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| **VUT LOGO** |
| **Faculty of Engineering and Technology****Electrical Engineering: Process Control** |
| **Workplace Based Learning PROJECT GUIDE** WBL**Code: EIPRJ4A** |
|  **Approved:** Advisory committee meeting**Contents*** Contact Details and General Requirements………………………………………….3
* Registration and Report Submission Instructions……………………………………4
* Project Proposal…………………………………………………………………………5
* Project Assessment Report……………………………………………………………8
* Appendix A Workplace Based Learning (WBL) Evaluation Guideline………….18
* Appendix B Syllabus……………………………………………………………….. 19
* Appendix C Project Format…….…………………………………………………….25
 |
| **Contact details** |
| **Department** | **Office** | **e-mail address** | **Telephone** |
| Computer Systems Coordinator | S112 | koosm@vut.ac.za | 016 950 9434 |
| Co-operative Education | N100 | 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 EIPRJ4A, 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 the project. 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 page 6, the assessor’s declaration (page 9), as well as the assessment report (page 10 to17).
* 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 B is a generic WBL syllabus for the study fields of Process Control Engineering. The assessor/mentor can the specific area of the project.
* Graduate attributes (GA1, GA2, GA 3, GA4, GA5, GA6, GA8) 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 B contain a detailed explanation of the GA’s.
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| 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 project module EIPRJ4A carries a credit value of 30 with a minimum time requirement of 900 hours (approx. 23 weeks).
 |
| **Workplace Based Learning (WBL) Reports** Preparation and submission procedure:* The project proposal, as well as pages 5 and 6 must be emailed to the VUT Process Control & Computer Systems Engineering coordinator (Mr. PJ Mitton), within the first three weeks after this module of WBL commences.
* Proposal

 Start with a firm introduction.  State the problem.  Propose solutions.  Include a schedule and budget.  |
| * The final project must be assessed and signed (page 10 to 17).
* After completing this module of WBL the assessor must complete the assessor’s declaration (page 9).
* The final project and project assessment 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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| Vaal University of TechnologyFaculty of Engineering and TechnologyWorkplace based Learning  Process Control Engineering |
| Logocolr |
| WBL**Project Proposal****EIPRJ4A (900 Hours)** |
| Procedure to complete and submit project proposal: |
| * Within 3 weeks after this module of WBL commenced the pages 5 and 6, as well as the project proposal must be emailed to the relevant VUT WBL coordinator. (Mr PJ Mitton, email address; koosm@vut.ac.za).
* Complete pages 6 signed by the mentor and the student.

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| **1** | **General information – Training SCHEDULE REPORT WBL (EIPRJ4A)** |
| **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** Start date:  |  | End date : |
|  **Student Signature:****Assessor signature:****VUT Office use :** |  | *Accepted* □ | *Declined* □ |
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|  | **2 PROJECT PROPOSAL FOR EIPRJ4A*** The student must submit a project proposal within the first 3 weeks after this module commences.
* The proposal must be signed by both the assessor and the student.
* The students may do a project on their own or they might from part of a project team which is busy with an ongoing project. The aim is to give to student exposure to industrial projects.
* The specific area of the project is determined by the Employer. The following represents typical fields of project content: Process Control Engineering systems

**While compiling a proposal the following outcomes must be kept in mind:*** Apply engineering principles to complete a *well-defined* engineering project.
* Apply knowledge of engineering sciences to applied engineering procedures, processes, systems and methodologies to complete a *well-defined* engineering project.
* Conduct investigations of well-defined problems through locating and searching relevant codes and catalogues, conducting standard tests, experiments and measurements.
* Use appropriate techniques, resources, and modern engineering tools to complete a well-defined engineering project, with an awareness of the limitations, restrictions, premises, assumptions and constraints.
* Communicate effectively, both orally and in writing within an engineering context.
* Demonstrate knowledge and understanding of the impact of this project on the society, economy, industrial and physical environment.
* Demonstrate knowledge and understanding of engineering management principles and apply these to the project, as a member and/or leader in a technical team and to manage the project.
* Understand and commit to professional ethics, responsibilities and norms of engineering technical practice.
* Demonstrate an understanding of workplace practices to solve engineering problems consistent with academic learning achieved.
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| Vaal University of TechnologyFaculty of Engineering and TechnologyWorkplace based Learning (WBL)Process Control Engineering |
| Logocolr |
| WBL**Project Assessment Report****EIPRJ4A (900 Hours)** |
| Procedure to compile and submit the assessment report:* The project structure Appendix C must be used to compile the written report on the project.
* After completion of the project, the project as well as the project assessment report must be submitted.
 |
| * After completion of this module on WBL the assessor must complete the assessor’s declaration (page 9).
* The project and project assessment report (page 8 to 17) must be submitted **by post** or in person to the Cooperative Education department (Room N100) at the VUT.(During Covid period documents can be emailed to coordinator)
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| 2 |  **ASSESSOR DECLARATION – ASSESMENT REPORT WBL Project (EIPRJ4A)** |

