

**DEPARTMENT OF BIOLOGICAL SCIENCES
NATIONAL UNIVERSITY OF SINGAPORE
GUIDELINES FOR WRITING THE UROPS PROJECT REPORT
AY2016/17 Semester 1**

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CONTENTS

The **order of the contents** of the UROPS project report should be as below:

1. Title Page
2. Abstract (200-word limit)
3. Introduction, including the Literature Review (<20% of the total words used)
4. Methods (15–20% of the total words used)
5. Observations and/or Results or Results and Discussion
6. Discussion
7. References
8. Acknowledgements
9. Appendices (optional)

Pagination

All sections of the UROPS project report before the *Introduction* (except the *Title Page*) should be paginated in **Roman numerals** (e.g., i, ii, iii, iv, v, etc.) at the bottom centre of the page. **All other pages** should be numbered with **Arabic numerals** (e.g., 1, 2, 3, 4, 5, etc.) Appendices will be numbered as A-1, A-2, A-3, A-4, A-5, etc.

Length

The **maximum word count** of the UROPS project report includes **only from the *Introduction to Discussion* sections:**

1. **3000 words for 4 MC modules (LSM2288; LSM3288)**
2. **5000 words for 8 MC modules (LSM2289; LSM3289)**

Please do not 'pad' your report to achieve this limit. This is detrimental!

Provide the number of words on the title page.

Report Format

The entire UROPS project report must be as follows:

1. Printed on white, A4 paper.
2. Have double spacing.
3. Use Times New Roman font and font size of 12 points throughout as in all parts of this document except some lines of Appendix 1.
4. Have a 3.5 cm left margin, and 2.5 cm margins on the three other sides as in this document.
5. The references in the *References* section should be typed with single spacing.

Submission Format

Two bound, hard copies which have been checked for plagiarism (for the examiners) and the PDF file of the UROPS project report must be submitted to the Admin Office of the Department by the set deadline. Late submission will be penalized, except in special cases (e.g., illness). The penalty is a 2% deduction for each day after the due date, inclusive of non-University working days.

Abbreviations and Biochemical Names

Units of measurement, symbols and abbreviations

Units

The International System of Units (SI units) should be used unless the traditional symbol is still in common usage in the field of study. The following URL would be helpful: <http://www.bipm.org/en/si/>

Symbols

The use of Greek letters in mathematical symbols and molecular nomenclatures should be clear. Ensure proper font type switches of the word processor so that the font does not change when the report appears in its final, printed form.

The use of *Italics* for mathematical variables, genera and species, gene/mutant nomenclatures, chemical prefixes and non-English words should be consistent throughout the report, and in line with its common use in the particular field of study.

Abbreviations and acronyms

Abbreviations should be defined at first mention and used consistently thereafter.

Numbers under 10 should be spelt out in the text (e.g., one, two, three, four,....eight, nine, 10, 11, 12, 100, 1000, 10000, 1000000, etc.) unless accompanied by the abbreviation for a unit: e.g., 1 mm, 2 cm, 4 μm . **Do not start a sentences with an Arabic numeral** but spell it instead, even if the number is 10 or more, e.g., “Fifty-nine trees were sampled.”

Recommended textbook for reference:

Baron and Clarke, Units, Symbols, and Abbreviations: A Guide for Authors and Editors in Medicine and Related Sciences. ISBN-10: 1853156248 | ISBN-13: 978-1853156243

References

Literature should be cited in the text as follows:

1. Depending on the **number of authors** of the reference, then by the lone or lead author’s surname and year of publication as follows:
 - a. **One author:** e.g., “Smith (1997) reported that ...” or “This result has been observed by at least one other worker (Smith, 1997)”.
 - b. **Two authors:** e.g., “Lim and Chee (2007) reported that ...” or “This result has been observed by at least two other workers (Lim and Chee, 2007)”.
 - c. **Three or more authors** (all other authors except the first are indicated by the Latin abbreviation *et al.*): e.g., “Rajamanickam *et al.* (2013) reported that ...” or “This result has been observed by at least three other workers (Rajamanickam *et al.*, 2013)”.
2. **Citing several references** together should be done chronologically then alphabetically: e.g., “This result has been observed by at least four other workers (Zhang, 1996; Smith and Ho, 1998; Soong, 1998; Alatas *et al.*, 2004).”
3. **Citing two or more references by the same author that were published in the same year**, e.g., “This result has been observed by at least five other workers (Lim, 1991a, b).”

For entries in the the *References* section, please do the following:

1. Only the references cited in the text should be included here.
2. All references must be listed in alphabetical order by the lone or senior author’s surname.
3. Use single spacing.
4. Use a hanging indent of 0.5 cm for each reference (see examples below in S/No. 5).
5. **You are at liberty to follow any journal’s format for the references**, but please be consistent and use the same format throughout the document. The following are examples of the form that is used in the journal, *Cell*, but you may use any other journal’s format:

Choi, C.K and Kim, S.H. (1989), ‘Coupled use of integration and nonconforming modes in improving quadratic plate element’, *Int. J. Num. Meth. Eng.*, Vol 28(4), 1909–1928.

