Advanced Diploma of Biomedical Engineering may get a job in Clinical Engineering as a
 - Biomedical Engineering Technician/Technologist,
 - Medical Equipment Technician, or
 - Biomedical Equipment Technician.
- Different job titles may be found around the world. Often the title of **BMET** is used.



BMETs

- BMETs work in a variety of environments
 - Many are employed by hospitals,
 - Others work in industry with medical equipment suppliers,
 - BMETs may also be self-employed and contract their services to various employers.

BMETs

- Some BMETs are
 - Generalists who work with many different types of devices,
 - others specialise in areas such as in imaging, surgery or laboratories.

Biomedical Engineering Technologists (Technicians)

- Biomedical Engineering Technologists work in large health care facilities providing comprehensive service and support of medical devices and equipment.
- Activities include inspection, installation, repair, and preventive maintenance of medical devices and complex medical systems.
- They also provide advice and training on the safe and effective use of medical devices and systems.



Source from The Canadian Medical and Biological Engineering Society

BMETs Contribution in Healthcare

- BMETs contribute to improved patient outcomes in health care settings by inspecting, repairing, calibrating and sometimes designing medical equipment that becomes more advanced and complex all the time.
- BMETs keep biomedical equipment in working order by performing tests, following preventive maintenance guides, repairing and troubleshooting break downs, evaluating service contracts, ordering special services if necessary, and maintaining inventories.
- BMETs use their technological knowledge to prevent electrical and mechanical faults that could lead clinicians to the wrong diagnosis or harm patients.
- BMETs set up preventative maintenance programs to keep life-saving equipment running.



<https://www.thebalancecareers.com/68a-biomedical-equipment-specialist-3346065>

- International Federation for Medical & Biological Engineering (IFMBE)
- IFMBE Clinical Engineering Division
- Institute of Physics and Engineering in Medicine (IPEM)
- Institute of Electrical and Electronics Engineers (IEEE)
- IEEE Engineering in Medicine and Biology Society (EMBS)
- American College of Clinical Engineers (ACCE)
- Canadian Medical and Biological Engineering Society
- Association for the Advancement of Medical Instrumentation (AAMI)
- › European Society for Biomaterials / Biomechanics (ESB)
- › Biomedical Engineering Society (BMES)

- **Engineers Australia**
 - Biomedical Engineering College
 - National Committee for Clinical Engineering
 - National Committee for Rehabilitation Engineering
- **Societies for Medical & Biological Engineering (SMBE)**
 - NSW
 - Victoria / Tasmania
 - South Australia / Northern Territory
 - Western Australia



<https://portal.engineersaustralia.org.au/college/122?page=3>

- 24 x 7 Magazine
 - <http://www.24x7mag.com/>
- Biomedical Engineering Online
 - <https://biomedical-engineering-online.biomedcentral.com/>
- SMBE (NSW)
 - www.smbensw.org.au
- Australian BME Website
 - <http://bme.asn.au/bmehomepage/index.html>
- Engineers Australia's Biomedical Engineering College
 - <http://www.engineersaustralia.org.au/biomedical-college>
- BME List server – bmelist@bme.asn.au
- IEEE - <http://spectrum.ieee.org/biomedical>

