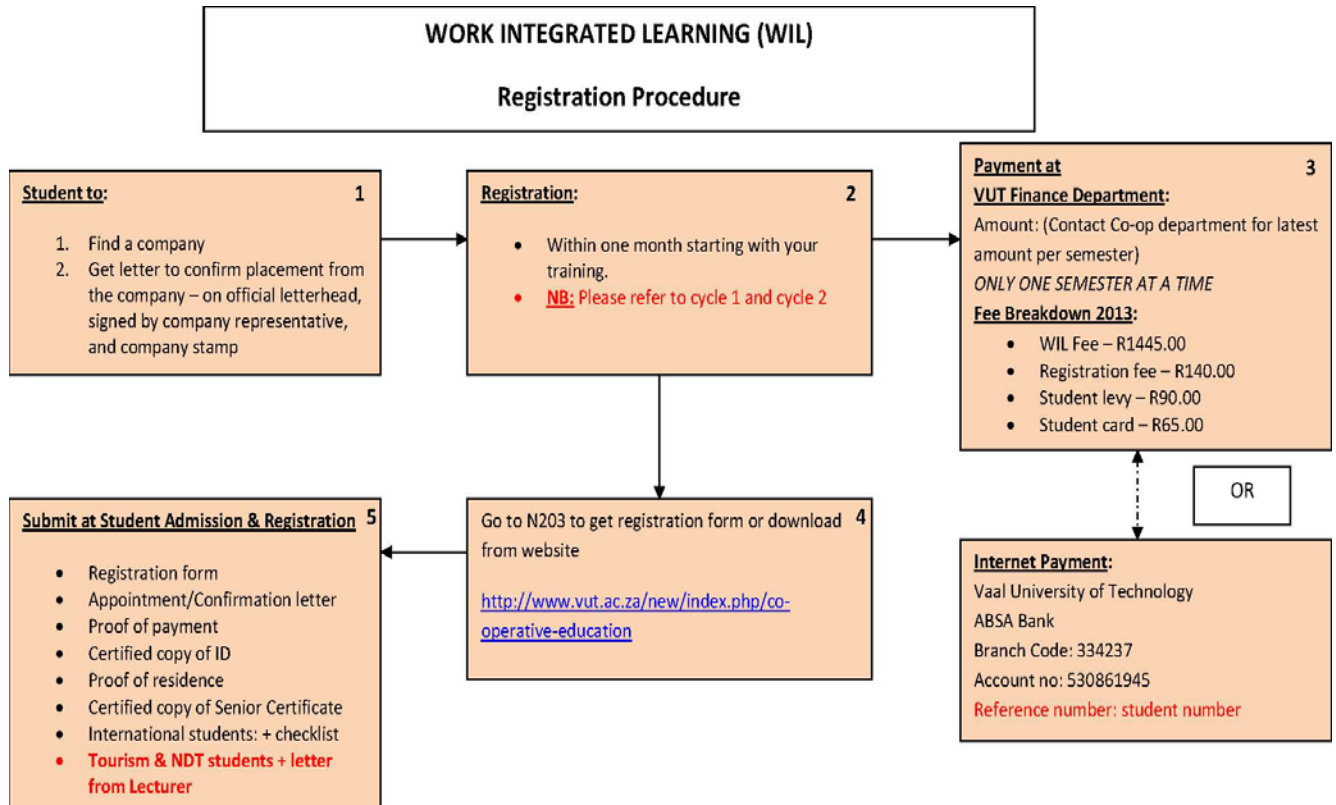


DEPARTMENT OF METALLURGICAL ENGINEERING

GENERAL INFORMATION AND GUIDELINES



Co-operative Education

Reception

Tel: 016-950-9496

Fax: 016-950-9759

Email: wil@vut.ac.za

Student Admission & Registration

Ms Carol Ramushwana

Tel: 016-950-9122

Fax: 086-573-1531

Email: carolr@vut.ac.za

1. Registration cycles

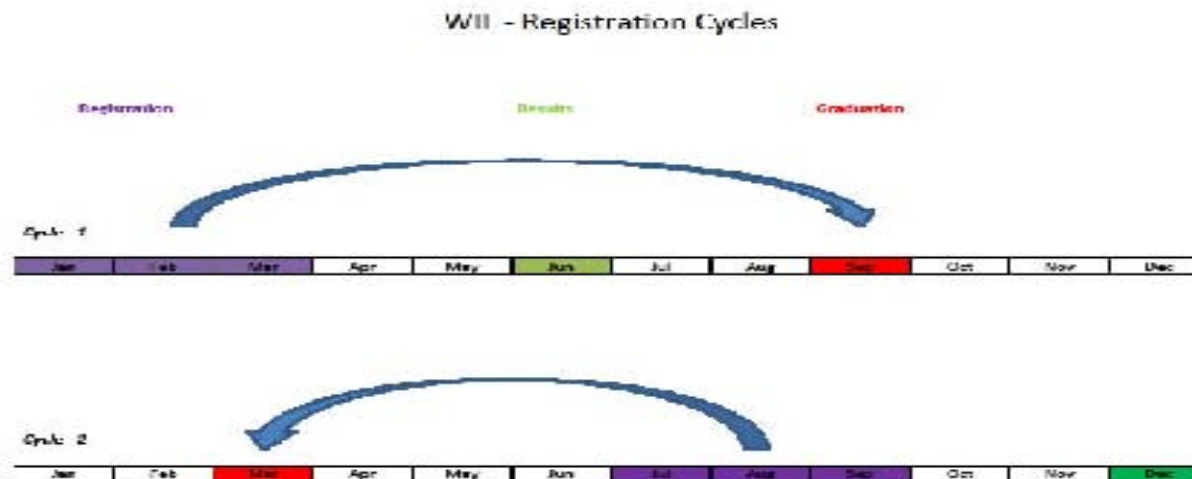
VUT has an annual (Jan – Dec) academic calendar set in line with the census dates; end of March and end of September

2. Cycle -1

Students that register before the end of March will have their results released in June, justifying the minimum period required for Work Integrated Learning, six (6) months; these students can only graduate in September.

3. Cycle–2

Students that register before the end of September will have their results released in December to make the March graduation ceremony.



WIL REGISTRATION, RESULT AND GRADUATION CYCLES

Year 1				Year 2			
Sem1		Sem2		Sem1		Sem2	
1	Before 31/3 Reg for SEM 1	Result June	Graduate Sept				
2		After 31/3 Reg for SEM 2	Result Nov	Graduate March			
3		Before 30/9 Reg for SEM 2	Result Nov	Graduate March			
4			After 30/9 Reg for Y2 SEM 1		Result June	Graduate Sept	

DEPARTMENT OF METALLURGICAL ENGINEERING



WORK INTEGRATED LEARNING

**CURRICULA AND
DEPARTMENTAL INFORMATION**

TABLE OF CONTENTS

1. INTRODUCTION: PURPOSE OF WORK INTEGRATED LEARNING
 2. WORK INTEGRATED LEARNING CURRICULA
 - 2.1 Metallurgical Engineering: Extractive
 - 2.2 Metallurgical Engineering: Physical
 3. MONITORING OF LEARNERS IN WORK INTEGRATED LEARNING
 4. PROGRAMME APPROVEMENT
 5. CONCLUSION
- SUMMARY: EVALUATION OF WORK INTEGRATED LEARNING

1. INTRODUCTION: PURPOSE OF WORK INTEGRATED LEARNING (WIL)

In terms of university policy, Universities of Technology are able to make a considerable contribution to relieving the manpower shortage that is being experienced in the technical fields in particular. The primary task of Universities of Technology is to provide education (instruction and learning) in order to equip persons with certain skills and sufficient technological knowledge of industry for the labour market.

