VAAL UNIVERSITY
OF TECHNOLOGY

Inspiring thought. Shaping talent.

EMPLOYER & STUDENT GUIDE

Faculty:	**ENGINEERING AND TECHNOLOGY**
Department:	**MECHANICAL ENGINEERING**
Course:	**EXPERIENTIAL LEARNING 1 (MECHANICAL)**
Title:	**EMEXM1A**
Compiled By:	**A. ANIKI & V KHOZA**
Year:	**2023**
NQF Level:	**6**
Credits:	**30**

The vision of Vaal University of Technology

An African university that leads in quality teaching and learning, informed by research and driven by innovation and technology.

Mission of Vaal University of Technology

To produce employable and entrepreneurial graduates who can make an impact in society.

Values

Excellence, Creativity, Mutual Respect, Collegiality, Integrity, Tolerance, Diversity

DETAILS OF VUT MODERATORS:
(PERSONS RESPONSIBLE FOR THE EVALUATION OF THE WORK INTEGRATED LEARNING TRAINING REPORTS)

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1. INTRODUCTION

1.1 To fulfill the requirements of the Mechanical Engineering Diploma, a student must complete at least six months (26 weeks minimum) of approved Experiential Training under the supervision of a qualified mentor. The mentor should either be from a professional Mechanical Engineer, in the field of Production, Maintenance, Thermo-fluids, Vibration, Design and Electro-Mechanical.

1.2 In the curriculum for the Diploma: Mechanical Engineering, the Work Integrated Learning (WIL) component is completed within a continuous six months. The student is required to submit a reports in respect of the experiential training received during a twenty-six weeks period within the particular year. The submission of satisfactory interim progress reports and a final report on work experience gained during the year shall be deemed as only requirement for obtaining the required credits for the subject. The granting of the required credits shall however be subject to the student complying with the required minimum time spent in training, adequately covering the principle work experience areas as outlined herewith and the student obtaining a minimum aggregate grade as allocated by both the mentor and university moderator. Students will also be required to be available for a final presentation assessment at the end of the year. Should the student fail to meet the minimum requirements, the training period would have to be extended until all identified deficiencies had been addressed and a satisfactory report can be submitted.

1.3 There are five parties involved in the Work Integrated Learning Training programme each with their responsibilities. The parties are:

1.3.1 The Student
1.3.2 The Mentor/Supervisor: as the agent of the employer or training body
1.3.3 The Co-operative Education Department: as the agent of the VUT
1.3.4 The WIL Officer from the Department of Mechanical Engineering
1.3.5 The External moderator

1.4 Graduate attributes (GA's) of the program this module contributes to

Experiential Learning 1 – Mechanical (EMEXM1A) will assess Graduate Attribute 12
Graduate Attribute 12 is measured during the in-service training, site visits, work integrated learning reports.

Graduate Attribute	Evidence required	Attribute covered in this module
1. Problem solving	Apply engineering principles to systematically diagnose and solve *well-defined* engineering problems in homework exercises, class tests and assignments.	No
2. Application of scientific and engineering knowledge	Apply knowledge of mathematics, natural science and engineering sciences to applied engineering procedures, processes, systems and methodologies to solve *well-defined* engineering problems in assignment and project work.	No
3. Engineering Design	Perform procedural design of components, systems, works, products or processes of *well-defined* engineering problems to meet requirements, normally within applicable standards, codes of practice and legislation.	No
4. Investigations, experiments and data analysis	Conduct investigations of *well-defined* problems through locating and searching relevant codes and catalogues, experiments and measurements during practical class.	No
5. Engineering methods, skills and tools, including Information Technology	Use appropriate techniques, resources, and modern engineering tools including information technology for the solution of well-defined engineering problems, with an awareness of the limitations, restrictions, premises, assumptions and constraints.	No
6. Professional and technical communication	Communicate effectively, both orally and in writing within an engineering context by means of presentations and report writing.	No
7. Sustainability and Impact of Engineering Activity	Demonstrate knowledge and understanding of the impact of engineering activity on the society, economy, industrial and physical environment by means of class tests and assignments.	Yes
8. Individual, Team and Multidisciplinary Working	Demonstrate knowledge and understanding of engineering management principles and apply these to one's own work, as a member and leader in a technical team and to manage projects.	No
9. Independent Learning Ability	Engage in independent and life-long learning through well-developed learning skills. The learning context is well-structured with some unfamiliar elements. Evidence: Project and assignment	No
10. Engineering Professionalism	Understand and commit to professional ethics, responsibilities and norms of engineering technical practice.	No
11. Engineering management	Demonstrate knowledge and understanding of engineering management principles.	No
12. Workplace practices	**Project-based learning: that brings together intellectual enquiry, real world problems and student engagement in meaningful work.**	**YES**