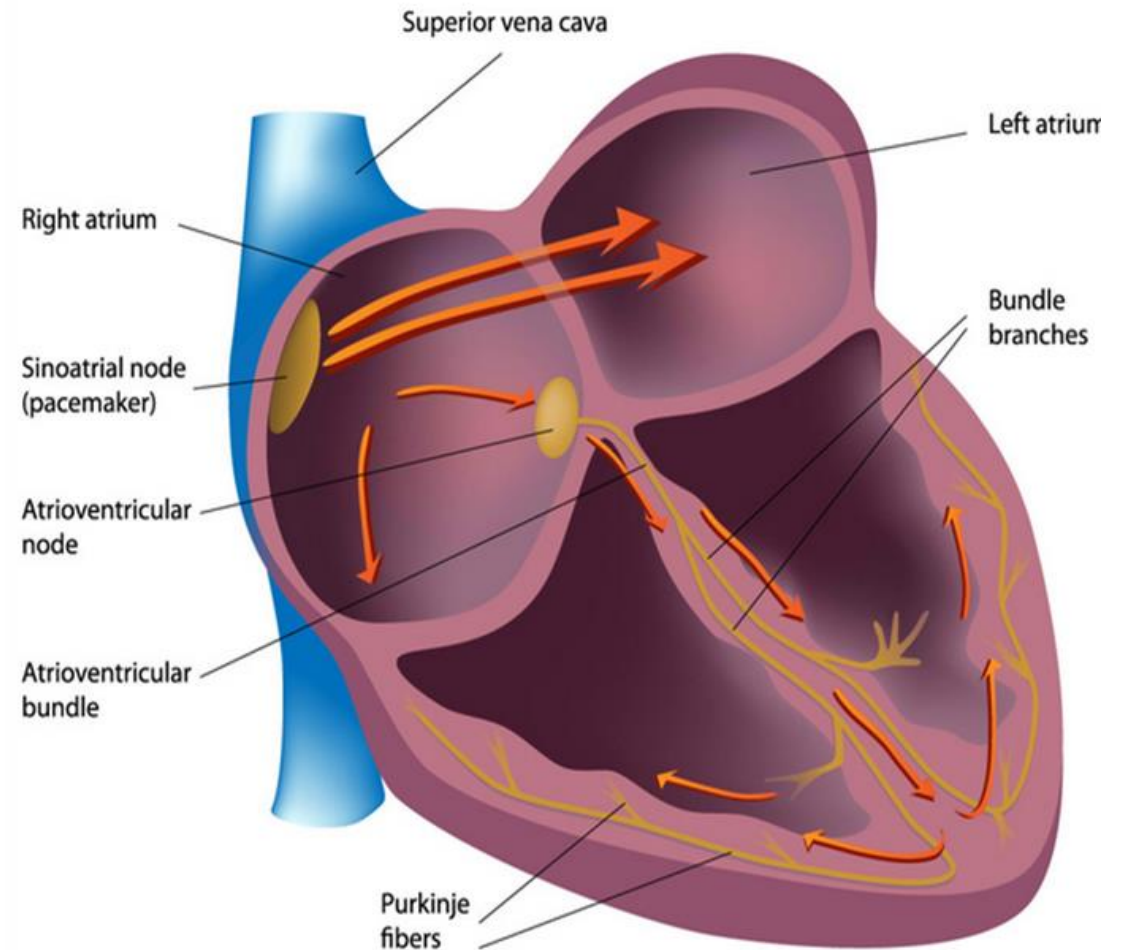
“Anyone who stops learning is old, whether at twenty or eighty. Anyone who keeps learning stays young.”

— Henry Ford

(Ford Motor Company founder and chief developer of the assembly line technique of mass production)

Learning about the human body structure (anatomy) and the way it works (physiology) prepares the way for understanding medical equipment.