Universities of Technology aim to train persons that are immediately ready to function in an occupation. To meet this objective it is of utmost importance that this career education model provides for a well structured partnership with employers towards education and learning to really satisfy the expectations of industry and to keep pace with the rapidly changing demands of the times.

The purpose of WIL is to provide the learner with an opportunity of applying and developing the knowledge received at the university, in industrial problem situations and to expose the learner to typical organisational culture, human relations and working conditions. However, to this end it is required that the employers in industry observe their responsibility in respect of relevant WIL programmes during the learner's period of study. With suitable guidance and supervision the learner is taught responsibility to work independently and to develop an awareness of the ethics and requirements of industry.

The guidelines as set out in this document lend themselves to benefiting all parties concerned with the co-operative education partnership (learner, university, and employer) in developing and introducing effective education/learning schemes and by being adaptable to technological developments within a relatively short period of time.

The guidelines are specifically intended to assist employers in structuring WIL programmes for learners/technologists who have completed or who are still undergoing their theoretical education/learning for the National Diploma in Engineering. The guidelines are drawn up in a generalised manner to cater for the industry at large. The content detail, however, can be added to or changed to suit the requirements of individual employers.

We trust that all learners will make full use of this opportunity to develop their talents, equip themselves to take up their places as citizens of the country and contribute to the well being of society and as such be loyal alumni that should be the proud bearers of the university message in their future careers.

The university looks forward to a continuous and pleasant period of liaison with employers with the confidence that the objectives of co-operation will be successfully achieved.

2 **WORK INTEGRATED LEARNING CURRICULA**

Applicable WIL means that a learner should gain experience in the practical application of metallurgical engineering techniques as applied in the specific industry with the emphasis on the following elements of Metallurgical Engineering.

2.1 **Metallurgical Engineering : Extractive**

Practical Period I

SAFETY MEASURES (Compulsory)

The main purpose of safety measures is to know the general safety condition of the plant or mine or factory, which will include:

- a Attending safety meetings;
- b Have an understanding of the OHS Act as applied to the plant, factory or mine;
- c NOSA course is recommended;
- d Accompanying the Safety Officer once or twice on safety inspection.

The learner shall be trained in **as many as possible** of the following during his/her WIL period, which will be determined by his/her employer.

COMMUNITION

The learner should familiarise him/herself with the general plant layout and the equipment used and should include the following:

- a Primary and secondary crushing
- b Milling and start-up
- c Conveying systems
- d Storage systems
- e Mass flow measurement (wet and dry)
- f Mass balances
- g Problem solving

SCREENING AND CLASSIFICATION

The learner should be able to

- a Calculate screen efficiencies
- b Calculate cyclone efficiencies

CONCENTRATION PROCESSES

The learner should be trained in any one or more of the following processes:

- a Shaking tables (spirals, etc.) mass balances, adjustments

- b Froth flotation, mass balance, adjustments to reagent requirements and problem solving
- c Dense medium separation, efficiencies, and problem solving
- d Magnetic and high-tension separation.

DEWATERING

The learner should gain understanding of the following:

- a Basic design of thickeners and filters
- b Pump and piping requirements
- c Problem solving
- d Start-up

CALCINATION AND ROASTING

The learner should be trained in the operation of the equipment including the following key aspects:

- a Basic chemistry involved
- b Control of the process
- c Air and heat requirements
- d Mass balances
- e Acid plant
- f Problem solving

SMELTING AND REFINING

The learner should be trained according to the type of equipment used including the following key aspects:

- a Construction of furnace
- b Refractories used
- c Energy requirements (Electric, gas, etc.)
- d Basic chemistry
- e Mass balances
- f Molten metal handling
- g Slag handling and treatment
- h Metal casting

ELECTROLYSIS

The learner should gain knowledge of the following:

- a Cell construction
- b Electrolyte composition
- c Factors affecting deposition
- d Effect of impurities
- e Basic chemistry
- f Cathode preparation

