FACULTY OF ENGINEERING AND TECHNOLOGY

ELECTRICAL ENGINEERING: PROCESS CONTROL

WBL

WORKPLACE-BASED LEARNING GUIDE
CODE: EIEXL2A

APPROVED: ADVISORY COMMITTEE MEETING

CONTENTS

CONTACT DETAILS

DEPARTMENT	OFFICE	E-MAIL ADDRESS	TELEPHONE
Computer Systems Coordinator	S112	koosm@vut.ac.za	016 950 9434
Co-operative Education	N000	pricilla@vut.ac.za	016 950 9707

GENERAL REQUIREMENTS

- It is the responsibility of the student to register for WBL before training commences.
- The student will simultaneously register for EIEXL1A, EIEXl2A and EIPRl4A, which are the three components of the workplace-based learning.
- The registration, completion and submission of reports must be done according to the guidelines on page 4.
- An accredited assessor, appointed by industry, will do the assessment of each relevant topic. This assessor must have a qualification that is equal to or higher than the qualification being assessed.
- The student must do the training under the supervision of a mentor, which could also be the assessor if the mentor has the necessary qualifications.
- A VUT accredited staff member will act as examiner.
- The assessor must complete the training schedule report (pages 5 to 7), the assessor's declaration (page 9), as well as the assessment report (page 10 to19).
- If the mentor or assessor needs any assistance feel free to contact the Process control Coordinator at VUT. (see top of page)
- To fulfil the requirements of the Diploma: Electrical Engineering: Process control, the student must successfully complete all academic requirements, as well as the three Workplace Based Learning components.
- The syllabus Appendix A is WBL syllabus for the study fields of Process Control Engineering. The assessor/mentor can schedule the topics for training.
- Topics that are not included in the list of topics in this document but are required by the training company should be added using the blank topic 10 on page 19. Add as many topics as necessary by just copying the blank topic 10 on page 19.
- Graduate attributes (GA1, GA2, GA5 and GA11) are GA's to be covered in this module as part of the requirements of the Engineering Counsel of South Africa (ECSA). The Process Control Engineering Syllabus Appendix A contain a detailed explanation of the GA's.
- The assessor must also indicate on the topic assessment form, which of the graduate attributes (GA's) are attained in each topic. Each topic may cover one or more of these GA's. The requirement is that all four GA's must be covered in this module.

REGISTRATION AND REPORT SUBMISSION INSTRUCTIONS

Registration of Workplace- Based Learning (WBL)

Registration procedure:

- Registration for the following WBL modules EIEXL1A, EIEXL2A and EIPRJ4A must be done simultaneously.
- This second module EIEXL2A carries a credit value of 16 with a minimum time requirement of 480 hours (approx. 12 weeks).

Workplace Based Learning (WBL) Reports

Preparation and submission procedure:

- The training schedule report (pages 5 to 7), must be completed and emailed to the VUT Process Control coordinator (Mr. PJ Mitton) as soon as possible after this module of WBL commences.
- After completion of each topic, the topic must be assessed and signed (page 9 to 18).
- After completing this module of WBL the assessor must complete the assessor's declaration (page 9).
- The final report for this module must be submitted by post or in person to the Cooperative Education Office (Room N100) at VUT.

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PROCESS CONTROL ENGINEERING

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TRAINING SCHEDULE REPORT
EIEXL2A (480 HOURS)

Procedure to complete and submit the training schedule:

- Within 14 days after WBL commenced the training schedule report (pages 5 to 7) must be emailed to the relevant VUT WBL Process Control coordinator. (Mr PJ Mitton, email address: koosm@vut.ac.za).
- Complete pages 6 and 7.
- The report must be signed by the mentor and the student (page 7).
- Only the topics that are offered by the company in accordance with their main business must be done. If there are other topics not mentioned in the document it should be added. Topic 10 on page19 is a blank topic and should be used for the additional topics.