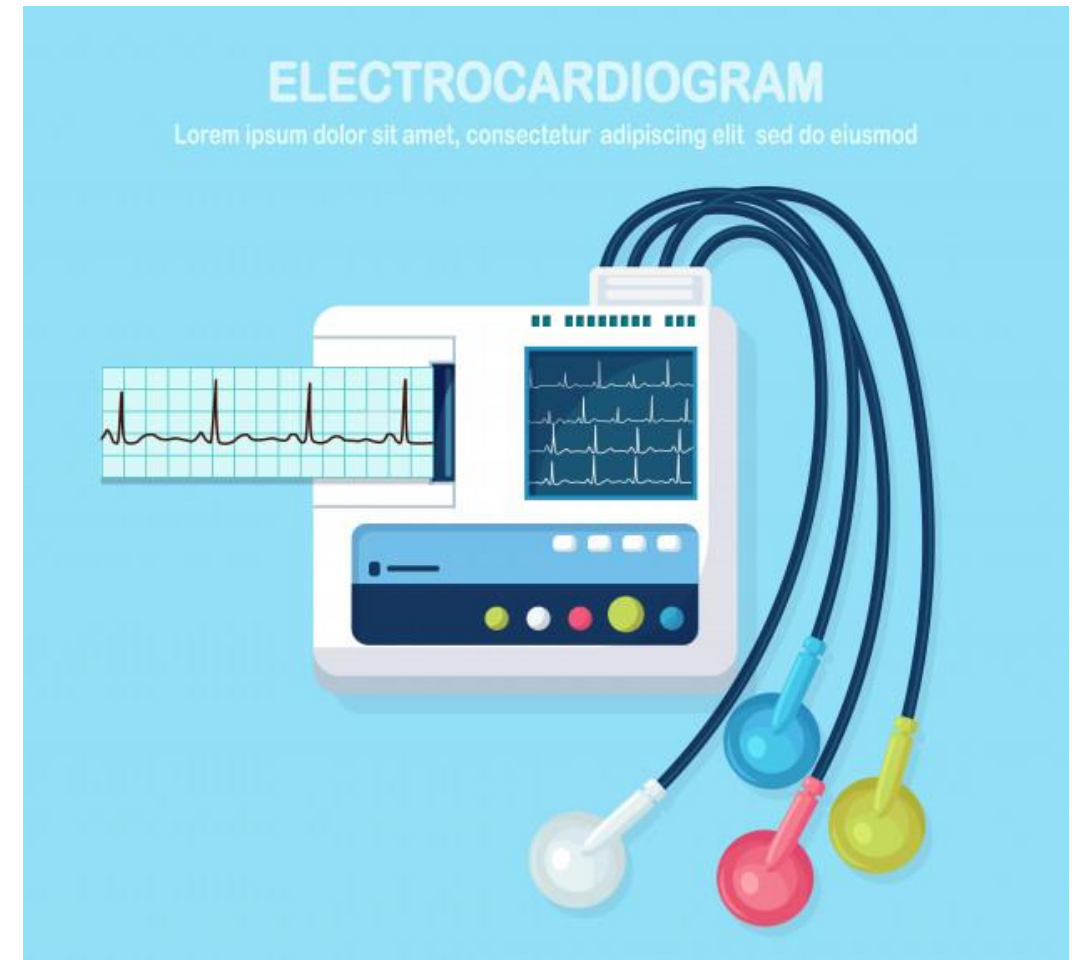
The Cardiac Conduction System



Defibrillators

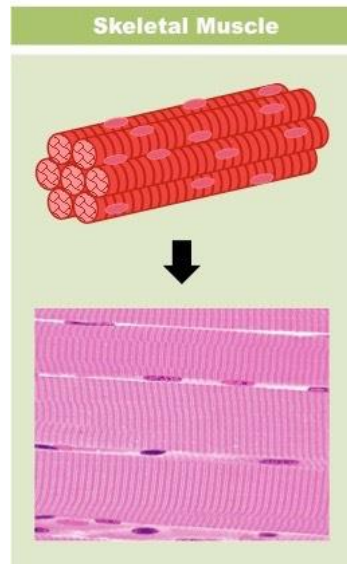


Electrocardiogram (ECG)



Skeletal Muscles

- Skeletal muscles
- produces voluntary gross and fine movements
- protects organs
- muscle fibres are organized into bundles supplied by blood vessels and innervated by motor neurons



Exoskeletons – e.g., ReWalk



- Connectivity – medical devices to the eMR
- Interoperability of medical devices
- Wireless devices
- Wearable sensors
- Minimally invasive procedures
- Closed loop devices
- Robotic limbs
- Exoskeletons
- Implants
- Assistive technology
- Relaxation of some regulations
- Outsourcing/Managed Equipment Services
- Integration of BME & ICT
- 3-D printing
- Apps, apps, apps
- New entries into the market, e.g.
 - Apple, Microsoft, Google
 - Samsung, Telstra

- › Robotics
- › 3D printing



<https://www.iotworldtoday.com/2020/05/31/will-covid-19-accelerate-robotics-in-the-supply-chain/>

Robot performs first dental surgery without human assistance: Sep 26, 2017



Da Vinci



DLR MicroSurge





Bioengineers proved the feasibility of printing living tissue structures on a specialized 3D printer. Photo: Wake Forest Institute for Regenerative Medicine

The bio-ink uses stem cells to grow human ear cartilage using the 3D-printing technology, to create a "living ear" for use in reconstructive surgery.