2. GUIDELINES

2.1 Objectives of Work Integrated Learning

The objectives of Work Integrated Learning is to allow the student to apply the basic theoretical and practical knowledge gained at University in a work environment and to develop the necessary ethics, professionalism and competenci,es as demanded by the relevant construction related practices and enterprises within the Mechanical fields.

The student must be trained to such extent that he/she develops the necessary insight, experience and knowledge to function independently and in a competent manner in the work environment at the end of his Work Integrated Learning, within the stated aims and outcomes of the study program

To be able to fulfil this aim the employer must appoint a suitably qualified person as mentor to supervise the trainee student.

2.2 Minimum requirements

To ensure that the student gains an acceptable level of competence during the training period, the university sets certain minimum requirements in respect of the type of training that the student must receive during the Work Integrated Learning period. The University minimum requirements can be found in Annexure 1.

Work that is of a nature that does not contribute much to the development of the student and not contributing towards the required outcomes of the program is unacceptable, not in the interest of the student, and shall not be considered in the evaluation process.

2.3 Work Integrated Learning

Tasks to demonstrate this outcome is designed to connect academic learning with workplace practice and may be performed in one or more of the following types (Modalities) of work-integrated learning:

- Work-directed theoretical learning: in which theoretical forms of knowledge are introduced and sequences in ways that meet both academic criteria and are applicable and relevant to the career-specific components.

- Problem-based learning (PjBL): where students work in small self-directed groups to define, carry out, and reflect on a task which is usually a real-life problem.
- Project-based learning (PBL): that brings together intellectual inquiry, real-world problems and student engagement in meaningful work.
- Workplace based learning (WBL): where students are placed in a professional practice or simulated environment within a training program.

Note: While Graduate Attribute 12 (GA 12) is specific to workplace practices, other attributes may be demonstrated simultaneously.

The assessment of the level of GA acquisition shall be in line with the following typifying exemplified associated competency indicators:

1. Orientation to the working environment is described in terms of company structure and conventions, rules, policies, working hours, dress codes and reporting lines.
2. Labour practices used in the workplace are described in accordance with relevant legislation.
3. Workplace safety is described in terms of the application of relevant safety, health, and environmental legislation.
4. General administration procedures are described in terms of how they operate and the key purpose.
5. Work activities are conducted in a manner suited to the work context.

   Range: Work activities include assisting, contributing, observing and applying at least four of the specific practices below:
   - Engineering processes, skills, and tools, including measurement;
   - Investigations, experiments and data analysis;
   - Problem solving techniques;
   - Application of scientific and engineering knowledge;
   - Engineering planning and design;
   - Professional and technical communication;
   - Individual and teamwork; or
   - The impact of engineering activity on health, safety, and the environment.
6. Knowledge and understanding gained from the work-integrated learning period is reported in a prescribed format, using appropriate language and style.

2.4 Categories

The ideal is to give the student practical training in as many aspects related to Mechanical Engineering as possible. This would imply exposure to most of the topics listed below. The minimum requirement is that a student must acquire an acceptable level of proficiency in at least four (4) of the following major seven (7) categories as detailed in annexure 1:

- Administration
- Drawing
- Mechanics
- Engineering Design
- Manufacturing Processes
- Theory of Machines
- Steam plant
- Hydraulics
- Special Projects (e.g Research, Investigation)

2.5 Project work

The student will identify a project work within the designated project. Mentors are expected to guide students on the scope of their projects but they must essentially be completed by students themselves. The presentation of the project must be in the format of project report as shown in annexure 3.

2.6 Computer Aided Work

It is desirable, but not compulsory, for the student to get experience in the use of computer software for solving problems or submitting documents and reports. Any software may be used. Some exposure to spread sheets, data base graphical displays, CAD, CREO, MatLab, A etc. would be of benefit to students.

