# 55-502858: Object Oriented Programming for Computer Science

**Assignment 1:** OOP Principles and Concepts

**Due:** Thursday 3rd December 2020 at 3pm (via Blackboard)

**Marks Available:** 100 (30% of the module assessment)

This task explores your understanding of Object-Oriented Programming principles and concepts in C++ using a fitness tracker case study (see separate case study document). The assignment is an individual piece of work and in-module retrieval is available.

## Introduction

Object oriented programming (OOP) is a powerful programming paradigm that builds upon procedural programming techniques; whereas procedural programming directs a programmer to split code into variables and functions, OOP asks the programmer to think about object data (attributes) and behaviours (methods) in such a way that a program is created by interacting objects. This way of thinking affords benefits such as encapsulation, inheritance and polymorphism, however, OOP is not without its disadvantages.

For this task, you will write a formal report that demonstrates your understanding of:

* Encapsulation,
* Inheritance,
* Dynamic Polymorphism

Your discussion of each point must include:

* An overview of the topic in your own words (do not quote from sources, but do express your own understanding)
* A discussion on how the topic is supported in C/C++. This must include your own code snippets based on the case study that demonstrate each topic and compares good and bad practice, along with advantages and disadvantages of the OOP style. When constructing your narrative, make sure to explore your code snippets in the written discussions by picking out details and discussing them. Do not just tell the reader to look at the examples and draw their own conclusions; the code snippets should support the narrative and not the other way around.

There is a word limit of 1,400 words, including headers, and captions, but excluding illustrations and references (approximately 4 sides of A4). Reading will cease once the word limit is reached and grading applied to what has been read. Remember, you are writing a formal document and not a best-selling novel - keep details concise. The word limit is a limit and not a target so don’t think you need to hit the word count; it is expected that you’ll be able to produce an excellent report in fewer words than the limit.

An example report is provided on the module site that includes a standard structure along with details of the SHU referencing style (APA). You are free to deviate from the report style if you wish, but keep it neat, clean, professional, and formal. Referencing must use the university's standard form though (all sources you use to back up discussions must be referenced).

## Grading Guidelines

Marks will be awarded as illustrated below:

| **Grading Area** | **Comments** | **Percentage Available** |
| --- | --- | --- |
| Encapsulation | Provide overview of topic including its purpose in a general setting along with demonstrating the concepts in C\C++ with respect to the case study.  You will find it useful to include something like a class diagram to demonstrate how classes relate to each other | 30% |
| Inheritance | 30% |
| Dynamic Polymorphism | 30% |
| Report Presentation | This includes effective use of language, conciseness, flow, layout, formatting, and suitable use of referencing | 10% |

The University common grading descriptor will be used to determine marks within each area (provided at the end of this document). The marking scheme embeds the concept of extended work by rewarding only the highest marks to those who demonstrate evidence of independent investigation, learning and thought. Thus, to achieve top grades, you will need to go beyond the materials presented in lectures and labs and undertake some of your own research (i.e. read and discuss related materials).

## Turnitin

Turnitin will be used to give your paper a similarity percentage when compared to the submission of others in addition to hundreds of millions of resources available more widely. There is a Turnitin submission point on Blackboard that you are strongly recommended to use to view your similarity percentage before submission (please note that scores may take several days to generate). As a rule of thumb:

* Anything below 5% is considered acceptable (although still checked).
* Up to 10% is looked at more closely for cases of possible plagiarism, although this typically means you have overly used quotes. **Avoid quotes because I want to hear what your thoughts and interpretations are, not those of others.**
* High similarity percentages indicate a high reliance, and even copying of text from sources; you are expected to write this report in your own words and thus high similarity percentages are not anticipated.

The similarity percentage will not just be taken at face-value but judge sensibly on a case-by-case basis. If you are in any doubt about a high similarity percentage then please ask. When you submit your work, it will not be compared to the pieces of work your peers are working on until I submit your final reports after the deadline… so don't copy from each other as it will become very apparent, even just to a human reader.

## Submission Process

Your report must be submitted electronically through the module Blackboard site as a Word document (yes, please ensure it is a Word document that can open within the Blabckboard preview once submitted). You may upload multiple attempts, however only your last on-time attempt will be viewed and graded (as per university regulations). Remember, there is a word limit on the report as outlined above.