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| --- | --- | --- |
| **Student** | **Initials and surname :** |  |
|  | **VUT - Student number :** |  |
|  | **ID number :** |  |
|  | **Company :** |  |
| **Training Period** |  **WBL :** | **to*****Start date: Completion date:*** |
| **Assesor** | **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 WBL Project (EIPRJ4A)

|  |  |
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| **Graduate Attribute 1** | **Problem Solving** |
| Apply engineering principles to systematically diagnose and solve *well-defined* engineering problems. |
| **Mark** (Mark with an X using attached guidelines Appendix A)***Assessor Signature***: | 1 | 2 | 3 | 4 | 5 |
| **Explain how this topic is addressed in the specific project.**(Refer to the Graduate attributes in the Syllabus Appendix B) |
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| **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. |
| **Mark** (Mark with an X using attached guidelines Appendix A***Assessor Signature:*** | 1 | 2 | 3 | 4 | 5 |
| **Explain how this topic is addressed in the specific project.**(Refer to the Graduate attributes in the Syllabus Appendix B) |
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| **Graduate Attribute 3** | **Engineering Design** |
| Perform procedural design of components, systems, works, products or processes to meet requirements, normally within applicable standards, codes of practice and legislation. |
| **Mark** (Mark with an X using attached guidelines Appendix A)***Assessor Signature:*** | 1 | 2 | 3 | 4 | 5 |
| **Explain how this topic is addressed in the specific project.**(Refer to the Graduate attributes in the Syllabus Appendix B)  |
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| **Graduate Attribute 4** | **Investigations, experiments and data analysis** |
| Conduct investigations of *well-defined* problems through locating and searching relevant codes and catalogues, conducting standard tests, experiments and measurements.  |
| **Mark** (Mark with an X using attached guidelines Appendix A)***Assessor Signature:*** | 1 | 2 | 3 | 4 | 5 |
| **Explain how this topic is addressed in the specific project.**(Refer to the Graduate attributes in the Syllabus Appendix B)  |
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| **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. |
| **Mark** (Mark with an X using attached guidelines Appendix A)***Assessor Signature:*** | 1 | 2 | 3 | 4 | 5 |
| **Explain how this topic is addressed in the specific project.**(Refer to the Graduate attributes in the Syllabus Appendix B)  |
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| **Graduate attribute 6** | **Professional and technical communication** |
|  Communicate effectively, both orally and in writing within an engineering context.  |
| **Mark** (Mark with an X using attached guidelines Appendix A)***Assessor Signature:*** | 1 | 2 | 3 | 4 | 5 |
| **Explain how this topic is addressed in the specific project.**(Refer to the Graduate attributes in the Syllabus Appendix B) |
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| **Graduate attribute 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. |
| **Mark** (Mark with an X using attached guidelines Appendix A)***Assessor Signature:*** | 1 | 2 | 3 | 4 | 5 |
| **Explain how this topic is addressed in the specific project.**(Refer to the Graduate attributes in the Syllabus Appendix B) |
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**Project Topic:……………………………..**

**PROJECT ASSESSMENT**

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| **Topics** | **Assessor** | **Rating****Appendix A** | **VUT Examiner** |
| Oral presentation |  |  |  |
| Assessment of documentation |  |  |  |
| Independent working ability of student |  |  |  |
| Technical standard of project |  |  |  |
| Technical success of project |  |  |  |
| **Total** |  |  |  |
| Graduate Attribute Mark |  |  |  |
| **Final Mark** |  |  |  |

Student Signature: ………………………………………Date:………………

Assessor Signature …………………………………. Date:………………….

University Examiner Signature: ………………….. Date:……………….

