Department of Chemical Engineering

Program: National Diploma: Chemical Engineering

In-Service Training

1. **IT IS THE RESPONSIBILITY OF THE STUDENT TO:**

- adhere to the rules, regulations and standards of the Experiential Training provider
- ☐ ensure that the guidelines laid out in this Experiential Training manual are adhered to
- ☐ commit themselves to meaningful and relevant experiential training
- ☐ submit Experiential Training reports as required
- ☐ provide feedback on experiential training undertaken
- ☐ provide feedback on work satisfaction, work environment and prospects for promotion.

2. Upon securing employment, the students must register within two weeks with the university The twelve months required for experiential will be counted from the date of registration.

3. **Hints for successful completion of experiential training**

A common misconception among students is that they are qualified once they have successfully completed the theoretical requirements. However, the diploma can only be awarded upon completion and approval of the experiential training. In order to ensure the approval of experiential training, the students need to:

3.1. ensure that requirements in the experiential training manual are met

3.2. if necessary, do tasks that are beyond their job description in their own time so that all requirements will be met

3.3 communicate with their supervisors regarding outstanding requirements

3.4 submit all reports on time

4. **Criteria for award of the Diploma**

The National Diploma in Chemical Engineering can only be awarded once the following requirements are met.

1. all theoretical subjects must have been passed

2. twelve months of appropriate experiential training must have been completed and the reports must have been submitted and approved, i.e. the requirements for Experiential Learning

3. application form requesting the award of the diploma must be duly completed and submitted.

Ensuring that all these conditions are met is 'literally' in your hands.

5. **Submission guideline for 12 months**

period	items
Month 1-3	Payment of registration fee Registration of EXCE101 and EXCE201 with the department Employer and student details Set up dut4life email account Register for Turnitin with the secretary
Month 3	1st technical report 1st visit and assessment by the university mentor / lecturer
Month 6	2nd technical report
Month 9	3rd technical report
Month 9-12	Oral presentation ONLY when 120 credits are met. Student will be contacted. 2nd visit and assessment by the university mentor / lecturer (if necessary)
Month 12	4th technical report Student assessment of the workplace Supervisor's assessment of the student Summary and proof of employment Certificate of employment

6. **Communication**

All communication via email to be done with the dut4life email address.

Contact Details : Dr. M. Chetty
In-service training co-ordinator
(031) 3732218 (secretary)
(031) 373384 (office)
(031) 3732285 (fax)
chettym@dut.ac.za

7. **Submission of reports**

All reports are to be submitted on the due dates which are the end of each academic term. Reports are to be placed in the department drop in box (open 24/7). If the student is working away from Durban, reports can be posted and the posting date will be taken as the submission date. Aggrotat forms to be filled with valid reasons for non-submission. If it is work-related then a company letter giving reasons for non-submission. Reports not submitted on the due date will have to wait in order for marking. All resubmissions are due 7 days from the date of receipt of the feedback form. Feedback will be sent to the du4life email address.

8. **Assessment**

A series of lectures/discussion sessions will be held during the course of the year. You will be notified via the dut4life email system. Requirements are 120 credits from the list below for the 12 months of training, oral presentation, lecturer assessment of the workplace training and industrial; supervisor's assessment of the training.

9. **Experiential Learning Outcomes for ND: Chemical Engineering**

SPECIFIED OUTCOMES	ASSESSMENT CRITERIA	CREDIT VALUE
The learner will be competent to:		
A. Produce a process flow diagram (PFD) of the process under consideration and describe in appropriate technical terms the processing route of the product/s of the plant/section of plant under consideration	i. A brief introduction to this outcome/task is presented. ii. The overall purpose of the plant / section of the plant is described, with the aid of a process flow diagram. iii. Chemical reaction/s involved in the production of product/s from the raw materials utilized in the plant /section of the plant is described. iv. Physical operations involved in the production of product/s from the raw materials utilized in the plant /section of the plant are described. v. Computer generated PFD is produced vi. All major streams and equipment are labeled vii. Stream information in the required format is presented on the PFD viii. Acceptable symbols and notation are used	10
B. Perform a comprehensive multiple unit material balance for the plant / section of plant under consideration	i. A brief introduction to this outcome/task is presented. ii. A flow-sheet / process block diagram for the plant/section of plant under consideration is presented iii. The basis for the calculations is clearly defined iv. Acceptable SI units consistently throughout the balance is used v. All assumptions are clearly stated and fully justified vi. The balance is presented in a clear and methodical manner vii. A summarized balance in the form of a table is presented (all streams and losses must be accounted for)	10
C. Perform a comprehensive multiple unit energy balance for the plant / section of plant under consideration	i. A brief introduction to this outcome/task is presented. ii. A flow-sheet / process block diagram for the plant/ section of plant under consideration is presented. iii. The correlations that are used to determine thermal and physical properties of the various streams under consideration are clearly stated and properly referenced. iv. Acceptable SI units are used consistently throughout the balance. v. All assumptions are clearly stated and fully	10