1 GENERAL INFORMATION – TRAINING SCHEDULE REPORT **WBL (EIEXL2A)**

STUDENT	NUMBER:		**STUDENT'S** POSTAL ADDRESS:
	INITIALS & SURNAME:		
	ID NUMBER:		
	E-MAIL:		
	TELEPHONE (WORK):		CELL PHONE:
COMPANY	NAME:		NUMBER OF EMPLOYEES:
	DIVISION:		NUMBER OF STUDENTS IN TRAINING:
	TRAINING SITE/STREET ADDRESS:		NUMBER OF ECSA REGISTERED STAFF:
			COMPANY'S SPECIALIZATION FIELD OR PRODUCTS
ASSESSOR	INITIALS & SURNAME:		ACCREDITED ASSESSOR: Y / N
	E-MAIL:		CELL OR TELEPHONE:
WBL REPORT	START DATE:		END DATE :

VUT OFFICE USE : *ACCEPTED* □ *DECLINED* □

2 TOPICS SCHEDULED FOR WBL 2 (EIEXL2A)

The following table shows the possible **applicable** topics that may be included by the company where the workplace based learning takes place. Show the total hours for each topic.
The scheduled topics are on pages 10 to 18. Extra topics that the company may wish to include should be added. The topics numbered 1 to 9 serves as a guide and may be modified by the company. Topics will however need to be approved by VUT.

TOPIC NUMBER	CONTENT TOPICS	TIME HOURS
1	Programmable devices	
2	Industrial systems	
3	Plant Loop Training	
4	Other	
5	Other	
6	Other	
	TOTAL Hours	480

WBL Training Schedule Report compiled by:

Students signature *Date*

WBL Training Schedule
report certified as correct:

Assessor's signature *Date*

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WORKPLACE BASED LEARNING (WBL)

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TOPIC ASSESSMENT REPORT

EIEXL2A (480 Hours)

Procedure to compile and submit the assessment report:

- After completion of each topic, the topic must be assessed by the assessor and signed. (page 10 to 19)
- After completion of this module on WBL the assessor must complete the assessor's declaration (page 9).
- The final report for this module (page 8 to 19) must be submitted **by post** or in person to the Cooperative Education department (Room N100) at the VUT.

2 ASSESSOR DECLARATION – ASSESMENT REPORT WBL 2 (EIEXL2A)

STUDENT	**INITIALS AND SURNAME :**	
	VUT - STUDENT NUMBER :	
	ID NUMBER :	
	COMPANY :	
TRAINING PERIOD	**WBL :**	**TO** ***START DATE:*** ***COMPLETION DATE:***
ASSESSOR	**INITIALS AND SURNAME :**	
	CELL OR TELEPHONE NUMBER :	
	E-MAIL:	
ASSESSMENT		

ASSESSOR DECLARATION

I, the above-mentioned assessor, declare that the above-mentioned student has completed this workplace based learning module (WBL) of the qualification in the mentioned period under my supervision.

The student was found competent in the outcomes as specified in the assessment report.

Signature *Date*

VUT OFFICIAL	**FINAL MARK:**	
SIGNATURE:		***DATE:***

ASSESMENT REPORT AND TRAINING SCHEDULE WBL 2 (EIEXL2A)

SYLLABUS: PROCESS CONTROL ENGINEERING

TOPIC 1	PROGRAMMABLE DEVICES

After completion of this topic the student should be able to do the following:

- Programming, downloading and testing of programs for programmable devices

.

Start Date:	End Date:	Total Hours:

Topic Mark (Mark with an X using attached rubric page 20) Assessor Signature:	1	2	3	4	5

Graduate attributes Mark the GA's addressed in this unit with an X) (See syllabus Appendix A)	GA 1	GA 2	GA 5	GA 11

Explain how this topic is addressed in the specific workplace.
(Refer also to the GA's in the Syllabus Appendix A) Insert more line if needed

Student Signature	Assessor Signature

TOPIC 2	Industrial systems

After completion of this topic the student should be able to do the following:

- Develop circuit diagrams and flow diagrams
- Demonstrate the interpretation of circuits and flow diagrams
- Ability to install and commission equipment on a system and do fault finding

Start Date:	**End Date:**	**Total Hours:**

Topic Mark (Mark with an X using rubric attached page 20) **Assessor Signature*:***	1	2	3	4	5

Graduate attributes Mark the GA's addressed in this unit with an X) (See syllabus Appendix A)	GA 1	GA 2	GA 5	GA 11

Explain how this topic is addressed in the specific workplace.
(Refer also to the GA's in the Syllabus Appendix A) Insert more line if needed

Student Signature	**Assessor Signature**

TOPIC 3	PLANT LOOP TRAINING

After completion of this topic the student should be able to do the following:

- Understand and work on control systems
- Understanding and demonstrate occupational safety and other legislative requirements for the practise of a learner technician/student
- Understand and demonstrate different ISO standards and how this tie into industry requirements to comply to these standards
- Understand and apply the requirements and steps that need to be followed to do work in the workplace with the permit to work system.
- .