Helpful Engineering is an international social impact community dedicated to solving global challenges through open source technology:

<https://helpfulengineering.org/>

Engineering new forms of vaccine delivery:

<https://createdigital.org.au/engineering-new-forms-of-vaccine-delivery/>



The advanced diploma in biomedical engineering instills a wide range of skills that may be applied to develop software, instrumentation, image processing, and mathematical models for simulation. Biomedical engineers are employed in hospitals, clinical laboratories, medical equipment manufacturing companies, medical equipment service and maintenance companies, pharmaceutical manufacturing companies, assistive technology, and rehabilitation engineering manufacturing companies and research centers.



DURATION

18 Months



STUDY MODE

Online



LOCATION

Online



INTAKES

2 Aug 2021

This advanced diploma 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 formalize and enhance their achievements, and those with higher-level qualifications in a related field who wish to develop specialist knowledge.

This means you are required to have either a trade certificate (Certificate 3) or equivalent, or at least three years of work experience within a relevant job and industry to gain entrance. You may also have a higher level of qualification in a corresponding field and be looking to gain further practical 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 application and may recommend pre-program studies if required.

Time Commitment & Duration

You are expected to spend approximately 10-15 hours per week learning the program material and completing assessments. This includes attending weekly webinars that run for about 90 minutes to facilitate class discussion and allow you to ask questions. This program is run online on an intensive part-time basis and has been designed to fit around full-time work. It will take 18 months to complete.

We understand that sometimes work commitments and personal circumstances can get in the way of your studies, so if at any point you feel that you are struggling with the pace of the course or finding a particular module challenging, you are encouraged to contact your designated learning support officer for assistance.

The program is composed of 18 modules. These modules cover a range of aspects to provide you with maximum practical coverage in the field of biomedical engineering.

Module Number/Module Name/Duration

1	Basic Electrical Engineering	4 Weeks
2	Technical and Specification Writing	4 Weeks
3	Fundamentals of Professional Engineering	4 Weeks
4	Engineering Drawings	4 Weeks
5	Printed Circuit Board Design	4 Weeks
6	Anatomy and Physiology for Engineering	4 Weeks
7	Power Electronics and Power Supplies	4 Weeks
8	Shielding, EMC/EMI, Noise Reduction and Grounding/Earthing	4 Weeks
9	Troubleshooting Electronic Components and Circuits	4 Weeks
10	Biomedical Instrumentation	4 Weeks
11	Biomedical Signal Processing	4 Weeks
12	C++ Programming	4 Weeks
13	Embedded Microcontrollers	4 Weeks
14	Biomedical Modelling and Simulation	4 Weeks
15	Biomedical Equipment and Engineering Practices	4 Weeks
16	Biomedical Image Processing	4 Weeks
17	Biomechanics and Assistive Technology	4 Weeks
18	Medical Informatics and Telemedicine	4 Weeks

Doctor of Engineering



Successful completion of the course will equip the graduate to take a leading role in the development of research investigations into current and future problems of industrial and community concern within their area of expertise. The program will give candidates the skills and experience to act as independent researchers or group leaders for investigations of practical importance in their professional area over their professional life.