2.7 Reporting

All reports as stipulated must be submitted in the required format. Students must ensure that all reports as required are submitted in time to the university program moderator at

the end of each term and semester in order to be considered for evaluation. Reports submitted late shall not be considered.

3. EVALUATION OF TRAINING

3.1 Evaluation

3.1.1 By the employer's appointed mentor who assesses and certifies the level of proficiency attained by the student, and accepts or rejects it.

3.1.2 To pass the student must obtain a minimum of Level 3 (adequate achievement: 50% - 74% Range Score as stipulated in the 4-Point Likert Scale in Table 1 provided below and to pass with distinction ≥75% (Level 4). The University acts as a moderator for the reports.

Table: 1 -point Likert scale Levels of Graduate Attribute (GA) Acquisition

Meet GA12	**Meet GA12**	**Did not meet GA12**	**Did not meet GA12**
4	3	2	1
Fully Achieved	Achieved	Partially Achieved	Not Achieved
75% - 100%	50% - 74%	25% - 49%	0% - 24%
Demonstrates a comprehensive, in-depth understanding and application of workplace practices to solve engineering problems consistent with academic learning achieved.	Demonstrates an overall understanding and application of workplace practices to solve engineering problems consistent with academic learning achieved.	Demonstrates some ability to understanding and application of workplace practices to solve engineering problems consistent with academic learning achieved.	Demonstrates minimal or no ability to understanding and application of workplace practices to solve engineering problems consistent with academic learning achieved.

Levels 1-2 correspond to levels of pre-acquisition. At level 3, mastery and/or acquisition of an attribute is deemed acceptable in a university setting. Level 4 designate a level of excellence that may go beyond what is expected in a university setting and may not be reached by all students.

3.1.3 By the university's WIL Officer who shall moderate the employer's evaluation and student's submitted reports. The WIL officer reserves the right to interview a student at any time during the training period and conduct an assessment at the premises of the university at the end of the training period, which the student shall be compelled to

attend. It is the student's responsibility to consult the WIL officer during the S6 semester before the final report is submitted if any uncertainties should require clarification.

4. REPORTING

4.1 Every report must have a cover page, clearly indicating:

All the relevant student information, i.e. initials, surname, signature, student number, name of diploma (field of study at the Vaal University of Technology), company, mentor/supervisor, signature, contact tel. no., etc.

Which report it is, i.e. either progress report or semester report or project report.

Which period this report covers, i.e. from which date (dd-mm-yyyy) till which date (dd-mm-yyyy).

The report structure should include the following;

Introduction

Background and overview of your organization including among other things

Nature of projects, organogram showing the student's position, size of the firm, geographical location etc.

All headings to be numbered with font size 14 and must be in bold or must be underline if not in bold but not both.Body font size must be 12 with 1.5 spacing.

All figures, tables and appendices to be numbered, captioned and referenced.

All cited literature in the report must be referenced using Harvard referencing style.

Students must include their contact cell numbers and email addresses for the final Assessor's feedback on their reports.

Progress report - Word count: 2000 (±5%) excluding appendices, references/bibliography,

Semester report - Word count: 4000 (±5%) excluding appendices, references/bibliography.

Annexure 1 and 2 should be attached to the semester and project reports respectively. Each category/knowledge area covered/reported should be a minimum of 1 page, and that excludes pictures and tables. (This has taken into consideration the fact that sometimes students tend to be more exposed in some activities than others.

Reflection

The students are required to write 200 words on the last page of the report to reflect on the experience obtained through the WIL and also link the experiences to the module studied in relation to the type of projects the student was exposed to.

The students can discuss the weakness and strength of how practical module was understood or taught in relation to practical experiences or new technology onsite.

Further assessment

It is mandatory for students to conduct presentations of the project report to the VUT WIL team. The presentations will be conducted within the last two weeks of November and the dates will be communicated accordingly.

5. THE DUTIES AND RESPONSIBILITIES OF THE STUDENT

5.1 In order to successfully complete the Work Integrated component, the student must comply with the following conditions:

The student must have a mentor, who will certify that the student has completed the work required satisfactorily.