Start Date:	End Date:	Total Hours:

Topic Mark (Mark with an X using rubric attached page 20) Assessor Signature:	1	2	3	4	5

Graduate attributes Mark the GA's addressed in this unit with an X) (See syllabus Appendix A)	GA 1	GA 2	GA 5	GA 11

Explain how this topic is addressed in the specific workplace.
(Refer also to the GA's in the Syllabus Appendix A) Insert more lines if needed

Student Signature	Assessor Signature

OTHER TOPICS (Make as many copies of this blank unit as necessary)

TOPIC 4	
After completion of this topic the student should be able to do the following:	

Start Date:	**End Date:**	**Total Hours:**

Topic Mark (Mark with an X using attached rubric page 20) **Assessor Signature*:***	1	2	3	4	5

Graduate attributes Mark the GA's addressed in this unit with an X) (See syllabus Appendix A)	GA 1	GA 2	GA 5	GA 11

Explain how this topic is addressed in the specific workplace. (Refer also to the GA's in the Syllabus Appendix A)

Student Signature	**Assessor Signature**

WBL - EIEXL2A

Evaluation guideline

This guideline can be used by the assessor to do student evaluation.

Rating	Theoretical knowledge	Application of theory	Use of: advanced tools / measuring equipment	Skills integration / Competencies gained	Working speed	Accuracy	Interpersonal relations	Diligence motivation
1 **0-19%**	Has little knowledge	Cannot apply any theory	Cannot use advanced equipment	Has not integrated any skills	Very slow and do not successfully complete any tasks	Never accurate	Does not get along with any staff	Does nothing unless instructed
2 **20-39%**	Can recall some basic knowledge	Can apply some theory with assistance	Can use advanced equipment with assistance	Has integrated some documented skills	Never complete tasks successfully on time	Has to redo and then sometimes accurate	Can interact positively with most of the staff	Does just enough to keep out of trouble
3 **40-59%**	Knows the basic minimum	Can apply the basic minimum theory	Can use advanced equipment to do the basic minimum	Has integrated the basic minimum documented skills	Just complete tasks successfully on time	Just meets the minimum specifications	Interact positively with all the staff	Does the minimum expected
4 **60-79%**	Good knowledge	Can apply high level theory	Can select and use advanced equipment independently	Effectively integrate skills as needed in practical applications	Normally complete all tasks successfully before/on time	Work is always better than minimum expected	Is accepted by the staff as somebody with good personal skills	Normally looks for over and above work to do
5 **80-100%**	Excellent knowledge	Can analyze and synthesize	Optimally select and use advanced equipment	Innovatively integrate all theoretical and practical skills to solve problems	Always complete all tasks successfully before time	Work is always excellent.	Uses personality to positively influence other staff	Ambitious and eager to prove talents beyond requirements

APPENDIX A

VAAL UNIVERSITY OF TECHNOLOGY

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT PROCESS CONTROL AND COMPUTER SYSTEMS ENGINEERING

SYLLABUS

WBL

INSTRUCTIONAL OFFERING:	Workplace-based Learning
INTERNAL CODE:	EIEXL2A
INSTRUCTIONAL PROGRAMMES:	Diploma in Electrical Engineering
ASSESSMENT:	Work Based Assessments
NQF LEVEL:	6
CREDITS:	16
DOCUMENT REVISION:	January 2020

1. Syllabus Content

(a) Programmable devices
(b) Industrial systems
(c) Plant Loop Training

2. Learning Outcomes

After completion of this course the student should be able to demonstrate at least one or more of the following:

After completion of this course the student should be able to demonstrate at least one or more of the following:

- Programming, downloading and testing of programs for programmable devices
- Develop circuit diagrams and flow diagrams

- Demonstrate the interpretation of circuits and flow diagrams
- Ability to install and commission equipment on a system and do fault finding
- Understand and work on control systems
- Understanding and demonstrate occupational safety and other legislative requirements for the practise of a learner technician/student
- Understand and demonstrate different ISO standards and how this tie into industry requirements to comply to these standards
- Understand and apply the requirements and steps that need to be followed to do work in the workplace with the permit to work system.

3. Graduate Attributes (GA's)

This module aids to assess the following ECSA defined graduate attributes as applicable to work-place-based learning:

Graduate Attribute 1: Problem Solving

Apply engineering principles to systematically diagnose and solve *well-defined* engineering problems.

Graduate Attribute 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.

