



UNIVERSITY OF
PORTSMOUTH
ASK - ACADEMIC
SKILLS UNIT

Experimental Laboratory Reports in Engineering: A template for level 4

(adapted from J. Donohue & J. Ingle, ISEE, UCL, 2018)

Most scientific reports use a similar structure designed to reflect a form of thinking, a particular logic in the applied sciences, known as the *scientific method*. This structure is often referred to as **IMRaD**, which stands for the different sections:

Introduction

Methods

Results

and

Discussion

The **IMRaD** structure has been in use for over 50 years and is a simple and straightforward way of organising either lab reports or research papers in the sciences. It is worth noting that sometimes different terminology is used and, depending on the experiment or purpose of the report, different sections may have more or less emphasis; or other sections are also required, such as: a title page, an abstract, a contents page (you will need to check the precise requirements with your tutors and/or in the assessment brief).

Below is a more detailed template for writing experimental laboratory reports in engineering. (At different sections/stages, the writing has different functions: DESCRIBING, EXPLAINING, and/or DISCUSSING. You should keep these in mind when writing each section/stage).

A template for writing experimental laboratory reports in engineering

INTRODUCTION AND BACKGROUND SECTIONS
1. Briefly states the engineering research problem or question being addressed
2. Briefly explains how the experiment addresses the research problem or question
3. Presents the key principles involved
4a. States the equations used with explanatory comments (see lab sheet)
OR 4b. Derives, where appropriate, equations for this experiment, with explanatory comments (see lab sheet)
5. Ensure intro flows and develops logically in an appropriate engineering style
METHODS (APPARATUS AND PROCEDURE) SECTIONS
1. Clearly labelled diagram (attributed if relevant) (a 2D diagram? are photos allowed?)
2. Description of the apparatus and how it works

3. Experimental procedure described
4. Ensure <i>methods</i> section flows and develops logically in an appropriate engineering style
RESULTS SECTION
1. Processed data, tabulated and labelled in this section (raw data is usually in the appendix and cross referenced in the text)
2. Explanation of how the processed results were obtained from raw data
3. Processed results presented in tables and figures
4. Ensure <i>results</i> section flows and develops logically in an appropriate engineering style
DISCUSSION SECTION
1. Brief discussion of problems in the experiment, and how they affect the analysed results and conclusions
2. Estimation and quantification of the uncertainties in the raw and analysed results
3. Qualitative and quantitative comparison of the observations with the theory
4. Exploration of any difference between theory and experiment (relation of the discrepancy to the experimental uncertainties and assumptions behind the theory)
5. Discussion of whether the research question or problem has been addressed.
6. Ensure <i>discussion</i> section flows and develops logically in an appropriate engineering style
CONCLUSIONS SECTION
1. Conclusions: a concise summary of the key outcomes of the experiment
2. The implications of the results in relation to the problem stated in the intro.
3. Future research: Does the experiment need to be run again (because the results are unsatisfactory) or if the results are satisfactory what research should be done next
4. Ensure <i>conclusions</i> section flows and develops logically in an appropriate engineering style
OVERALL PRESENTATION
1. Correct format of equations
2. Correctly formatted references and reference list
3. Accurate spelling/punctuation/grammar
4. Professional layout/format of the report

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