



LA TROBE
College Australia

Diploma of Engineering (LDEN)

Course Outline

Version: 1

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Diploma of Engineering (LDEN)

1. Summary Information

| | |
|------------------------------------|--|
| Program Title | Diploma of Engineering (LDEN) |
| Home campus: | Bundoora |
| Award “ownership” | La Trobe College Australia |
| Year and trimester of introduction | Trimester 1 2015 |
| Total Credit Points | 120 Credit points |
| Mode of Delivery | Face to Face on Campus |
| Intake Trimesters | Trimester 1 and 2 |
| Duration | 42 weeks over three trimesters |
| Articulation options | La Trobe University: Bachelor of Engineering Honours (Industrial) Bachelor of Civil Engineering (Honours) Bachelor of Science (Maths major) |

2. Course Overview

The Diploma of Engineering provides an introduction to the field of engineering and a pathway to engineering degrees offered at La Trobe University.

The course is practical and hands-on. Depending on your chosen degree, you will develop skills in a number of core areas like biomedical engineering, communication engineering, electronic and electrical systems, sustainability in energy production, automotive engineering, the application of technology in modern medicine, project management of large-scale projects, sustainable infrastructure, water resources, civil construction, surveying and computer-aided design.

3. Course learning outcomes

- Use engineering principles and technical knowledge together with current tools and techniques to solve engineering problems.
- Apply math tools and methods to find the right answers for engineering problems.
- Use critical thinking to develop appropriate engineering solutions.
- Conduct reviews and suggest ways to improve plans and processes.
- Consider how society, culture, and the environment are affected by engineering solutions; follow the professional rules and ethics set by Engineers Australia.
- Communicate clearly, whether you're explaining to experts or non-experts.
- Work well independently or in a team to achieve common goals.

4. Level of Award

This is a Higher Education, Australian Qualifications Framework Level AQF 5.

5. Program Duration

The program can be completed in three trimesters.

6. Entry requirements

(a) Academic Entry Requirements:

- Completion of Year 12 with satisfactory ATAR score or completion of Foundation Studies program.

(b) Minimum age requirement:

- 17 years

(c) English language requirement:

- IELTS Academic overall score of 6.0 (no band less than 5.5)

(d) Pre-requisite / assumed knowledge:

- Units 3 and 4: satisfactory completion of any English and satisfactory completion in one of Maths: Mathematical Methods or Maths: Specialist Mathematics.

7. Program approval

La Trobe College Australia Academic Board and TEQSA.

8. Program Structure

| Trimester | Unit Code | Name of Unit | Core / Elective | Credit points |
|-----------|-----------|---|-----------------|---------------|
| 1 | LTM1AIM | Academic Integrity Module | Required | 0 |
| 1 | EPHY1SCA | Principles of Physics A | Core | 15 |
| 1 | EMAT1NLA | Number Systems and Linear Algebra | Core | 15 |
| 2 | EMAT1CDE | Calculus and Differential Equations | Core | 15 |
| 2 | ECSE1CES | Programming for Engineers and Scientists | Core | 15 |
| 2 | EEMS1MS | Mechanics of Solids | Core | 15 |
| 3 | EEMS1CAD | Computer Aided Design | Core | 15 |
| 3 | EELE1IEL | Introduction to Electrical and Electronic Engineering | Core | 15 |
| 3 | EEMS1EDP | Engineering Design and Problem Solving | Core | 15 |

a) Recommended Study Plan:

All diploma students enrol into an online, zero credit point module, LTM1AIM Academic Integrity Module. This module is compulsory, and in addition to your eight required subjects. All students must complete this module in their first trimester.

Recommended study plan to complete your diploma in three trimesters:

| | | | | |
|------------------------|---|---|---|---------------------------------------|
| Year 1 (Diploma) | LTM1AIM Academic Integrity Module | | | |
| | Compulsory online module that must be completed in the first trimester. | | | |
| | First Trimester | EPHY1SCA Principles of Physics A | EMAT1NLA Number Systems and Linear Algebra | |
| | Second Trimester | EMAT1CDE Calculus and Differential Equations | ECSE1CES Programming for Engineers and Scientists | EEMS1MS Mechanics of Solids |
| Third Trimester | EEMS1CAD Engineering CAD | ELE1IEL Introduction to Electrical and Electronic Engineering | EEMS1EDP Engineering Design and Problem Solving | |

a) Overview of Subjects:

EPHY1SCA Principles of Physics A

On completion of this subject, students will be able to solve problems in classical physics (mechanics, thermodynamics, and waves) which provide the basis for further study in physics, engineering, or another science. They will be able to use the essential apparatus in a physics laboratory to take and analyse measurements and understand the vocabulary and concepts of classical physics. The topics covered include linear and rotational kinematics and dynamics, thermodynamics, and simple harmonic motion. Students will conduct four experimental investigations related to these topics.