Range Statement: Knowledge of mathematics, natural science and engineering science is characterized by:

1. A coherent range of fundamental principles in mathematics and natural science underlying a sub-discipline or recognised practice area.
2. A coherent range of fundamental principles in engineering science and technology underlying an engineering sub-discipline or recognised practice area.
3. A codified practical knowledge in recognised practice area.
4. The use of mathematics, natural sciences and engineering sciences, supported by established mathematical formulas, codified engineering analysis, methods and procedures to solve well-defined engineering problems.

Graduate Attribute 5: Engineering methods, skills, 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.

Range Statement: A range of methods, skills and tools appropriate to the discipline of the program including:

1. Sub-discipline-specific tools processes or procedures.
2. Computer packages for computation, simulation, and information handling;
3. Computers and networks and information infrastructures for accessing, processing, managing, and storing information to enhance personal productivity and teamwork;
4. Basic techniques from economics, management, and health, safety and environmental protection.

Graduate Attribute 11: Workplace practices

Demonstrate an understanding of workplace practices to solve engineering problems consistent with academic learning achieved.

Note: The purpose of work-integrated learning is to enable the learner to connect academic learning with workplace practice.

Range Statement: Tasks to demonstrate this attribute may be performed in one or more of the following curriculum types:

1. 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.
2. Problem-based learning: where students work in small self-directed groups to define, carry out and reflect on a task which is usually a real-life problem.
3. Project-based learning: that brings together intellectual enquiry, real world problems and student engagement in meaningful work.
4. Workplace learning: where students are placed in a professional practice or simulated environment within a training programme.
5. Simulated learning.

4. Graduate attributes assessment

ECSA Graduate attribute	Assessment details
Graduate Attribute 1: Problem Solving Apply engineering principles to systematically diagnose and solve *well-defined* engineering problems.	
Where is outcome assessed?	In the work place.
How is this outcome assessed?	Solving of work-based problems must be demonstrated in the design, configuration and implementation of systems relevant to the student's work environment.
What is satisfactory performance?	System design, configuration and implementation must be demonstrated to be functional within the requirements of the particular system.
What is the consequence of unsatisfactory performance?	Work must be repeated until the desired results can be achieved.

Graduate Attribute 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.	
Where is outcome assessed?	In the work place.
How is this outcome assessed?	The application of engineering knowledge and practices used in the design and implementation of systems relevant to the work environment must be demonstrated.
What is satisfactory performance?	The engineering knowledge and practices must be demonstrated to be appropriate to the requirements.
What is the consequence of unsatisfactory performance?	Work must be repeated until the desired system requirements can be achieved.

Graduate Attribute 5: Engineering methods, skills, tools, including Information technology Use appropriate techniques, resources, and modern engineering tools, including information technology, prediction and modelling, for the solution of broadly-defined engineering problems, with an understanding of the limitations, restrictions, premises, assumptions and constraints.	
Where is outcome assessed?	In the work place.
How is this outcome assessed?	Students are required to demonstrate the use of appropriate techniques, resources and modern engineering tools in the development or design and implementation of systems that they work on.
What is satisfactory performance?	Knowledge of the application and use of tools appropriate to the discipline and the task can be demonstrated.
What is the consequence of unsatisfactory performance?	Work must be repeated until the required skills and methodologies can be demonstrated.

Graduate Attribute 11: Workplace practices Demonstrate an understanding of workplace practices to solve engineering problems consistent with academic learning achieved.	
Where is outcome assessed?	In the work place.
How is this outcome assessed?	Students are required to demonstrate the ability to apply appropriate theoretical knowledge and understanding to the systems and environment in which the work-place-based learning takes place.
What is satisfactory performance?	Appropriate and applicable theoretical knowledge is used to perform implementations, configurations, design or development.
What is the consequence of unsatisfactory performance?	Work must be repeated until the appropriate application of theoretical knowledge can be demonstrated.

5. Module Credits

L	TL	ML	T	Tt	Mt	P	Tp	Mp	X	Tx	Mx	A	Ta	E	Me	Credit
0	1	1	0	1	1	300	1	0.5	0	1	1	16	1	14	1	16

L	Lectures Sessions	**TL**	Lecture Duration	**ML**	Work per Lecture period
T	Tutorials Sessions	**Tt**	Tutorial Duration	**Mt**	Work per tutorial period
P	Practical Sessions	**Tp**	Practical Duration	**Mp**	Work per practical period
X	Other contact Sessions	**Tx**	Other Duration	**Mx**	Work other period
A	Assessment	**Ta**	1 Hour	**E**	Work outside (Me = 1)

6. Module Knowledge Profile

Mathematical Sciences	Natural Sciences	Engineering Sciences	Engineering Design	Computing and IT	Complementary Studies	Work Integrated learning
						16