**Appendix A**

**WBL - EIPRJ4A**

|  |  |
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| **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 B

|  |  |
| --- | --- |
| Logocolr | **Vaal University of Technology** |
| **Faculty of Engineering and Technology** |
| **Department Process Control and Computer Systems Engineering** |
| **Syllabus** |
|  |  |
| **Instructional offering:** | Work-place-based Learning |
| **Internal Code:** | EIPRJ4A |  |
| **Instructional programmes:** | Diploma in Electrical Engineering |
| **Assessment:** | Written Project Report |
| **NQF Level:**  | 6 |
| **Credits:**  | 30 |
| **Document revision:** | February 2020 |

1. **Syllabus Content**
2. **Project:** The specific area of the project is determined by the Employer. The following represents typical fields of project content: Industrial control systems, programmable devices, plant control loops and field instruments.
3. As an NQF level 6 module the project could be done in an engineering environment, which typically includes control systems, safety systems, industrial networks, field instruments and IIOT devices.
4. Other areas in which the project in work-place-based learning is recommended is in the more advanced aspects of process data capturing and storage systems. It could also include the design, configuration, and implementation of IIOT systems and devices.

**2. Learning Outcomes**

After completion of this project the student should be able to demonstrate following:

* Apply engineering principles to complete a *well-defined* engineering project.
* Conduct investigations of well-defined problems through locating and searching relevant information, conducting standard tests, experiments, and measurements.
* Communicate effectively, both orally and in writing within an engineering context.
* Demonstrate an understanding of workplace practices to solve engineering problems consistent with academic learning achieved.
* Participation in a real-world problem that brings together intellectual enquiry and student engagement in meaningful work.

**3. References**

* .

**4. Graduate Attributes**

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.

**Level Descriptor: Well-defined engineering problems:**

1. Can be solved mainly by practical engineering knowledge, underpinned by related theory.

**and have one or more of the characteristics:**

1. are largely defined but may require clarification.
2. are discrete, focused tasks within engineering systems.
3. are routine, frequently encountered, may be unfamiliar but in familiar context.

**and have one or more of the characteristics:**

1. can be solved in standardized or prescribed ways.
2. are encompassed by standards, codes and documented procedures; requires authorization to work outside limits.
3. information is concrete and largely complete but requires checking and possible supplementation.
4. involve several issues but few of these imposing conflicting constraints and a limited range of interested and affected parties.

**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:** The level of knowledge of mathematics, natural sciences and engineering sciences is characterized by:

1. A coherent range of fundamental principles in mathematics and natural science underlying a discipline or recognised practice area.
2. A coherent range of fundamental principles in engineering science and technology underlying an engineering 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 3: Engineering Design**

Perform procedural design of components, systems, works, products, or processes to meet requirements, normally within applicable standards, codes of practice and legislation.

**Range Statement:** Design problems used in assessment must conform to the definition of well- defined engineering problems:

1. A design project should be used to provide evidence of compliance with this outcome.
2. The problem would be typical of that which the graduate would participate in a typical employment situation shortly after graduation.
3. The selection of components, systems, engineering works, products, or processes to be designed is dependent on the sub-discipline.
4. A design project should include one or more of the following impacts: social, economic, legal, health, safety, and environmental.

**Graduate Attribute 4: Investigations, experiments, and data analysis**

Conduct investigations of well-defined problems through locating and searching relevant codes and catalogues, conducting standard tests, experiments, and measurements.

**Range Statement:** The balance of investigation should be appropriate to the discipline. An investigation should be typical of those in which the graduate would participate in an employment situation shortly after graduation.

**Note:** An investigation differs from a design in that the objective is to produce knowledge and understanding of a phenomenon.

**Graduate Attribute 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.

**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 6: Professional and technical communication**

Communicate effectively, both orally and in writing within an engineering context.

**Range Statement:** Material to be communicated is in a simulated professional context:

1. Audiences are engineering peers, academic personnel and related engineering persons using appropriate formats.
2. Written reports range from short (minimum 300 words) to long (a minimum of 2 000 words excluding tables, diagrams and appendices), covering material at the exit level.
3. Methods of providing information include the conventional methods of the discipline, for
4. Example engineering drawings, physical models, bills of quantities as well as subject- specific methods.

**Graduate Attribute 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.

**Range Statement:**

1. The ability to manage a project should be demonstrated in the form of the project indicated in graduate attribute 3.
2. Tasks are discipline specific and within the technical competence of the graduate.
3. Projects could include laboratories, business plans, design, etc.;
4. Management principles include:
5. Planning: set objectives, select strategies, implement strategies and review achievement.
6. Organising: set operational model, identify and assign tasks, identify inputs, delegate responsibility and authority.
7. Leading: give directions, set example, communicate, motivate.
8. Controlling: monitor performance, check against standards, identify variations, and take remedial action.