Choi, C.K. and Kwak, H.G. (1989), "Optimum RC member design with discrete sections", *Proceedings of '89 ASCE Structures Congress*, San Fransisco, May.
Salvadori, M.G. and Baron, M.L. (1961), *Numerical Methods in Engineering*, Prentice-Hall, Eaglewood Cliffs, NJ.

Names of Organisms

Scientific names of organisms are Latinised binomials (e.g., algal, bacterial, botanical, fungal or zoological names) or trinomials (zoological names) that must be written in *italics* whenever used. The first or **generic name** is written with an initial capital letter, the second or **specific epithet** or third or **subspecific epithet** is written with a lower case initial letter, e.g., *Escherichia coli*, *Zingiber officinale*, *Trachemys scripta elegans*.

Title

The **rules for formulating a good title** are:

1. The title should identify the specific nature of the research and also some broader area within which the work occurred.
2. The **title length should be kept to a minimum**, preferably approximately a dozen or so words at the most.
3. **Avoid non-essential words or phrases** such as "Studies on the...", "Some aspects of" and "Investigations into the"

Abstract

The *Abstract* should have these **features**:

1. Be 200 words or less.
2. Be a single paragraph.
3. Have his form:
 - a. The first few sentences identify the topic
 - b. The next few the research design
 - c. Then the basic observations and/or results
 - d. The last one or two, the theoretical implications of the observations and/or results.
4. Not contain references to literature, figures or tables.
5. Avoid jargon (i.e., "the language, especially the vocabulary, peculiar to a particular trade, profession, or group").

Being an overview of the report, **the Abstract should be written last.**

Provide the number of words in the Abstract at the end of that section.

Introduction (Including the Literature Review)

The *Introduction* must form a bridge from past to the present work in a stimulating manner. The 'bridge', moreover, should have the shape of an inverted pyramid: In other words, a good introduction starts with a broad base and ends with a specific point. It first considers the importance of the major area being investigated, primarily to provide the reader with a frame of reference from which to consider your work.

Then, within the chosen area, it identifies a gap in our knowledge, or a precise question, or a particular controversy. Finally, it pinpoints the intended value of the present research. New approaches and assumptions on which the work is based should also be identified at this point.

A **broad summary of the literature** concerning the chosen topic may be presented in the report. All too frequently this section is more 'padding' (i.e., unnecessary verbal material used deliberately to lengthen a speech, essay, etc.), especially when the literature is presented in chronological order rather than in an integrated form.

A limit of **20% of the total words used** is set for the *Introduction*.

Materials and Methods

The *Materials and Methods* section consists of **three sets of descriptions**—those of the procedures, subjects and equipment used during the study. All three are traditionally given in sufficient detail to allow a competent researcher to exactly duplicate the whole study. There are a number of ways of simplifying this task:

1. The first is to name but not describe commercially available equipment and well-known procedures.
2. Specially built equipment must of course be described in detail, though they can often be illustrated with simple figures.
3. Another approach that can eliminate much trivia is to focus on the animal or plant material rather than on your activities.
4. If the procedures are long and complex, they can often be succinctly presented in tables and/or figures.

Commonly omitted information in experimental studies includes (i) precautions needed to ensure safety of the workers or accuracy of the data, (ii) preliminary experiments, (iii) advantages of the chosen design over related designs, and (iv) purity of the chemicals used.

A limit of **15% to 20% of the total words used** is set for the *Materials and Methods*.

Observations and/or Results (can be combined with the Discussion)

At first glance, an ideal *Observations and/or Results* section would be one that presents all the data in a completely objective manner. This is rarely possible. The major problem is that 'raw' data collected directly from experiments or observations seldom make sense unless summarized. The natural consequences of using summaries are a loss of detail in the information and some more or less subjective choices of summarizing techniques. Another departure from the ideal occurs when, for a number of possible reasons, some data must be excluded. Because of these qualifications, a good *Observations and/or Results* section should contain data that have been carefully but not overly simplified and are presented with as little interpretation as practicable.

A typical *Observations and/or Results* section is **organized into discrete subunits** without any overall order. An improvement would be to present the subunits in some logical and obvious pattern, such as chronological order or from the most general to the most specific (e.g., from the simplest to the more complex analyses). An alternative improvement would be preface the *Observations and/or Results* section with a description of the planned layout of the subunits.

Within each subunit, much **data can be summarized within tables and figures**. Doing so has several advantages. Tables and figures require less space than text for an equivalent amount of data and their content is more easily deciphered. For example, a paragraph can begin with “Figure 3 shows ...” and then proceed to identify the major aspects of the figure.