Subject Learning Outcomes

1. Diagrammatically represent, analyse and/or solve conceptual and mathematical problems related to mechanics, thermodynamics, waves, and material properties.
2. Use accurate terminology and appropriate SI units to describe physical phenomena related to mechanics, thermodynamics, waves and material properties.
3. Perform experiments related to mechanics, thermodynamics and waves using standard physics laboratory techniques, equipment and software and assess the data to check for inappropriate, irrelevant or spurious results.
4. Explain and interpret laboratory results in the context of mechanics, thermodynamics, waves, and material properties.
5. Collaborate in pairs to complete laboratory experiments and submit reports.

Class requirements

Timetabled hours per week (8 hours)

- One 2-hour lecture per week
- One 4-hour tutorial per week
- One 2-hour lab/workshop per week

Assessments

| Assessment piece | Weighting | Subject Learning Outcomes |
|-----------------------|-----------|---------------------------|
| Online Quizzes | 10% | 1, 2 |
| Lab report / exercise | 20% | 2, 3, 4, 5 |
| Mid trimester test | 15% | 1, 2 |
| Final examinations | 55% | 1-5 |

EMAT1NLA Number Systems and Linear Algebra

In this subject, students learn and apply mathematical concepts and develop skills that provide a foundation for all studies in mathematical sciences. Emphasis is placed on a deeper understanding of fundamental mathematical concepts and the way they connect to each other. Students review and extend their knowledge of algebra, functions, sets and number systems with significant coverage of complex numbers adding to their repertoire. After consideration of sequences and series, students proceed to a module on Logic and Proof. Students also explore a coherent treatment of vectors and vector geometry that includes matrices and solutions of systems of linear equations via the Gauss-Jordan algorithm, and brief treatment of eigenvalues and eigenvectors. An emphasis is placed on students improving their understanding of mathematical concepts and results so they can be appropriately applied, and development of their reasoning skills and ability to clearly present written arguments.

Subject Learning Outcomes

1. Use key mathematic properties to solve algebraic and numerical problems and sketch solutions without a graphing calculator.
2. Solve algebraic problems involving complex numbers.
3. Apply vector techniques and matrix operations to find and describe objects in three-dimensional space.
4. Communicate mathematical processes and outcomes effectively.
5. Present mathematical thinking meaningfully and succinctly using words and mathematical notation.

Class requirements

Timetabled hours per week (6 hours)

- One 3-hour lecture per week
- One 3-hour tutorial per week

Assessments

| Assessment piece | Weighting | Subject Learning Outcomes |
|-------------------|-----------|---------------------------|
| Tests | 45% | 1-5 |
| Quizzes | 15% | 1, 4, 5 |
| Final Examination | 40% | 1-5 |

EMAT1CDE Calculus and Differential Equations

In this subject, students learn and apply mathematical concepts and develop skills that provide a foundation for all studies requiring knowledge of calculus. Students refine and extend their knowledge of the concepts and techniques of differentiation and integration and move on to the notions of differential equations and modelling the real world. Techniques for solving first order separable and first and second order linear differential equations are covered together with some approximation techniques. An active learning approach is used engaging students in solving mathematical problems and exploring the detail of mathematical concepts so they can be appropriately applied. Students will develop reasoning skills and the ability to clearly present their written arguments. They are strongly encouraged to practice verbal communication of ideas by working in small groups.

Subject Learning Outcomes

1. Apply basic techniques of differentiation and integration in calculations.
2. Use derivative functions to solve common problems associated with tangents and rates of change in science and engineering contexts.
3. Draw conclusions from mathematical models representing real-world phenomena based on hand and computer calculations.
4. Present mathematical thinking meaningfully and succinctly using words and mathematical notation.
5. Use modelling techniques and computer packages to model changes in applied areas.

Class requirements

Timetabled hours per week (6 hours)

- One 3-hour lecture per week
- One 3-hour tutorial per week

Assessments

| Assessment piece | Weighting | Subject Learning Outcomes |
|-------------------|-----------|---------------------------|
| Progress Tests | 35% | 1-5 |
| Final Examination | 65% | 1-5 |

ECSE1CES Programming for Engineers and Scientists

In these subject students learn and apply fundamental programming concepts. Students analyse, design, construct, and document solutions to simple programming problems. Python programs are developed using online and desktop Python IDE and other tools.

