# An Example Scientific Report

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*Abstract: This report provides an example structure for your Object-Oriented Programming assignment. Particular areas covered include the use and labelling of images, equations, referencing and general style. While abstracts and the use of keywords in papers are normal, you can omit this for your reports.*

## 1 Introduction

There are different ways and styles used to write a scientific report / paper. This document will look at one specific approach with the aim of demonstrating key principles that can be used when structuring your reports for the Object-Oriented Programming assignment.

Each section of the report is well defined by a title and incrementing number. You may also have subsections that would be labelled X.Y where X is the major section and Y is the subsection number. The use of defined sections/subsections allows you to accurately reference aspects of your report from any other part to avoid duplication. For example, section 2 looks at referencing third-party sources while sections 3 and 4 consider the use of equations and figures that you might wish to embed into a report.

Present your work / narrative in the third person. Using an active voice will improve clarify and effectiveness in concise writing. For example, "the dog chased the cat" (active) vs. "the cat was chased by the dog" (passive) (The Writing Centre, 2016).

## 2 Referencing

Referencing in scientific reports is important to demonstrate your awareness of similar work in the area and provide the reader further information about a topic you are discussing or reinforce statements you wish to make. Accurate and consistent referencing is essential and at Sheffield Hallam University the APA reference style is used (Sheffield Hallam University, 2016).

You must acknowledge the work of others when you use it; failure to do so amounts to plagiarism and is a serious academic offense. This is done in two places:

* A citation in the main body of text at the point of use enables the reader to find details in a full reference list
* An alphabetically order reference list at the end of the work with full details of the source used

Many kinds of sources can be referenced and there is a style for slight variations (e.g. single author vs. multiple authors) so make sure you familiarise yourself with the APA reference style.

Avoid directly quoting chunks of text when using references unless you want to quote speech. Instead write the essence of what you wish to convey in your own words and provide references to add support to the statements you are making.

A scientific report should include references from several sources. This lends its discussions weight and support by demonstrating an awareness of the context. Relying on only a few references demonstrates a lack of reading in the area and relies on the assumption that those sources are correct and accurately portray the subject.

## 3 Equations

When using equations, you should give each key equation a consecutive number that transcends sections. Never refer to an equation as "in the equation below". Instead, use "as given by equation 1", or similar.

So, for example, the equation for a straight line is given by equation 1, where *m* is the gradient of the line and *c* is the offset up the y-axis when *x* is 0 (make sure to define your variables and when talking about them in a concrete fashion, give your values, as illustrate in Figure 3.1).

**(1)**

Equation 2 provides the differential of equation 1, which gives us its tangent.

**(2)**

When an equation contains multiple lines for its derivation, unless you need to highlight specific steps in that derivation, you can simply give the whole series of equations a single number, as illustrated in equation 3 for the recursive definition of the Fibonacci sequence.

**(3)**

## 3 Figures and Tables

Like equations, when using figures or tables, you should refer to them by reference. Figure and table names should be consecutively numbered, but take the format X.Y, where X is the section number and Y is the consecutive number, restarting at one for each new section.

For example, figure 3.1 illustrates the visualisation of the line defined in equation 1, where *m*=1.5 and *c*=4. Notice how figure 3.1 has a caption underneath it with a brief description. Notice how figure 3.1 does not fit immediately below this section of text. Instead of squeezing it in, anchor it at the top of the next page as illustrated with Figure 3.1.

The use of figure referencing allows content to detach itself from the location of the text but do try and get the image on the same page as its first reference whenever possible. When using figures and tables, make sure you tell the reader what they are expected to take away from it. Do not assume the reader will understand what you want them to by simply saying “Figure 3.1 shows how to do figures”.

**Figure 3.1:** Visual representation of equation 1 where m=1.5 and c=4

Treat tables in the same way as an image but use the word "Table" as opposed to "Figure".

To include source code, format it as if it were a picture, as illustrated in Figure 3.2.

int width=800;

int height=600;

int sc\_width=GetSystemMetrics(SM\_CXSCREEN);

int sc\_height=GetSystemMetrics(SM\_CYSCREEN);

int offx=(sc\_width-width)/2;

int offy=(sc\_height-height)/2;

**Figure 3.2:** C/C++ code to centre a window on the screen using Win32 APIs

As figure 3.2 illustrates, having code in a report can be fiddly in terms of width and layout, so think about what is relevant and what is not.

If you are going to have in image, table, etc., you should discuss it in the main body of the report and not just simply have it there. Discuss with the reader what they can see and why it is important to your text. If you are not discussing what an image shows then there is no point having it.

You should never directly copy an image or table that is taken from another source without citing that source and obtaining permission from the author. The caption should include text appended to the end to indicate permission has been given, e.g. “Reproduced from (T. Author, 2017) with their permission”. Anything not cited is assumed to be your own work/creation.

## 4 Conclusions

This document covers a range of different topics to get you started writing scientific documents. It attempts to cover the majority of aspects that you will encounter when structuring and formatting your document but if you are unsure about something not covered then please ask and/or look at other examples of scientific writing.

Remember, writing style is the key to a successful report. Make sure you write in a concise style and convey that which is relevant and important; less is more and quality over quantity. Always proofread your work - you may not catch all errors, but you will get most of them.

## A References

Sheffield Hallam University. (2016). APA Referencing. Retrieved from http://libguides.shu.ac.uk/referencing

The Writing Centre. (2016). Use the active voice. Retrieved from http://writing.wisc.edu/Handbook/CCS\_activevoice.html

## B Other References

If you had other stuff you wish to present to the reader, but it wasn't important to the main thread of the discussion, you would put it in appendix sections with alphabetic labels and reference them. If you don't reference an appendix then it isn't needed and don't include it (like this one). If you expect the reader to skip to an appendix while reading your report mid-flow then the materials belongs in the main body of the report.