Tables, Figures and Plates

Tables, figures and plates (photographs) should provide information that cannot be conveniently provided in the text. The most common problem is poor labelling. Another is excessive information—Are the important data obvious to an informed reader?

Each table, figure or plate must be accompanied by a caption that makes it understandable without reference to the text. **Captions for tables** are inserted above the table and **captions for figures and plates** are inserted below the figure.

Discussion (Can Be Combined with the Observations and/or Results)

Data presented in the *Observations and/or Results* section are **critically discussed** here in relation to each other, to the results of other studies, and to the proposed hypothesis (if any). These relationships are rarely so straight-forward that only one conclusion is possible. They must, therefore, be interpreted. But the ‘interpretations’ are not as subjective and arbitrary as the word implies—the arguments must be logical and firmly based on facts.

There are **several elements to a good discussion**.

1. One is a brief introductory paragraph that refers to the problem raised in the *Introduction* section and states how the results will be discussed. Lack of a preface or of any obvious order in the discussion’s contents is a very common mistake.
2. Another element is consideration of all subunits of the *Observations and/or Results*. Failure to do so is a surprisingly frequent error.
3. A third feature of a good discussions is that it never glosses over contradictory or apparently uninterpretable data. It also points out faults in the research design used.
4. Another element is full recognition of the relevant findings and hypotheses of other researchers.
5. And, lastly, speculations are provided but only when they suggest testable hypotheses or fruitful observations.

6. The discussion can end with suggestions for future work.

Acknowledgements

This section usually consists of a single paragraph of thanks to the supervisor and other academic or technical staff, colleges and institutions for ideas, advice, criticisms, use of facilities, services, etc. Contrary to common practice, this is not a place to 'let your hair down'—you are not allowed to acknowledge your pets, religious leaders, and so on and avoid expression of excessive gratitude or gushing praise to your supervisor or anyone else.

Appendices

Appendices are reserved for material that is not strictly necessary for the presentation and interpretation of the data but may be useful to other researchers in duplicating the study, re-analyzing the data, avoiding time-consuming errors when conducting similar studies, etc. Examples of the type of material that can be included are data pro formas, computer programs, preliminary experiments, and supplementary statistical data. Raw data should not be included. Like the literature review in the *Introduction*, this section is frequently used for padding out the report therefore, refrain from doing this.

Schedule for Writing

Preparation of the report may be divided into **four basic steps**:

1. The first step is to decide, on the basis of the format provided above, where the various bits of the information go. This is usually a simple task.
2. The second step of writing the major sections, is of course, the paramount difficulty. The key is order. Can the information be framed within some logical pattern? Only the *Introduction* has a generally accepted form, the pyramid structure, so it is up to you to find patterns for the other sections. At this stage, you should prepare an ordered outline of each section—start with the easiest section, which is usually the *Materials and Methods*. Then rapidly write a 'rough draft' based on the outline and on tables and figures of data. After a readable (but not polished) draft has been completed, request your supervisor to evaluate the overall organization (and analyses, if this has not already been done). Examine the criticisms carefully, not only for specific improvements but also for general rules.
3. The third step is to re-write the *Report* with the useful criticisms included. An important problem is an absence of continuity between sections. This is not surprising since students commonly write each section separately and only bring all the parts together for the final draft. The solution is to treat the *Report* as a single unit immediately after rough drafts of the sections have been completed. In other words, after receiving the criticisms from your supervisor, you should check the *Report* from beginning to end.

4. The fourth step is to seek further criticisms from your supervisor, but this time on all aspects of the work, including the grammar — remember that the *Report* is a form of communication in the medium of English.

The following are some **specific hints** to help you write better science:

1. Vary the length of sentences within paragraphs.
2. Avoid slang, colloquialisms, abbreviations, foreign words, the over-worked word 'however' and plural pronouns (e.g., we).
3. Use synonyms frequently to avoid sounding repetitious. For example, 'research' can be replaced with 'study', 'investigation' or 'work'.
4. Use short common words in preference to long uncommon words.
5. Use the present tense when discussing general facts or concepts, but the past tense for specific results.
6. Consult a dictionary, thesaurus, and manual of English usage (e.g., *Fowler's Modern English Usage*) frequently when in doubt about spelling, grammar or expression.
7. Use concrete examples to illustrate abstract ideas.
8. Practice speaking parts of the report.
9. Use double quotation marks (“”) only for words or sentences quoted within another quote (that has been identified by single quotation marks (')); e.g., Gould (1982) states 'The reductionistic drive of scientists has resulted in many attempts to explain “motivation” as a unitary process.'

Appendix 1. Format for the Title Page.

TITLE IN 20 PT BOLD CAPITALS

Student's Name in 18 Points Bold Title Capitals
Student's Matric Number in 16 Points Bold Title Capitals

Undergraduate Research Opportunities in Science

PROJECT REPORT

submitted to the

Department of [Insert]
National University of Singapore

LSMX288 (4 MC) or LSMX289 (8 MC)

Month, Year

No. of words