Subject Learning Outcomes

1. Analyse a given problem and construct data structure and a logical solution.
2. Use appropriate programming tools to develop solutions in python code.
3. Accurately determine the output of a given python program.
4. Apply the 3 basic programming constructs of sequence, selection, and iteration.
5. Use basic data structures such as lists, sets and dictionaries.
6. Format and comment python code following rules and conventions.

Class requirements

Timetabled hours per week (4 hours)

- One 1-hour lecture per week
- One 3-hour lab per week

Assessments

| Assessment piece | Weighting | Subject Learning Outcomes |
|-------------------|-----------|---------------------------|
| Quizzes and Tests | 25% | 1-6 |
| Assignment | 5% | 1-6 |
| Progress Test | 30% | 1-6 |
| Final Examination | 40% | 1-6 |

EEMS1MS Mechanics of Solids

A fundamental requirement in the design of many engineering structures is to be able to assess the force interaction between structural elements using the principles of mechanics, and to determine the ability of a structural element to safely resist forces applied to it. This subject presents the fundamentals of engineering statics and strength of materials.

Subject Learning Outcomes

1. Find the resultant of a system of forces and moments.
2. Use the equations of equilibrium to find the forces and moments in trusses, beams and frames.
3. Evaluate properties of areas and volumes needed for engineering calculations.
4. Develop and apply theories to calculate the stresses in beams and shafts.
5. Describe the behaviour of columns and calculate their capacity.

Class requirements

Timetabled hours per week (5 hours)

- One 2-hour lecture per week
- One 3-hour lab per week

Assessments

| Assessment piece | Weighting | Subject Learning Outcomes |
|----------------------|-------------------------|---------------------------|
| Tests x 6 | 90% total (15% each) | 1-5 |
| Group Lab Assessment | 10% | 1-5 |

EEMS1CAD Computer Aided Design

Computer Aided Design (CAD) encompasses a variety of computer tools which enable engineers to design, simulate and model an engineered product. In addition, quite often the person that designs an object is not the same as the one that builds/manufactures it. Therefore, CAD drawings are the tool of communication between the designer and the manufacturer/builder. This subject develops understanding and problem-solving skills necessary to interpret and use CAD tools.

Subject Learning Outcomes

1. Apply appropriately the terminology of engineering drawing.
2. Identify the principles of laying out engineering CAD drawings.
3. Use the appropriate software to produce accurate drawings and analysis.
4. Optimise CAD models to improve a design (e.g. strength, sustainability, cost).

Class requirements

Timetabled hours per week (5 hours)

- One 2-hour lecture per week
- One 3-hour lab per week

Assessments

| Assessment piece | Weighting | Subject Learning Outcomes |
|------------------|-----------|---------------------------|
| Lab Tasks | 30% | 1-4 |
| Assessments | 30% | 1-4 |
| AutoCAD Test | 20% | 1-4 |
| SolidWorks Test | 20% | 1-4 |

EELE1IEL Introduction to Electrical and Electronic Engineering

This introductory subject assumes no prior knowledge of electronics. The unit consists of two components: DC and AC Circuit Analysis. The first component introduces elementary circuit analysis techniques and applies them to DC circuits. The second component extends these analysis techniques and applies them to AC circuits. At the end of the subject, students will be familiar with: circuit theory, sinusoidal and non-sinusoidal waveforms, phasors, impedance, network theorems, measurement systems, instruments and DC/AC applications.

Subject Learning Outcomes

1. Analyse DC and AC circuits to determine the currents flowing through, voltages across and power delivered or absorbed by elements in a circuit.
2. Analyse circuits using circuit analysis theorems.
3. Investigate and analyse engineering problems using provided information sources.
4. Construct and analyse circuits to ascertain and document their functionality through measurements.
5. Demonstrate effective written communication skills by presenting an engineering technical report in a clear and logical fashion.

Class requirements

Timetabled hours per week (8 hours)

- One 2-hour lecture per week
- One 2-hour tutorial per week
- One 2-hour lab/workshop per week
- One 2 hour test/feedback per week

Assessments

| Assessment piece | Weighting | Subject Learning Outcomes |
|------------------|-----------|---------------------------|
| Lab Reports x 4 | 15% | 1-5 |
| Quizzes x 10 | 15% | 1-5 |
| Tests x 10 | 70% | 1-5 |

EEMS1EDP Engineering Design and Problem Solving

Engineers are often involved in projects and hold supervisory or administrative positions whilst others work in design, construction, research, and teaching. Key skills for a successful engineer include written and oral communication, perception, visualisation, logical reasoning and problem solving; management of oneself, other people, time and equipment. Through project-based learning, students will develop a range of generic skills together with experience in complex problem solving and an appreciation of the complete project cycle.

