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| **Programme** | **B.Sc (Mechanical Engineering) with Foundation Year** | |
| **Module** | **Engineering Technology: ATT3036** | |
| **Assessment Title** | **Assignment 2- Technical Report writing** | **Weighing;50%** |
| **Student Number** |  | |
| **Marking Tutor** | **Khyati Shah** | |
| **Submission Deadline** | **15/01/2024** | |
| You are required to submit a report of 1500 words.  **Please note**: *Up to 10% over the specified word length = no penalty*   * *10 – 20% over the specified indicative word length = 5 marks subtracted (but if the assessment would normally gain a pass mark, then the final mark to be no lower than the pass mark for the assessment).* * *More than 20% over the indicative word length = if the assessment would normally gain a pass mark or more, then the final mark will capped at the pass mark for the assessment*.     **Note- Table of contents, Diagrams and references are not included in word count.** | | |
| All written work should be referenced using the standard University of Bolton referencing style– see: <https://libguides.bolton.ac.uk/resources/referencing/> | | |
| **How to Submit** | Unless otherwise notified by your Module Tutor, electronic copies of assignments should be saved as word documents and uploaded into Turnitin via the Moodle class area. If you experience problems in uploading your work, then you must send an electronic copy of your assessment to your Module Tutor via email BEFORE the due date/time. | |

1. **Assignment and Specifications**

You are expected to work in groups for the entirety of this project; the submission will be a group report at the end of the project. The purpose, learning outcomes and task of the project are given in the following sections.

## Aims and learning outcomes

This assessment satisfies the following learning outcomes:

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| **Learning outcomes** | |
| **LO4** | Develop foundation Engineering technical knowledge |
| **LO5** | Experience Modern Engineering Modelling and Analysis Software |

The project aims to give you a firsthand experience of the Engineering design process and working in teams. By the end of the project you are expected to:

* + 1. Understand the requirements, tasks and specifications of the project
    2. As a team, put forth various design concepts that meet the design specifications
    3. Systematically evaluate the various design concepts as a team and justify the selection of one design concept (or an amalgamation of the initial design concepts into one design concept)
    4. Further develop the selected design concept in order to generate a detailed design that can meet the design specifications and is reproducible

These outcomes can be further broken down into sequential tasks given as follows:

* + - 1. **Calculations:** Each group will work together to carry out calculations to meet the design specifications
      2. **Conceptual design:** Each group member will produce and communicate a conceptual design via design sketches and 3D models made on Solidworks
      3. **Detailed design:** Teams will generate a finalized deign based on individual concepts and the calculations via Solidworks. Simulating physical conditions via Solidworks/Ansys is encouraged
      4. **Prototype feasibility:** Teams will review and evaluate their detailed design, making trade- offs between cost, weight and functionality, wherever necessary

## Task and design requirements

Your task is to design a rubber band powered buggy and propose how you would manufacture it. The design requirements are as follows:

1. The buggy shall carry a payload which has a maximum load of 25g.

2. The dimensions of the payload are 𝟖𝟎×𝟓𝟎×𝟏𝟎𝒎𝒎.

3. The payload should always remain intact to the buggy and should not be damaged with the movement of the buggy.

4. The buggy should only be powered by rubber bands and will always be in contact with the ground.

5. The buggy should be able to sustain small collisions with walls when carrying the payload.

6. The buggy should be economical, sustainable and should not be hazardous

7. The buggy should not be pulled or pushed for it to start moving. Components such as wheels can be turned to wind up the rubber bands.

# Submission

This is a group assignment and constitutes 50% of the module. The deadline for submission is Friday**, 18th September 2023** by **5:00pm**. The submission must be made on Moodle via Turnitin, the link for which will be made available on the module’s Moodle page. The following must be submitted:

* **A group project report as a PDF file.**

The report should highlight the following:

1. Individual conceptual designs (Sketches and images/ drawings of the 3D model)
2. Literature on and its working principles, materials and manufacturing
3. Calculations of dimensions,
4. Selection criteria of the detailed design
5. Selection of materials
6. Suggestions for manufacturing processes
7. Detailed design of the Sphere (Sketches and images/drawings of the 3D model)
8. Working principle of the designed Sphere
9. Improvements and future work
10. Technical drawings of the 3D model

# Report structure and marking scheme

## Report Structure:

* + 1. Title Page
    2. Table of contents
    3. Abstract
    4. Introduction
    5. Literature Review
    6. Methodology
    7. Results
    8. Conclusions
    9. Future work
    10. References
    11. Appendix

## Marking scheme

The breakdown of the method of assessment is detailed in the following table:

***Table 1:*** *Assessment criteria of the design project report*

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| **Marking criteria** | **Allocated marks** |
| **Abstract** | 5 |
| **Introduction** | 5 |
| **Literature review** | 10 |
| **Calculations** | 5 |
| **Conceptual design (sketches, CAD model and technical drawings)** | 15 |
| **Detailed design (sketches, CAD model and technical drawings)** | 15 |
| **Materials selection (Justifications for materials, costing, sustainability)** | 10 |
| **Suggested manufacturing methodology (Feasibility, costing)** | 10 |
| **Future work (Suggested improvements, conclusions)** | 10 |
| **References** | 10 |
| **Clarity and grammar** | 5 |

# Indicative reading

1. Nigel Cross, Engineering Design Methods: strategies for product design, Wiley, 4th ed., 2008.
2. Pahl & Beitz “Engineering Design: A Systematic Approach”. Springer, 3rd ed., 2006.
3. Childs, P.R.N “Mechanical Design”, 2nd ed. 2004
4. Kalpakjian, S., and Schmid, S.R., 2010, Manufacturing Engineering and Technology, Pearson, 6th ed.
5. Mikell P. Groover “Principles of Modern Manufacturing” John Wiley & Sons, 4th ed., 2010.
6. Colin H. Simmons, Neil Phelps, Dennis E. Maguire. “Manual of engineering drawing: technical product specification and documentation to British and international standards”, 4th ed., 2012.