	justified. vi. The balance is presented in a clear and methodical manner. vii. A summarized balance in the form of a table is presented (all streams and losses must be accounted for).	
D. Evaluate the efficiency of OR design elementary piping, pumping and mixing systems	i. A brief introduction to this outcome/task is presented. ii. A flow-sheet / process block diagram for the plant/ section of plant under consideration is presented. iii. The type of piping, pumps, and mixing equipment used in the various applications encountered in the plant / section of plant is stated and the selection justified iv. The correlations that are used to evaluate/design the piping and mixing systems and that which was used for the selection of the various pumps in the evaluation/design are clearly stated and properly referenced. v. Acceptable SI units is used consistently throughout the calculations vi. All assumptions are clearly stated and fully justified vii. The evaluation/s/design/s are presented in a clear and methodical manner viii. Spreadsheets are used for all iterative calculations.	10

E. Produce a Process and Instrumentation Diagram (P&ID) of the plant / section of plant under consideration	i. A brief introduction to this outcome/task is presented. ii. Computer generated P&ID is produced iii. All major streams and equipment are labeled iv. All major control loops are indicated v. Acceptable symbols and notation are used and is included a legend in the P&ID vi. All major control loops in the various applications encountered in the plant / section of plant are stated and selection justified vii. The operating range of the plant/section must be stated viii. A brief description and operating principles of the various instruments are shown on the P&ID.	10
F. Perform a Hazard and Operability Study (HAZOP) on the process or part of the process under consideration	i. A brief introduction to this outcome/task is presented. ii. The P&ID for the plant / section of plant under consideration is presented. iii. Appropriate methodology is used correctly iv. The study is presented in a clear and methodical manner	10

	v. Deviations studied are meaningful vi. The appropriate consequences and recommendations to the deviations under study are presented vii. The study is presented in an acceptable format	
G. Evaluate the efficiency of or design at least one heat transfer operation in the plant / section of plant under consideration	i. A brief introduction to this outcome/task is presented. ii. A flow-sheet / process block diagram for the plant / section of plant under consideration is presented. iii. The choice of heat transfer equipment in the various applications encountered in the plant are stated and justified iv. The correlations that are used to design the various heat exchange equipment are clearly stated and properly referenced v. SI units are used consistently throughout the calculations vi. All assumptions are clearly stated and fully justified vii. The calculations / design/s is presented in a clear and methodical manner viii. Spreadsheets are used for all iterative calculations. ix. The differences between the actual and design performance is extensively commented on	10
H. Evaluate the efficiency of or design at least one mass transfer operation in the plant / section of plant under consideration	i. A brief introduction to this outcome/task is presented. ii. A flow-sheet / process block diagram for the plant / section of plant under consideration is presented. iii. Mass transfer equipment in the various applications encountered in the plant is stated and justified choice iv. The correlations that are used to design the various mass exchange equipment are clearly stated and properly referenced v. SI are used units consistently throughout the calculations vi. All assumptions are clearly stated and fully justified vii. The calculations / design/s is presented in a clear and methodical manner viii. Spreadsheets are used for all iterative calculations. ix. The differences between actual and design performance is extensively commented on.	10
I. Develop diagnostic tool for the	i. A brief introduction to this outcome/task is	10

