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 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 achieve appropriate solutions for engineering problems.
- Use critical thinking to develop appropriate engineering solutions.
- Conduct reviews and suggest ways to improve plans and processes.
- Demonstrate an awareness of social, cultural and environmental issues when solving engineering problems and abide by the professional and ethical requirements mandated by Engineers Australia.
- Communicate technical information in writing and drawings to both technical and non-technical audiences.
- Collaborate and contribute effectively as both a team leader and a team member to achieve team 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	EMAT1001	Tools for Modelling the world	Core	15
2	EMAT1002	Modelling Changes In Science, Society and Engineering	Core	15
2	TCSE1PEXS	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	**EMAT1001** Tools for Modelling the world	
	Second Trimester	**EMAT1002** Modelling Changes In Science, Society and Engineering	**TCSE1PEXS** Programming for Engineers and Scientists	**EEMS1MS** Mechanics of Solids
	Third Trimester	**EEMS1CAD** Computer Aided Design	**ELE1IEL** Introduction to Electrical and Electronic Engineering	**EEMS1EDP** Engineering Design and Problem Solving

a) Overview of Subjects:

Subject Descriptions

LTM1AIM Academic Integrity Module

(online, zero credit point unit, all students must complete this unit in their first trimester)

This subject introduces students to the principals of academic integrity in the context of La Trobe University's values and policy. Students learn what their responsibilities are in relation to maintaining ethical standards in all aspects of academic work and the potential ramifications for academic misconduct according to the Academic Integrity Policy. Activities and quizzes are provided, which are designed to develop and understanding of the concepts of cheating, plagiarism and collusion. Topics include an explaining of how the text-matching tool 'Turnitin" is used at La Trobe, and where to get help and where to go to develop referencing skills.

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	Week Due (exact date on LMS)	Subject Learning Outcome(s)	Course Learning Outcome(s)
Weekly Online Quizzes	10%	Weeks 1-12	1,2	1,2,5,7
Lab reports	20%	Weeks 4, 8, 9, 11	2-5	5,7
Mid trimester test	15%	Week 5	1, 2	2,5,7
Examination	55%	Week 13	1-5	1,2,5,7

EMAT1001 Tools for Modelling the world

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. Present mathematical thinking meaningfully and succinctly using words and mathematical notation
5. Use modelling techniques and computer packages to solve applied problems.

Class requirements

Timetabled hours per week (8 hours)

Weekly		
Timetabled Hours *		**Recommended Study Hours ****
Lectures	2	8
Tutorials	4	
Lab / Workshop	2	

Assessments

Assessment Piece	**Weighting**	**Week Due** **(exact date on LMS)**	**Subject Learning Outcome(s)**	**Course Learning Outcome(s)**
Quizzes MATLAB	15%	Weeks: 3, 6, 9 and 12	1, 4,5,	1,2,3
Tests	45%	Weeks: 4, 8, and 12	1 to 5	2,3
Final Examinations	40%	Exam weeks	1 to 5	1,2,3

EMAT1002 Modelling Changes In Science, Society and Engineering

One constant in the world is change. The mathematical language of change is calculus, so using calculus allows us to model phenomena to better understand the world.
You will learn the fundamental principles of calculus and how to combine its powerful mathematical properties so you can apply this knowledge across areas as diverse as the evaporation of water from a wetland, the snap of a mousetrap, to calculating how much cloth you need to make a parachute that could keep a falling elephant safe. You will develop this understanding of the concepts and techniques of calculus and move on to the ideas of differential equations whose mathematics describes the sustainable level of fishing in an area, the spread of disease, the dangerous shaking frequencies of an earthquake, the cooling of a cup of coffee and the warming of the planet.
An active learning approach is used, so you will solve mathematical problems and explore the detail of mathematical concepts in a hands-on way, solving simpler problems by hand to build the understanding that you will use to engage with complex problems using computer packages.
Reasoning skills and the ability to clearly present written arguments will be developed. Verbal communication skills are practiced through group-work and interaction with staff

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

Weekly		
Timetabled Hours *		**Recommended Study Hours ****
Lectures	2	8
Tutorials	4	
Lab / Workshop	2	

Assessments

Assessment Piece	**Weighting**	**Week Due** **(exact date on LMS)**	**Subject Learning Outcome(s)**	**Course Learning Outcome(s)**
Tests and MATLAB workshops	35%	Weeks 2-11	1, 4,5,	1,2,3
Calculus Exam	32.5%	Week 6	1 to 5	1,2,3
Differential Equations Exam	32.5%	Week 13	1 to 5	1,2,3

TCSE1PEXS 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

The subject is delivered over a 12-week teaching period, consisting of 1 x 2-hour lecture per week and 1 x 2-hour tutorial per week

Students are expected to undertake additional hours for the preparation of lessons, regular revision of work, and completion of assessments.