DURATION
36 Months



STUDY MODE
Online



LOCATION
Online



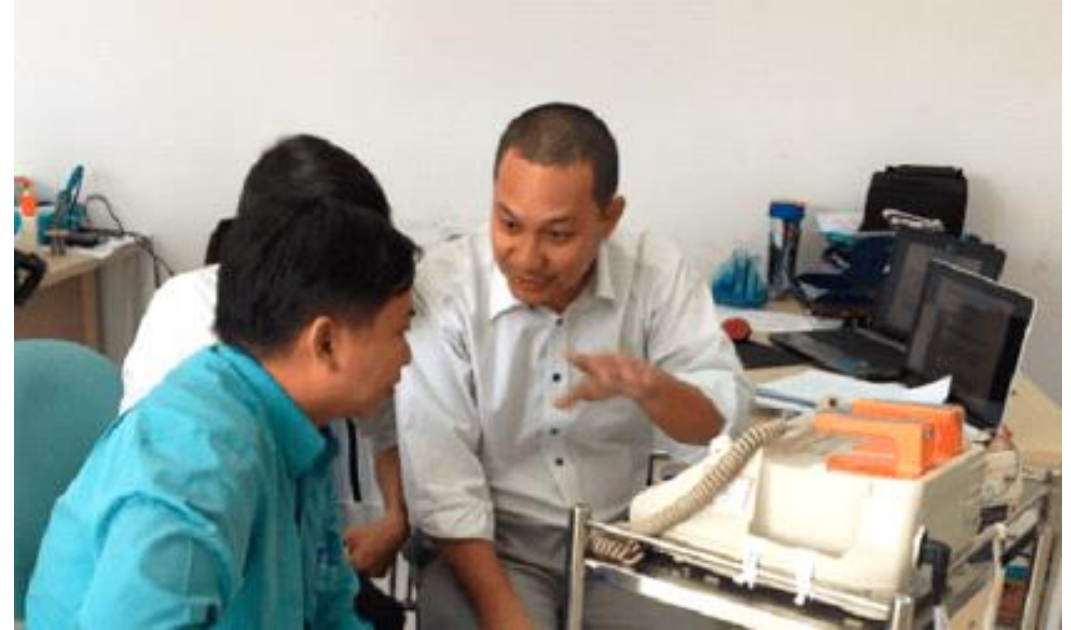
INTAKES
28 June 2021

Armando D. Ngojo

After many years of working in the industry, Armando felt that he wanted to take the next step in advancing his career. He went on a search for a biomedical engineering course that would allow him to upskill even further, and that is when he discovered EIT. He noticed our Advanced Diploma in Biomedical Engineering was exactly what he needed.

“I took the course because although I was already working in the healthcare industry for the last 15 years, I lacked a proper school qualification. This is due to my home country; in the Philippines, no university was hosting a real course in Biomedical Engineering in my time.”

“Professionally, I got a promotion within my company and was given more responsibilities, and of course, better remuneration. My newly acquired qualification also opened up a lot of opportunities for me. Being an EIT graduate was a power credential in my portfolio.”



Learn more: https://www.eit.edu.au/student_stories/armando-d-ngojo/

Ryan Smith

“I chose biomedical engineering to compliment my background in electronics and further understand how technology interplays with anatomy and physiology. The course impacted the way I interact with clinical stuff, empowering me to confidently understand the medical lexicon. I gained a higher appreciation for the devices I work with and their impact on people’s lives.”

“I have an elevated level of confidence in my day-to-day work life, thanks to my qualifications. It’s opened up various avenues for my career and inspired me to continue studying in the biomedical sciences field.”

Ryan says that employers have reacted positively to his qualification from EIT. He says it has increased his visibility in the biomedical field and has opened various avenues for his career progression. EIT’s novel online training methodology allows students to progress in their careers while also gaining their qualifications.