During work integrated learning, the student must submit a progress report after two months (10 pages minimum) that contains sufficient information. This report must be approved by the student's mentor before being submitted to the Department of Mechanical Engineering, Vaal University of Technology.

On completion of the training period, the student must submit a Semester report nothing less than 50 pages and a Project report (30 pages minimum). All reports should be ring-bounded otherwise it will not be accepted for marking

A logbook kept up to date by each student serves as a good personal record for all Work Integrated Learning received.

5.2 Work Integrated Learning term and Report Submission

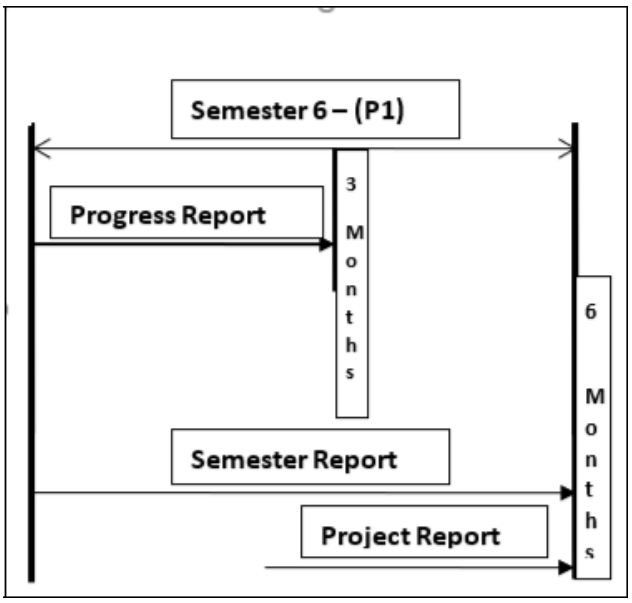

Figure 1: Report Submission Period Diagram

If the work submitted does not comply with the level of proficiency required, the Work Integrated Learning period will be extended until the expected level has been achieved.

6. THE DUTIES AND RESPONSIBILITIES OF THE EMPLOYER

6.1 The Employer must undertake to provide a Work Integrated Learning training programme, or conform to the programme laid down by the VUT.

6.2 The employer must appoint a suitable mentor to supervise the Work Integrated Learning student. The mentor must be suitably qualified in Mechanical Engineers in various field such as Maintenance, Thermo-fluids, Design, Production or within a senior position within the particular organization or practice.

6.3 The mentor's responsibilities:

6.3.1 The mentor must ensure that the student receives suitable training, assumes responsibility for stimulating a suitable working environment and the implementation of the training programme. The mentor must ensure that the scope and depth of the Work Integrated Learning to which the student is being exposed is sufficient to obtain the required level of proficiency.

6.3.2 At the end of the training period the mentor must check the accuracy of the student's Work Integrated Learning report, evaluate it using marking rubrics in annexure 2 & 4 and endorse it by way of a signing off.

7. THE DUTIES AND RESPONSIBILITIES OF THE WIL OFFICER

7.1 On behalf of VUT the WIL Officer will check the student's progress and the completed and signed Work Integrated Learning report and projects.

7.2 The WIL Officer will assess and moderate the student's Work Integrated Learning Report.

7.3 The WIL Officer will advise and guide the mentor or the student in any aspect of the Work Integrated Learning requirements.

7.4 It is envisaged that the WIL officer or moderator could visit the student at the place of training whenever deemed necessary. The student’s diary should be up to date at all times for presentation during such visits.

8. REFERENCE

1. Ipperciel, D and EIAia, S. (2014). Assessing Graduate Attributes: Building Criteria – Based Competency Model. International Journal of Higher Education, Volume 3, No.3. doi:10.5430/ijhe.v3n3p27.

VAAL UNIVERSITY OF TECHNOLOGY

FACULTY OF ENGINEERING

PROJECT REPORT GUIDELINES FOR WIL

When doing projects during your experiential training period the following guidelines, for writing the report, should be followed by all students. More detail on the projects can be obtained from the specific departmental guidelines.

1. CONTENTS

1.1 Table of contents with page reference.
1.2 List of tables, figures and drawings.
1.3 Identification of the problem:

When starting with a project it often is the case that the problem to be solved may not be obvious and only symptoms are apparent.