Assessments

Assessment Piece	Weighting	Week Due (exact date on LMS)	Subject Learning Outcome(s)	Course Learning Outcome(s)
Quizzes	25%	1-8	1 to 6	1,4
Assignment	5%	12	1 to 6	1,4
Progress Test	30%	9	1 to 6	1,3,4,5
Final Exam	40%	13	1 to 6	1,3,4,5

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)

Weekly		
Timetabled Hours *		**Recommended Study Hours ****
Lectures	2	5
Tutorials	3	

Assessments

Assessment Piece	Weighting	Week Due (exact date on LMS)	Subject Learning Outcome(s)	Course Learning Outcome(s)
Tests 1-6	90%	2,4,6,8,10,12	1-5	1-6
Group Lab Assessment	10%	12	1-5	1-6

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)

Weekly		
Timetabled Hours *		**Recommended Study Hours ****
Lectures	2	5
Tutorials	2	
Lab / Workshop	1	

Assessments

Assessment Piece	**Weighting**	**Week Due (exact date on LMS)**	**Subject Learning Outcome(s)**	**Course Learning Outcome(s)**
Quiz	30%	2,4,6,8 and 10	1-4	1,3,6,7
Labs 1 to 9	30%	1-4 & 6-10	1-4	1,6,7
Test 1 - AutoCAD	20%	6	1-4	3,6,7
Test 2 - SolidWorks	20%	12	1-4	3,6,7

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)

Weekly		
Timetabled Hours *		**Recommended Study Hours ****
Lectures	2	8
Tutorials	2	
Lab / Workshops	2	
Test / Feedback	2	

Assessments

Assessment Piece	Weighting	Week Due (exact date on LMS)	Subject Learning Outcome(s)	Course Learning Outcome(s)
4 x Lab Reports	15%	5,7,9,11	1-5	5,6,7
10 x Quizzes	15%	2 - 11	1-5	3,4,5,6,7
10 x Tests	70%	3 - 12	1-5	3,4

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. Recognize the practice of relevant engineering stream.
2. Appraise existing engineering problem and implement appropriate design strategies for an operative solution.
3. Apply collective problem-solving skills to a team project and collaborate effectively in writing a group report.
4. Organize and critically review information to form a cogent argument.
5. Effectively communicate your technical design orally to an audience of your peers.

Class requirements

Timetabled hours per week (5 hours)

Weekly		
Timetabled Hours *		**Recommended Study Hours ****
Lectures	2	5
Tutorials	2	
Lab / Workshop	1	

Assessments

Assessment Piece	**Weighting**	**Week Due (exact date on LMS)**	**Subject Learning Outcome(s)**	**Course Learning Outcome(s)**
Oral Team Presentation	**15%**	**6,12**	**3,4,5**	**1,6,7**
Workshop Reports	**30%**	**1-6**	**1,2,3,4**	**2,3,4**
Team Written Project	**45%**	**5,11**	**1,2 3,4**	**3,5,6,7**
Class Participation	**10%**	**1-12**	**1,2,3,4,5**	**6,7**

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, 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 to be accepted into the 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	There is one lecture theatre (capacity 90) and three computer labs capacity 25. 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. **Seminar rooms:** 5 capacity 50 7 capacity 40 3 capacity 30 21capacity20
Computer Laboratory	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. **Computer labs:** 2 capacity 20 2 capacity 30
Library	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.

Type of facilities and resources required	Explanation
Learning Management System	**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: • 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

(b) Student Feedback on Assessment Tasks

Students are typically provided with marking rubrics and sufficient feedback for formative assessments on how to improve in future assessments.

Students can also request a walkthrough for major assessment pieces to further clarify areas for improvement.

Feedback shall be provided verbally in class ,via Turn it in and may include Text ,Voice or Quick marks ,studetns shall receive feedback within two weeks of the assignment due date.

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 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.