Subject Learning Outcomes

1. Demonstrate an acquired detailed knowledge of, and enthusiasm for, the practice of the relevant engineering stream.
2. Solve an engineering problem, using appropriate technical tools.
3. Work effectively as a member of a team on an engineering project.
4. Apply time management skills and adhere to a time schedule where appropriate information from a variety of sources is gathered and evaluated.
5. Organize and critically review information to form a convincing argument.
6. Contribute to a written technical report as part of a team.
7. Give a technical oral presentation to peers.

Class requirements

Timetabled hours per week (5 hours)

- One 1-hour lecture per week
- One 4-hour lab per week

Assessments

| Assessment piece | Weighting | Subject Learning Outcomes |
|-------------------------|-----------|---------------------------|
| Workshop Reports | 30% | 1, 2, 4, 5 |
| Class Participation | 10% | 1, 2, 4, 5 |
| Written Team Reports | 45% | 1-6 |
| Oral Team Presentations | 15% | 3, 5, 7 |

9. Rules for Program Completion

Students need to successfully complete 120 credit points comprising 8 core units.

10. Program articulations

Graduates of this program can articulate with credit for all of the 8 units into Bachelor of Engineering Honours (Industrial), Bachelor of Civil Engineering (Honours) and Bachelor of Science (Maths major) at La Trobe University.

Students must successfully pass all subjects with an average score of 60 in their diploma course in order to be accepted into the Bachelor of Engineering Honours (Industrial) and Bachelor of Civil Engineering (Honours). Students must successfully pass all subjects with an average score of 50 in their diploma course in order to be accepted into the Bachelor of Science (Maths major).

11. Facilities and Resources

| Type of facilities and resources required | Explanation |
|---|--|
| Teaching rooms | <p>There is one lecture theatre (capacity 90) and three computer labs capacity 25.</p> <p>The college has seminar style classrooms that are designed as team-work hubs. Each room has audio visual equipment including, data projectors with multiple screens wireless microphones, visualisers, high speed Wi-Fi and desk-based power points.</p> <p>Seminar rooms:</p> <ul style="list-style-type: none">5 capacity 507 capacity 403 capacity 3021 capacity 20 |
| Computer Laboratory | <p>Students have access to three dedicated computer laboratories and access to a shared computer hub. All are equipped to a standard equivalent to those provided at the partner University. This includes wireless computer access, printers and scanners. All computers contain a range of specialist software and the MS Office Suite. All hardware is replaced on a three-year cycle.</p> <p>Computer labs:</p> <ul style="list-style-type: none">2 capacity 202 capacity 30 |
| Library | <p>Students have access to the LTU library which supports ELICOS and pathways programs. The library facilities include a specific lending collection aligned to programs offered, student computers, quiet study areas, access to online resources and library staff for research assistance and direction.</p> |

| Type of facilities and resources required | Explanation |
|---|--|
| Learning Management System | <p>The Learning Management system (Moodle) contains all subject information for students including subject outline, assessments, tutorial activities, and collaborative learning activities. LTCA delivers all subjects using the face to face delivery mechanism, onsite for all students onshore on a student visa. For Domestic students, a blended learning model and approach is available stemming out of the transformation to online learning starting January 2020 due to the pandemic. A number of online learning tools have been added. These include, but are not limited to:</p> <ul style="list-style-type: none"> • Virtual classrooms • Synchronous and Asynchronous sessions • Interactive whiteboards • Discussion forums • Podcasts and screencasts • Embeddable external platforms (Kahoot, Socrative, Quizlet, H5P etc.) |

12. Measurement of student outcomes

(a) Grading Scale

The Grading Scale is included in every course outline. The assessment grade is a measure of the extent to which the desired learning outcomes have been achieved in the units of the program. Grades the students achieve are descriptive rather than numeric and are officially defined as:

| Grade | Percentage Range |
|-------|------------------|
| A | 80 - 100 |
| B | 70 - 79 |
| C | 60 – 69 |
| D | 50 - 59 |
| N | 0 - 49 |

13. Articulation options

This diploma will provide students with the basic skills to enter various industries in an entry level position. With this diploma, students are eligible for entry to the second year of the Bachelor of Engineering Honours (Industrial), Bachelor of Civil Engineering (Honours), and Bachelor of Science (Maths major). Upon completion of the degree, students are ready to register with professional bodies such as: Engineers Australia and Australian Mathematical Society.