Learn more: https://www.eit.edu.au/student_stories/ryan-smith/



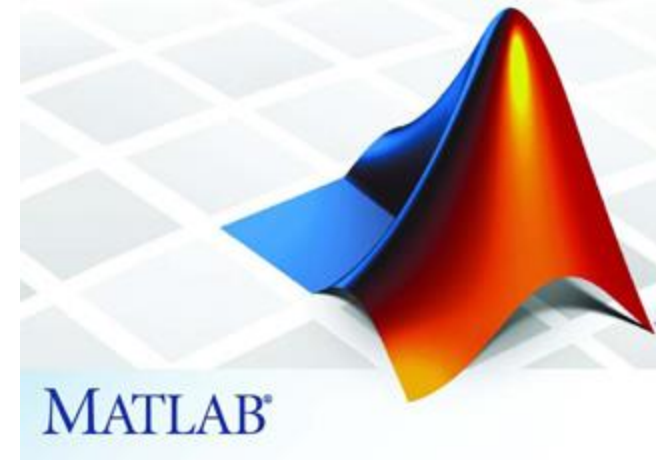
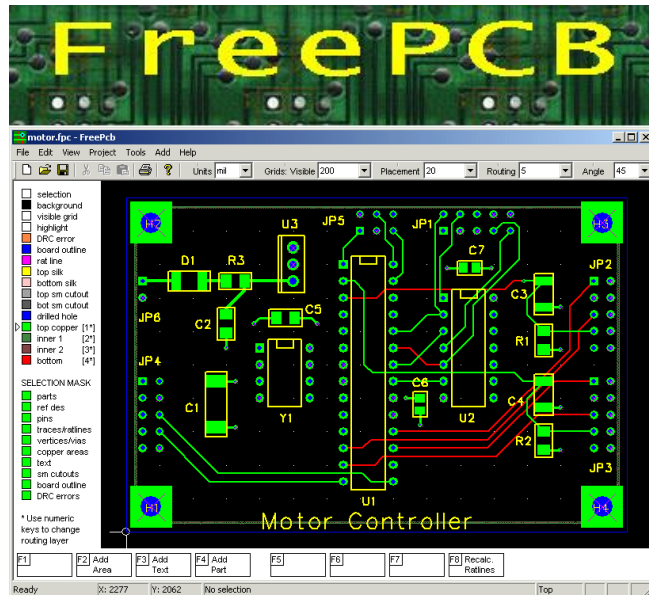
Sharon Bowler | VET LSO
Based in Perth, Western Australia

- › Learning Support Officers (LSOs) are in addition to the academic support (instructors/lecturers).
- › LSOs guide the students from the onboarding process through to graduation.
- › LSOs are the support, encouragement and go-to person for any question relating to a student's studies.
- › One LSO is dedicated to the student for the duration of either a professional certificate or VET program.
- › EIT has LSOs based in: *South Africa, Switzerland, Zimbabwe, New Zealand and Australia.*



- › In the majority of our programs students complete practical exercises using a combination of remote and virtual laboratories (including simulation software).
- › In these remote and virtual laboratories students can control physical equipment and sensors equivalent to the traditional university engineering lab.
- › This means that even though you are studying online, you are not missing out on your hands-on, practical experience. For the on-campus students, workshops and work integrated learning via an internship is incorporated into the student journey.
- › Through these hands-on exercises using simulation software, remote laboratories, practical based assignments and interactive discussion groups, students are able to grasp new knowledge and apply it successfully to the real world.
- › **Each hosted engineering software and hardware can be controlled in real time; it's as simple as logging in and selecting an available lab and timeslot!**

Software Used in Advanced Diploma of Biomedical Engineering



Weka

- **Power System Stability in Microgrids**

<https://www.eit.edu.au/event/power-system-stability-in-microgrids/>

Join Dr. Imtiaz Madni, an Electrical System Engineer working within the Energy industry, to learn more about Power System Stability in Microgrids.

Date: 3rd of June 2021

Time: 4:30 pm - 5:30 pm Australian Western Standard Time

- **What if Leonardo da Vinci used CAD Software?**

<https://www.eit.edu.au/event/what-if-leonardo-da-vinci-used-cad-software/>

Join Dr. Arti Siddhpura, one of EIT's Mechanical Engineering Lecturers, to find out what would have happened if Leonardo da Vinci used CAD Software.

Date: 17th of June 2021

Time: 3:00 pm - 4:00 pm Australian Western Standard Time

Q&A





Engineering Institute of Technology.



Website

www.eit.edu.au



Head Office

1031 Wellington Street West Perth
Perth, WA 6005



Phone

Inside Australia: 1300 138 522
Outside Australia: +61 8 9321 1702



Email

Caroline.mackay@eit.edu.au