	efficient operation of the plant / section of plant under consideration	presented. ii. A flow-sheet / process block diagram for the plant / section of plant under consideration is presented. iii. Fault tree analysis of the plant / section of plant under consideration are presented. iv. Acceptable and meaningful rectification paths for the potential problems are identified	
J.	Perform technical investigations	i. The need and purpose of investigation is presented ii. Investigation / experimental methodology is described and defended. iii. Data collection and analysis methods are described and defended. iv. Results are presented in a logical and appropriate manner v. Meaningful recommendations and conclusions are presented	10
K.	Setup, operate, monitor, and optimum control of process operations NB. The complexity of the process / plant will be taken into account in the assessment of this specified outcome.	This competence is evaluated through workplace assessment: i. The understanding of the chemical process as a set of related systems is demonstrated ii. Skill in operating the plant / section of plant iii. Skill in trouble shooting in process operations to isolate / correct cause of problem iv. Ensured compliance with the company=s safety standards and procedures during operations v. Communicated effectively (both oral and written) and promptly with regards to reporting and recording of information during process operations vi. A written summary of this specified outcome / competence / skill may be included in one of the reports submitted to the University of Technology vii. A statement from the company confirming the student is competent to start up, operate and shut down the plant/section of the plant.	10
L.	Perform Safety and Hazards Audit	i. A brief introduction to this outcome/task is presented. ii. A flow-sheet / process block diagram for the plant / section of plant under consideration is presented. iii. All potential hazards are identified in accordance with: legislation, codes of practice, industry	10

		standards, operational procedures, evaluation procedures. iv. Compile safety, health, and environmental (SHE) data for all chemicals (raw materials, products, and waste streams) encountered in the plant / section of plant. The occupational exposure limits (OELs) for all chemicals handled on the plant/section of plant is obtained and tabulated v. Hazards associated with potential harm to people, the environment, and organisations are described. Results presented of actual audit work with action items. vi. The intentions and requirements of legislation are identified in terms of the relevant Act's objectives and compliance duties related to hazard control. vii. Plans for controlling hazards are developed and communicated in accordance with organisation requirements viii. Present all results of the actual audit with action items	
M.	Perform an environmental engineering and waste minimisation study	i. A brief introduction to this outcome /task is presented. ii. A flow-sheet / process block diagram for the plant / section of plant under consideration is presented. iii. The environmental effects of engineering systems quantified in accordance with: legislation, codes of practice, industry standards, material safety data sheets, operational procedures, evaluation procedures. iv. Methods to control the environmental effects of engineering systems are proposed. v. Methods to improve energy efficiency in engineering systems and optimize process utility consumption are proposed. vi. A pollution minimization plan to reduce pollution to within industry accepted levels is prepared	10
N.	Use and apply computer technology and application software	i A brief introduction to this outcome/task is presented. ii Purpose and application of engineering software tools are described iii Scope of problem is fully defined iv Use of software is justified v Solution algorithm is described vi Assumptions made during application is listed and justified	10

		vii Results obtained are evaluated and discussed	
O.	Perform laboratory analyses as required by production and quality assurance systems	i. A brief introduction to this outcome/task is presented. ii. Significance of property measured is described iii. Implications of deviations from standard are discussed iv. Brief description of analysis procedure is provided v. Present experimental data vi. Analyse and discuss results obtained against specifications vii. Present experimental results viii. Design and analyse against specifications	10
P.	Perform problem solution to customer request.	i. A brief introduction to this outcome/task is presented. ii. Typical customer request/problem is identified and described iii. Proposed solution is described and justified iv. Evaluation of implemented solution is provided	10
Q.	Application of financial principles to process / production / plant	i. A brief introduction to this outcome/task is presented. ii. Process/production/plant under consideration is fully described iii. All assumptions are clearly stated and fully justified iv. Calculations of production / capital costs are presented in a clear and methodical manner. v. Any correlations that are used are clearly stated and properly referenced vi. Financial tools used to calculate profits / breakeven point / rate of return etc are presented in a clear and methodical manner.	10
R.	Write computer generated technical reports	i. computer-generated work is presented neatly and professionally ii. sentences are punctuated, spelt and constructed appropriately iii. The needs of the readership is addressed iv. Computer graphics are generated appropriately v. Diagrams and tables are accurately, neatly and legibly annotated vi. Calculations are presented in computer-generated spreadsheets vii. Graphic material is integrated appropriately viii. Professional and technical vocabulary is used appropriately	10

	ix. Content critically and logically selected and arranged x. Page space is used effectively and efficiently xi. Cited references fully and appropriately xii. A relevant and complete bibliography using the appropriate convention is drawn up xiii. Enthusiasm and interest is conveyed xiv. The report is presented in an acceptable technical XIV. report format - report contains: title page, declaration, abstract / summary, content page etc.	