At this stage one should keep an open mind to not only see the problem but to understand its relationship with its environment.

Once a problem is identified and understood it must be formulated and written down. Objects to be met, specific requirements, unacceptable conditions and factors to be considered when the eventual solution to the problem is to be evaluated, must be known and recorded.

1.4 Statement of the problem:

The problem should be stated in one sentence. If this is not possible, the problem is not clearly understood.

The statement consists of three basic components:

1.4.1 In the first part of the sentence the "what needs to be done" should be addressed.

1.4.2 Secondly the standard and principles on which the solution will be based, must be stated.

1.4.3 Finally the goal to be achieved or "why the design/solution needs to be done/found" is answered.

1.5 Statement of sub-problems:

Some projects will be too large to be handled by a single person. Such projects should be divided into smaller projects, or sub-problems, that will be easier to comprehend and then given to other people to solve.

1.6 Delimitation:

State all references as far as the gathering of information is concerned. In the problem statement the project leader states exactly what will be done? It is also important that he/she specifies what he/she does **not** intend to do.

1.7 Assumptions:

The factors that will be taken for granted and will not be incorporated into the solution must be clearly stated.

1.8 Gathering of information:

The gathering of information is extremely important and is not always that obvious. Important sources of information are:

- **1.8.1** People.
- **1.8.2** Written material – books, catalogues, reports, and magazines.
- **1.8.3** Experimental data, designs, and drawings.
- **1.8.4** Existing conditions.
- **1.8.5** The Internet.

1.9 Preliminary Ideas:

This is the stage in which your imagination and creativity plays a major role. Try to think of a number of possibilities to the solution. Sketch your different ideas and write down the advantages and disadvantages. Don't limit yourself. Think beyond your frame of reference.

1.10 Evaluation of ideas:

Select the best ideas or combine some of the ideas to create new possibilities. Preliminary calculations and discussions with the relevant people will help to eliminate some of the ideas.

1.11 Analysis:

All calculations and deliberations must be reported under this heading.

1.12 Implementation of the solution:

State how the solution was implemented and supply support material such as sketches, drawings and graphs.

1.13 Recommendations:

State all the recommendations made to the company on grounds of the solution.

1.14 Conclusion:

Give a summary of what had been achieved and to what value this project with its solution was to the company.

Thank everybody who contributed to the project.

1.15 References

GA rubric for the module.

Graduate Attribute 12	Workplace Practices					
Learning Outcomes:	Demonstrate an understanding of workplace practices principles to solve engineering problems consistent with academic learning achieved and an ability to identify and address their own educational needs in a changing world in ways sufficient to maintain their competence and to allow them to contribute to the advancement of knowledge.					
Where is this outcome assessed?	WIL (EMEXM1A)					
How is this outcome assessed?	The learner is assessed through practical work by submitting the report by applying/implementing the knowledge acquired during the practical session and meet the standard required.					
What is satisfactory performance?	When the students are able to demonstrate the following outcomes, the ability to identify the problem, think about the solution to use to solve the problem and be able to utilize the resources the learner has to bring the expected outcome.					
What is the consequence of unsatisfactory performance?	If the student fails to obtain 50% he or she will be given another chance to pass (GA5)If the student still does not obtain 50% then the student must repeat the module.					
INDICATORS	**Level 4 (75% to 100%) Outstanding**	**Level 3 (50% to 74%) Competent**	**Level 2 (25% to 49%) Developing**	**Level 1 (0% to 24%) Insufficient**	**Examiner**	**Moderator**
Interest and Curiosity: Inclination/ability to explore a subject/topic in the pursuit of knowledge.	Demonstrates a skillful ability to explore a subject/topic thoroughly, generating a variety of knowledge, possibly specialized or obscure, demonstrating deep fascination and curiosity.	Demonstrates an ability to explore a subject/topic, generating a variety of knowledge, demonstrating fascination and curiosity.	Demonstrates some ability to explore a subject/topic, providing some knowledge, demonstrating mild interest and growing curiosity.	Demonstrates minimal or no ability to explore a subject/topic, demonstrating minimal interest or curiosity.		
Initiative: Inclination/ability to explore additional opportunities for learning.	Creates and seeks additional opportunities for learning.	Finds and pursues additional opportunities for learning.	Some inclination to explore additional opportunities for learning.	Minimal or no inclination to identify additional opportunities for learning.		
Adaptability to New Situations: *Ability to apply prior knowledge, skills and/or behaviors to new situations.*	Demonstrates a skilful ability to apply prior knowledge, skills, and/or behaviors in an innovative way to new situations.	Demonstrates an ability to apply prior knowledge, skills, and/or behaviors to new situations.	Demonstrates some ability to apply prior knowledge, skills, and/or behaviors to new situations.	Demonstrates minimal or no ability to apply prior knowledge, skills and/or behaviors to new situations.		
Reflection (Lessons Learned): Ability to reflect on (analyze and evaluate) experiences/situations, and apply results from reflections to subsequent experiences/situations. (Learns from successes and mistakes, and recognizes limitations.)	Reflect with depth and insight on experiences/situations. Skillfully applies what is learned from reflections to subsequent experiences/situations.	Demonstrates an ability to reflect On experiences/situations. Demonstrates learning through reflection.	Demonstrates some ability to reflect on experiences/situations. Demonstrates some learning through reflection.	Demonstrates minimal or no ability to reflect on experiences/situations. Tends to repeat mistakes.		
ASSESSMENT MARK %					/100	
GRADUATE ATTRIBUTE LEVEL					**Level of Achievement**	