**5. Graduate attributes assessment**

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| **Graduate Attribute 1: Problem Solving**Apply engineering principles to systematically diagnose and solve *well-defined* engineering problems. |
|  |
| Where is outcome assessed? | In a workplace project. |
| How is this outcome assessed? | Within the context of a workplace project.  |
| What is satisfactory performance? | The project can be described in a coherent problem statement.A solution to the problem can be presented.  |
| What is the consequence of unsatisfactory performance? | Students must work on the project definition until a suitable solution can be proposed.  |

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| --- |
| **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 a workplace project. |
| How is this outcome assessed? | Through the project documentation.  |
| What is satisfactory performance? | The project solution is supported by the relevant scientific and engineering knowledge within the documentation.  |
| What is the consequence of unsatisfactory performance? | The documentation must be updated until all relevant engineering knowledge can be reported.  |

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| **Graduate Attribute 3: Engineering Design** Perform procedural design of components, systems, works, products or processes to meet requirements, normally within applicable standards, codes of practice and legislation.  |
|  |
| Where is outcome assessed? | In a workplace project. |
| How is this outcome assessed? | A coherent design incorporating any relevant social, economic, legal health safety or environmental impacts is presented.  |
| What is satisfactory performance? | The problem design must be demonstrated to be relevant within the requirements of the particular project. |
| What is the consequence of unsatisfactory performance? | Students must work on the project design until a suitable solution can be proposed.  |

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| **Graduate Attribute 4: Investigations, experiments and data analysis** Conduct investigations of well-defined problems through locating and searching relevant codes and catalogues, conducting standard tests, experiments and measurements. |
|  |
| Where is outcome assessed? | In a workplace project. |
| How is this outcome assessed? | A coherent design incorporating any relevant data is presented.  |
| What is satisfactory performance? | The data, codes, test results or measurements must be demonstrated to be relevant within the requirements of the particular project. |
| What is the consequence of unsatisfactory performance? | Students must work on the project until all relevant data can be presented.  |

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| **Graduate Attribute 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. |
|  |
| Where is outcome assessed? | In a workplace project. |
| How is this outcome assessed? | A coherent design incorporating any relevant data is presented.  |
| What is satisfactory performance? | The data, codes, test results or measurements must be demonstrated to be relevant within the requirements of the particular project. |
| What is the consequence of unsatisfactory performance? | Students must work on the project until all relevant data can be presented.  |

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| **Graduate Attribute 6: Professional and technical communication**Communicate effectively, both orally and in writing within an engineering context. |
|  |
| Where is outcome assessed? | In a workplace project. |
| How is this outcome assessed? | Students are required to present a compressively documented and referenced project report and to do an oral presentation of the project.  |
| What is satisfactory performance? | The documentation and presentation is professionally presented.  |
| What is the consequence of unsatisfactory performance? | The documentation must be corrected until it is of a satisfactory standard.  |

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| **Graduate Attribute 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. . |
|  |
| Where is outcome assessed? | In a workplace project. |
| How is this outcome assessed? | Students are required to present a compressively documented and referenced project report and to do an oral presentation of the project.  |
| What is satisfactory performance? | The documentation and presentation is professionally presented.  |
| What is the consequence of unsatisfactory performance? | The documentation must be corrected until it is of a satisfactory standard.  |

**6. Module Credits**

**30 Credits**

**1 Credit = 30 Hours**

**30 x 30 = 900 hours (23 Weeks)**

**7. Module Knowledge Profile**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Mathematical****Sciences** | **Natural Sciences** | **Engineering Sciences** | **Engineering Design** | **Computing and IT** | **Complementary Studies** | **Work Integrated learning** |
|  |  | 15 | 10 |  | 5 |  |

**Appendix C**

**Make use of the format as described in subject project design EDES3.**

**Cover Page Title page Declaration**

**Acknowledgments**

 **Abstract**

**Table of Contents**

**List of Figures List of Tables**

**List of Acronyms/Abbreviations**

**Chapter 1 Chapter 2 Chapter 3**

**Chapter 4 Chapter 5**

**List of References**

**Appendixes**

**(optional)**