- g Mass balancing and energy requirements
- h Problem solving and control

HYDROMETALLURGY

The learner should gain knowledge of the general plant layout as well as the equipment used. This should include the following:

- a Pulp requirements
- b Reagents required
- c Agitation methods
- d Flow rates and retention times
- e Piping and pumping
- f Heating requirements (steam generation)
- g Mass balances
- h Basic chemistry
- i Metal recovery methods
- j Security arrangements
- h Problem solving

OTHER

It is important that every learner should attend any one or more of the following to expand his/her knowledge:

- a Related symposiums
- b Related schools
- c Management courses
- d Related visits to other plants
- e Technical report writing courses.

Practical Period II

SAFETY MEASURES (Compulsory)

COMMUNITION

SCREENING AND CLASSIFICATION

CONCENTRATION PROCESSES

DEWATERING

CALCINATION AND ROASTING

SMELTING AND REFINING

ELECTROLYSIS

HYDROMETALLURGY

All of the above aspects must be dealt with according to company needs and availability of processes and equipment in a more advanced program than that used during *Practical Period I*.

OTHER

It is important that every learner should attend any one or more of the following to expand his/her knowledge:

- a Related symposiums
- b Related schools
- c Management courses
- d Related visits to other plants
- e Technical report writing courses.

Enquiries: P. Mendonidis at (016) 950-9241 or
F.J. du Toit at (016) 950-7514
D. Nake at (016) 950-9243

2.2 Metallurgical Engineering : Physical

Practical Period I

SAFETY MEASURES (Compulsory)

The main purpose of safety measures is to know the general safety condition of the plant or mine or factory, which will include:

- Safety measures and conditions
- Have an understanding of the OHS Act as applied on the plant or factory
- NOSA courses are recommended.

The learner should be trained in **as many as possible** of the following during his/her WORK INTEGRATED LEARNING period, which will be determined by his/her employer.

LABORATORY AND QUALITY CONTROL LEARNING

The learner should spend some time in the laboratory environment, chemical as well as metallurgical. The following should be looked at:

- Familiarise the learner with all instrumentation
- Familiarise the learner with all laboratory equipment
- Sampling procedures
- Conducting of tests.

PLANT LEARNING

The learner should spend the majority of the learning time (75%) in this work environment. The learner should understand and know the principles of the plant and even spend time with the operator in running the plant.

- Forming operations
- Casting operations
- Welding processes
- Heat treatment
- Surface coatings.

RESEARCH ACTIVITIES

The learner should be subjected to very basic research projects in any of the above operations.

All tasks should be done initially in collaboration with a competent mentor that can give the learner the necessary guidance. The degree of difficulty of these projects should increase as the learner gains experience. All projects should be complimented by a written report to the plant superintendent, the mentor and the university after completion of the project or learning session.

Practical Period II

SAFETY MEASURES (Compulsory)

Follow-up NOSA courses

The learner should attend safety meetings, serve on safety committees and accompany the safety officer on safety inspections on a regular basis.

The learner should be trained in **as many as possible** of the following during his/her WORK INTEGRATED LEARNING period, which will be determined by his/her employer.

LABORATORY AND QUALITY CONTROL LEARNING

The learner should be involved in:

Conducting of tests

Interpretation and application of standards and specifications

Release and rejection of material

Cost estimation and budgeting

Planning and design

PLANT LEARNING

Attention should be given to process variables, defects, and problem solving. These factors should lead to product- and process development.

Forming operations

Casting operations

Welding processes

Heat treatment

Surface coatings.

RESEARCH ACTIVITIES

The learner should be subjected to very basic research projects in any of the above operations.

OTHER ELEMENTS

The learner should be exposed to other in-house learning courses such as computer literacy, leadership, supervision and also attend seminars and symposia.

The degree of difficulty of these projects should increase as the learner gains experience. All projects should be complimented by a written report to the plant superintendent, the mentor and the university after completion of the project or learning session.