Make sure that you upload the correct Word document file by checking once you have submitted - mistakes discovered after the deadline cannot be corrected; it is your responsibility to ensure that you submit the correct file by the deadline.

You may be asked to present your report after the submission date before a grade is awarded.

The submission deadline is given at the top of this document.

## Learning Outcomes

This task assesses the following learning outcomes from the module descriptor

* Describe how fundamental OO principles and concepts are supported in a programming language such as C++.
* Discuss the benefits and limitations of the OO paradigm in the development of a range of applications.

Additionally, final year students frequently comment that they would like more practice at writing technical / scientific documents in readiness for writing their dissertation report in their final year. The two learning outcomes highlighted above for this module ideally lend themselves to this kind of task and provides you an opportunity to write technical documents and get useful feedback to help prepare you for your final year… so while scientific writing will no doubt be met with groans of despair, make the most of the opportunity to practice before it counts towards much more.

# Level 5 - Generic grade descriptor: relationship of degree classification to percentage mark ranges and categorical grades (CG)

| **Class** | **Mark range** | **CG%** | **General Characteristics** |
| --- | --- | --- | --- |
| FIRST  (Excellent) | 93 - 100 | 96 | Exceptional breadth and depth of knowledge and understanding of the area of study; evidence of extensive and appropriate selection and critical evaluation/synthesis/analysis and of reading/research beyond the prescribed range, in both breadth and depth, to advance work/direct arguments; exceptional demonstration of relevant skills; excellent communication; performance deemed to be beyond expectation. |
| 85 - 92 | 89 |
| 78 - 84 | 81 | Outstanding/excellent knowledge and understanding of the area of study **as the student is typically able to go beyond what has been taught (particularly for a mid/high 1st)**; evidence of extensive and appropriate selection and critical evaluation/synthesis/ analysis of reading/research **beyond the prescribed range**, to advance work/direct arguments; excellent demonstration of relevant skills; excellent communication; performance deemed beyond expectation of the level. |
| 70 - 77 | 74 |
| UPPER  SECOND  (Very good) | 67 - 69 | 68 | Very good knowledge and understanding of the area of study as the student **is typically able to relate facts/concepts together with some ability to apply to known/taught contexts**; evidence of appropriate selection and evaluation of reading/research, some beyond the prescribed range, may rely on set sources to advance work/direct arguments; demonstrates autonomy in approach to learning; very good demonstration of relevant skills; strong communication skills. |
| 64 -66 | 65 |
| 60 - 63 | 62 |
| LOWER  SECOND  (Good) | 57 - 59 | 58 | Good knowledge and understanding of the area of study **balanced towards the descriptive rather than analytical**; evidence of appropriate selection and evaluation of reading/research but generally reliant on set sources to advance work/direct arguments; good demonstration of relevant skills, though may be limited in range; communication shows clarity but structure may not always be coherent. |
| 54 - 56 | 55 |
| 50 - 53 | 52 |
| THIRD  (Sufficient) | 47 - 49 | 48 | **Knowledge and understanding is sufficient to deal with terminology, basic facts and concepts** but fails to make meaningful synthesis; some ability to select and evaluate reading/research however work may be more generally descriptive; strong reliance on available support set sources to advance work; arguments may be weak or poorly constructed; adequate demonstration of relevant skills over a limited range; communication/presentation is generally competent but with some weaknesses. |
| 44 - 46 | 45 |
| 40 - 43 | 42 |
| FAIL  (Insufficient) | 30 - 39 | 35 | Insufficient knowledge and understanding of the area of study; some ability to select and evaluate reading/research however work is more generally descriptive; fails to address some aspects of the brief; a limited use of sources to advance work; arguments may be weak/poor or weakly/poorly constructed; demonstration of relevant skills over a reduced range; communication shows limited clarity, poor presentation, structure may not be coherent. |
| 20 - 29 | 25 |
| 10 - 19 | 15 | Highly insufficient knowledge or understanding of the area of study; **understanding is typically at the word level with facts being reproduced in a disjointed or decontextualised manner**; fails to address the outcomes addressed by the brief; typically ignores important sources in development of work and data/evidence inappropriately used; weak technical and practical competence hampers ability to demonstrate/communicate achievement of outcomes. |
| 1-9 | 5 |
| ZERO | 0 | 0 | Work of no merit OR absent, work not submitted, penalty in some misconduct cases. |