# General Assessment Criteria for Written Assessments Level HE3

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|  | % | Relevance | Knowledge | Argument/An alysis | Structure | Presentation | Written English | Research/Ref erencing |
| Class I (Exceptional Quality) | 85-100% | Directly relevant to title.  Expertly addresses the main assumptions of the title and/or the requirements of the brief. | Demonstrates an exceptional knowledge/un derstanding of theory and practice for FE3 level through the identification and summary of key themes. | Makes exceptional use of appropriate arguments and/or theoretical models.  Presents a comprehensive discussion of material resulting in clear, logical and original  conclusions. | Coherently articulated and logically structured. An appropriate format is used. | The presentational style & layout is correct for the type of assignment. Effective inclusion of figures, tables, plates (FTP), where appropriate. | A very well written answer with standard spelling and grammar.  Style is clear, resourceful and academic. | A wide range of sources drawn upon. Sources are cited accurately in the text and in the reference list. |
| Class I (Excellent Quality) | 70-84% | Directly relevant to title.  Addresses the main assumptions of the title and/or the requirements of the brief. | Demonstrates an excellent knowledge/un derstanding of theory and practice for FE3 level through the identification and summary of key themes. | Makes excellent use of appropriate arguments and/or theoretical models.  Presents a comprehensive summary of material resulting in clear, logical  conclusions. | Coherently articulated and logically structured. An appropriate format is used. | The presentational style & layout is correct for the type of assignment. Effective inclusion of figures, tables, plates (FTP), where appropriate. | A well written answer with standard spelling and grammar.  Style is clear, and academic. | A wide range of sources drawn upon. Sources well cited in the text and in the reference list – with only minor errors. |
| Class II/i (Very Good Quality) | 60-69% | Generally addresses the title/brief and covers some key issues in sufficiently meaningful detail. | Demonstrates a very good knowledge/un derstanding of theory and practice for FE3 level through the identification and summary  of key themes. | Uses appropriate arguments or theoretical models.  Clear and valid summary of the material. Presents clear, logical  conclusions. | Logically constructed in the main. An appropriate format is used. | The presentational style & layout is correct for the type of assignment. Inclusion of FTP, where appropriate. | A clearly written answer with standard spelling and grammar. Style is clear, and academic. | A range of sources drawn upon.  Most sources cited accurately in the text and in the reference list. |

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| Class II/ii (Good Quality) | 50-59% | Generally addresses the title/brief but sometimes considers irrelevant issues. | Demonstrates a good knowledge/un derstanding of theory and practice for FE3 level through the identification and summary of some key issues. | Presents largely coherent arguments. Valid summary of the material although focus lacking in places.  Presents conclusions which are fairly clear and  logical. | For the most part coherently articulated and logically structured.  An acceptable format is used. | The presentational style & layout is largely correct for the type of assignment. Inclusion of FTP lacks selectivity. | Competently written with minor lapses in spelling and grammar. Style is readable, and generally academic. | Relevant sources drawn upon.  Some weaknesses in referencing technique. |
| Class III (Satisfactory Quality) | 40-49% | Some degree of irrelevance to the title/brief.  Superficial consideration of the issues. | Demonstrates an adequate knowledge/un derstanding of theory and practice for FE3 level. An attempt is made to identify and summarise key themes. | Presents basic arguments, but focus and consistency lacking in places. Some issues may lack clarity.  Presents conclusions which are not always clear or logical. | Some attempt at articulation and logical structure but gaps in coherence and progression. An acceptable format is used. | The presentational style & layout is largely correct for the type of assignment. Inappropriate use of FTP or not used where clearly needed to aid understanding. | Generally competently written although intermittent lapses in grammar and spelling pose obstacles for the reader. Style limits communicatio n and is non- academic in  places. | Some academic sources but overreliance on non- academic sources.  A number of errors in referencing technique. |
| Borderline Fail | 35-39% | Significant degree of irrelevance to the title/brief. Only the most obvious issues are addressed at a superficial level and in unclear terms. | Demonstrates weaknesses in knowledge of theory and practice for FE3 level, with poor understanding of key themes. | Limited arguments, which lack clarity in places.  Presents conclusions which are neither clear  nor logical. | Poorly structured. Lack of articulation. Format deficient. | For the type of assignment the presentational style &/or layout is lacking.  FTP ignored in text or not used where clearly needed. | Deficiencies in spelling and grammar makes reading difficult.  Simplistic or repetitious style impairs clarity.  Style is not  academic. | Limited sources and poor referencing. |
| Fail | <34% | Relevance to the title/brief is intermittent or missing.  The topic is reduced to its vaguest terms. | Demonstrates a lack of basic knowledge of either theory or practice for FE3 level, with little evidence of  understanding. | Severely limited arguments. Lacks clarity. Conclusions presented are sparse. | Unstructured. Lack of articulation. Format deficient | For the type of assignment the presentational style &/or layout is lacking.  FTP as above. | Poorly written with numerous deficiencies in grammar, spelling and expression.  Style is not academic. | An absence of sources and poor referencing technique. |