Enquiries: P. Mendonidis at (016) 950-9241 or

F.J. du Toit at (016) 950-7514

D. Nake at (016) 950-9243

3. **MONITORING OF LEARNERS DURING WORK INTEGRATED LEARNING**

The Engineering Council of South Africa (ECSA) requires that learners be continually monitored throughout their experiential learning period. (Refer to the WIL policy, section 2.4.2). A staff member from the Vaal University of Technology will visit both learner and mentor at least once per annum. Should any problems or questions arise regarding the WIL/university education, learners and mentors are encouraged to discuss this during such a visit or otherwise, to contact the department. (See appendix for an example of the form, which will be used during such a visit). Learners and employers should at all times adhere to the general Faculty regulations regarding WIL as set out in the Faculty policies, procedures and guidelines.

Take special note of the requirements of project reports. This document should at least contain the following:

Cover page: (Attached to this document)

Contents:

Table of contents

List of tables, figures and drawings.

Problem setting/ project setting

Delimitations

Assumptions

Gathering of information:

 People

 Written material – books, reports, magazines, etc.

 Experimental data

 Existing conditions

 The Internet.

Method of examining the problem/project

Evaluation of Results

Deductions and recommendations

Conclusions and references.

(Additional project report guidelines are available on the VUT website).

4. **PROGRAMME APPROVEMENT**

In learning people for an occupational directed career the interaction between the learner, the employer and the educational institution is of utmost importance.

A company with a structured learning programme/schedule must submit this schedule to the Vaal University of Technology for assessment in terms of the under mentioned criteria:

- 4.1 The learning has to be structured and should provide for learners to get exposure and experience in the different fields specified in the syllabi for experiential training.

- 4.2 Personnel overseeing the learning of learners are to be adequately trained and must have relevant experience to act as mentors. They should preferably also be registered with the Engineering Council (ECSA).
- 4.3 Learners have to be supervised and evaluated on a continual basis by mentors (supervisors).
- 4.4 Adequate facilities must be available so as to give learners hands-on experience in the workplace.
- 4.5 The assessment of the learner's WIL, is to be carried out in accordance with the guidelines, norms and criteria laid down by the Vaal University of Technology.
- 4.6 The organisation has to actively take part in the co-operative education programmes of the Vaal University of Technology.

5. CONCLUSION

This document has been devised with the intention for the guidance of both learner and employer during the WIL period. We hope that this will contribute to the interaction between the employer, learner and university. Please do not hesitate to call us for assistance or to comment on the contents of this guide and let us know of anything that may be of interest and benefit to the learners. We are all stakeholders in the co-operative education business and positive contributions are always welcome to facilitate continuous improvement.

Please feel free to contact the Head of Department, should any problems or questions arise.

Faculty of Engineering
Department: Metallurgical Engineering
Vaal University of Technology
Private Bag X021
VANDERBIJLPARK, 1900

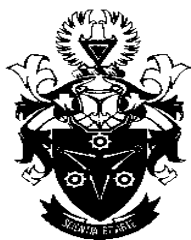
Tel: (016) 950- 9165/9243
Fax: (016) 950- 9796

VAAL UNIVERSITY OF TECHNOLOGY

FACULTY OF ENGINEERING AND TECHNOLOGY

METALLURGICAL ENGINEERING

EVALUATION OF WORK INTEGRATED LEARNING



- ◆ This document must be completed by the learner and the employer for each semester of WIL he/she has done and must be certified as correct by the employer
- ◆ A typed report of approximately 2000 words on the WIL period from the learner must accompany this document.
- ◆ After completion of his/her studies, the learner must submit this document to the Vaal University of Technology, together with the application for the diploma.
- ◆ The application for the diploma must be accompanied by a supporting covering letter bearing the letterhead of the company.

LEARNER INITIALS & SURNAME	
----------------------------	--

LEARNER NUMBER		IDENTITY NUMBER	
----------------	--	-----------------	--

LEARNING PERIOD PER SEMESTER	FROM		TO	
------------------------------	------	--	----	--

COMPANY	
---------	--

COMPANY ADDRESS			
		TEL.NR.	