Annexure 1

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STUDENT INFORMATION FORM

WORK INTEGRATED LEARNING (EMEXM1A)

Department of Mechanical Engineering

STUDENT INITIALS & SURNAME:	

STUDENT NUMBER:		IDENTITY NUMBER	

TRAINING PERIOD:	FROM		TO	

COMPANY:	
MENTOR'S NAME:	

COMPANY ADDRESS:		
	TELEPHONE NUMBER:	

EXPERIENTIAL TRAINING REPORT	
Progress:	
Semester:	
Project:	

STUDENT SIGNATURE: ..... Date .....

MENTOR'S SIGNATURE: ..... Date .....

Annexure 2

TO BE COMPLETED BY THE MENTOR / EVALUATOR

It is hereby declared that the information contained in this document is correct and that the student has done the prescribed training for the period indicated.

NAME: _____

DESIGNATION: .....

SIGNATURE: .....

DATE: .....

Company Stamp

PROFESSIOANAL REGISTRATION

ECSA ☐

SaiMechE ☐

OTHER ☐ SPECIFY _____

REGISTRATION CATEGORY

Pr Eng ☐

Pr Tech Eng

Pr Techni Eng

Pr CPM

OTHER

REG. NUMBER .....

FOR UNIVERSITY USE ONLY:

FINAL MARK: ……%

NAME: _____

DESIGNATION: .....

SIGNATURE: .....

DATE: .....

ECSA REGISTRATION CATEGORY: e.g. Pr Eng or Pr Tech Eng: ……

ECSA REGISTRATION NUMBER:.....

EXTERNAL MODERATOR:

FINAL MARK: ……%

NAME: ……

DESIGNATION: …….

SIGNATURE: ……

DATE: …….

.....

ECSA REGISTRATION CATEGORY: e.g. Pr Eng or Pr Tech Eng ….....

ECSA REGISTRATION NUMBER:.....

PROJECT REPORT MARKING FORM

Controlled by:

Mentor: _____ University moderator: _____

Using University guidelines for project report writing: ☐

Results:

Specific Practices	Mentor*	Moderator	Max Marks
Engineering processes, skills and tools, including measurement			15
Investigations, experiments and data analysis			15
Problem solving techniques Application of scientific and engineering knowledge			10 15
Engineering planning and design			10
Professional and technical communication			15
Individual and teamwork			10
The impact of engineering activity on health, safety and the environment			10
Total			
Percentage			
Final Mark by University (average)			

I hereby declare that this project report is my own work.

Signature of the Student: _____ Date: _____

This project complies/does not comply with all the set standards *

Signature of the Mentor: _____ Date: _____

This project complies/does not comply with all the set standards *

Signature of the University: _____ Date: _____

Moderator: ---------- Date: ----------

* *delete which is not applicable*

TO BE COMPLETED BY THE MENTOR / EVALUATOR

It is hereby declared that the information contained in this document is correct and that the student has done the prescribed training for the period indicated.