Mark with a x in the appropriate space:

METALLURGICAL		EXTRACTIVE		PHYSICAL	
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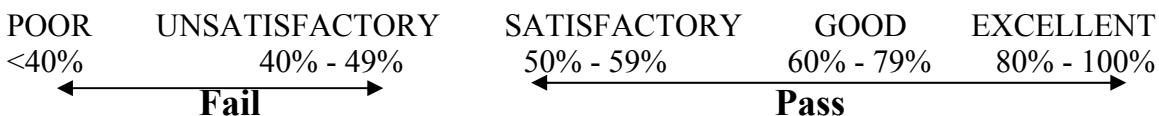
WORK INTEGRATED LEARNING		
SEMESTER 1	PRACTICE I	
SEMESTER 2	PRACTICE II	

SUMMARY OF WORK INTEGRATED LEARNING:

METALLURGICAL ENGINEERING: EXTRACTIVE

WORK INTEGRATED LEARNING (Duration 26 Weeks/semester)	Duration in weeks	EVALUATION MARK (%) (see below)	SIGNATURE (Supervisor)
Safety Measures			
Communion			
Screening and Classification			
Concentration processes			
Dewatering			
Calcination and Roasting			
Smelting and Refining			
Electrolysis			
Hydrometallurgy			
Other			

Explanation of the evaluation scale:



METALLURGICAL ENGINEERING: PHYSICAL

WORK INTEGRATED LEARNING (Duration 26 Weeks/semester)	Duration in weeks	EVALUATION MARK (%) (see below)	SIGNATURE (Supervisor)
Safety Measures			
Laboratory and Quality Control			
Plant Learning			
Research Activities			
Other			

Explanation of the evaluation scale:



EVALUATION OF THIS APPLICABLE SEMESTER’S FUNCTIONAL ELEMENTS OF LEARNER:

ELEMENT	EVALUATION MARK (%) (see previous page)	SIGNATURE (Supervisor)
1. Technological knowledge		
2. Manipulative skills		
3. Mental skills		
4. Communication skills		
5. Personal and Interpersonal skills		
6. Supervisory and Management skills		
7. Professional growth		
8. Judgement		
9. Working pace		
10. Punctuality		
11. Dress		
12. Attendance		

FINAL MARK:

.....%

TO BE COMPLETED BY THE SUPERVISOR

REMARKS ON THE LEARNER'S PROFESSIONAL GROWTH AND DEVELOPMENT

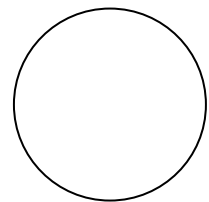
It is hereby declared that the information contained in this document is correct and that the learner has done the prescribed learning for the period indicated.

NAME

DESIGNATION

SIGNATURE

DATE



OFFICIAL STAMP

SIGNATURE OF LEARNER:

FOR UNIVERSITY USE ONLY:

EVALUATION BY SUPERVISOR

.....%

EVALUATION BY UNIVERSITY/MODERATOR

.....%

REMARKS:

.....
.....
.....
.....
.....

FINAL MARK:

.....%

.....
HEAD OF DEPARTMENT

.....
DATE



**VAAL UNIVERSITY OF TECHNOLOGY
FACULTY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF METALLURGICAL ENGINEERING**

COVER PAGE

Type of report (indicated with an X):

P1 Progress report

P1 Semester report

P1 Appendix D

P2 Progress report

P2 Semester & Project report

P2 Appendix D

LEARNER NAME

LEARNER NUMBER

ID NUMBER

DATE

**WORK INTEGRATED LEARNING
PERIOD (P1 or P2)**

ADDRESS OF LEARNER

COMPANY

MENTOR

SIGNATURE: LEARNER

SIGNATURE: MENTOR