



COM5003

## Programming

### Portfolio

**Date for Submission:** Please refer to the timetable on ilearn

**(The submission portal on ilearn will close at 14:00 UK time  
on the date of submission)**



## Assignment Brief

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As part of the formal assessment for the programme you are required to submit a **Programming** assignment. Please refer to your Student Handbook for full details of the programme assessment scheme and general information on preparing and submitting assignments.

### Learning Outcomes:

After completing the module, you should be able to:

1. Identify simple algorithms in an Object-Oriented language; along with apply simple testing and debugging techniques in program development.
2. Design systems specifications using object-oriented modelling techniques; and apply these using an appropriate computer assisted software engineering (CASE) tools.
3. Use appropriate techniques to apply inheritance in the design and implementation of classes; along with aggregation techniques.
4. Design and implement solutions to a small number of applications that consist of a limited number of classes within an Object-Oriented language.
5. Formulate solutions to simple programming problems



## Guidance

Your assignment should include: a title page containing your student number, the module name, the submission deadline and the exact word count of your submitted document; the appendices if relevant; and a reference list in AU Harvard system. You should address all the elements of the assignment task listed below. Please note that tutors will use the assessment criteria set out below in assessing your work.

**You must not include your name** in your submission because Arden University operates anonymous marking, which means that markers should not be aware of the identity of the student. However, please do not forget to include your STU number.

**Maximum word count:** 4000 words

Please refer to the full word count policy which can be found in the Student Policies section here: [Arden University | Regulatory Framework](#)

### **Please note the following:**

Students are required to indicate the exact word count on the title page of the assessment.

The word count includes everything in the main body of the assessment (including in text citations and references). The word count excludes **numerical data in tables, figures, diagrams, footnotes, reference list and appendices. ALL other printed words ARE included in the word count.**

*Please note that exceeding the word count by over 10% will result in a 10-percentage point deduction.*



## Assignment Task

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### Introduction

This assignment is aimed at allowing you to demonstrate a holistic set of skills in object-oriented programming and systems engineering as required for the design and implementation of real-world Internet applications. This includes the adoption of UML-based systems design concepts and Java-based coding techniques ensuring professional software development. You are required to complete a portfolio of tasks related to a specific case study described below. These tasks constitute a comprehensive design of an electronic system to support the core system's functionality. Consider yourself a senior software engineer delivering this assignment as a stand-alone project for your organisation.

### Case study

A hotel wants to introduce an online booking system service for its guests. To make their offer is as widely available as possible, they need to implement booking solution allowing customers to browse the availability of the rooms, view pictures of the facilities and other amenities such as parking and place orders online. The hotel also provides discounts to members (frequent guests) and regularly emails members about special offers including discounts.

The solution needs to support the following functionality.

#### 1. On the admin side:

- a. Arranging offline system into room categories such Double, Executive, etc. ensuring rooms under modifications/unusable are removed from the booking system.
- b. Uploading pictures of the rooms and other facilities on offer.
- c. Creating reports on the room bookings for management.

#### 2. On the customer side:

- a. Browsing the hotel system with rooms available for booking.
- b. Making a selection and booking of rooms
- c. Entering their information as a member or non-member
- d. Entering payment details and placing the order
- e. Leaving customer reviews.



### Task 1 (LO 2)

Answer the following questions:

- a. Draw a UML Class diagram to capture the classes/objects, class hierarchy and relationships between the classes for the system described in the case-study. Make sure to specify multiplicities for all associations shown in your diagrams.

(15 marks)

- b. Sketch a UML sequence and activity diagram for the scenario where the customer enters the payment details and places their order (book room(s) for stay).

(15 marks)

### Task 2 (LO 1)

Implement the class diagram you have created for the case-study in Java. Add appropriate methods to set and get the instance variables in the classes.

(15 marks)

### Task 3 (LO 3 & 4)

- a. Using the class and object diagram created in response to task 1a, select an appropriate class as the base class. Write the Java code for this base class and up to three derived classes and **implement this hierarchy in Java.**

(15 marks)

- b. For this assignment consider the database to be text files. In these text files, include dummy data showing the availability of rooms and prices for each per day. Demonstrate one example of the functionality on the customer side of the system (selecting a room(s) and number of days) and passing them to the class where the price is calculated. **Implement this interaction in Java.**

(15 marks)

- c. Select the price calculation functionality as an abstract method defined in an abstract class/interface. **Demonstrate how the full functionality of this abstract method can be implemented in Java.**

(15 marks)



#### **Task 4 (LO 5)**

Write a program that asks the user to enter a minimum of twenty-five positive integers greater than zero and less than 1000. The program should stop asking the user for input when they enter a zero or a negative number. The program then prints out:

- i) The number of positive integers whose value is less than 10
- ii) The number of positive integers whose value is equal to or greater than 10 but less than 100
- iii) The number of positive integers whose value is equal to or greater than 100 but less than 1000

The program should cater for a wrong input: if the user enters a wrong input (a value which is not an integer) the program should notify the user that invalid input has been entered and ask the user to enter positive integers again.

**(10 marks)**

#### **Additional instructions**

- Responses to all the tasks, including UML diagrams and examples of Java code must be put together and submitted as a single Word document.
- Each task involving UML diagrams must be accompanied by a brief critical discussion with references to relevant literature (up to 250 words per task).
- Each example of Java code must be properly documented using comments.

**End of questions**



## Formative Feedback

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You have the opportunity to submit a draft to receive formative feedback.

The feedback is designed to help you develop areas of your work and it helps you develop your skills as an independent learner.

If you are a distance learning student, you should submit your work, by email, to your tutor, no later than 2 weeks before the actual submission deadline. If you are a blended learning student, your tutor will give you a deadline for formative feedback and further details.

Formative feedback will not be given to work submitted after the above date or the date specified by your tutor - if a blended learning student.

## Referencing Guidance

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You **MUST** underpin your analysis and evaluation of the key issues with appropriate and wide ranging academic research and ensure this is referenced using the AU Harvard system.

Follow this link to find the referencing guides for your subject: [Arden Library](#)

## Submission Guidance

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**Assignments submitted late will not be accepted and will be marked as a 0% fail.**

Your assessment should be submitted as a single *Word (MS Word) or PDF* file. For more information please see the “Submitting an Assignment - Guide” document available on the A-Z key information on iLearn.

You must ensure that the submitted assignment is all your own work and that all sources used are correctly attributed. Penalties apply to assignments which show evidence of academic unfair practice. (See the Student Handbook which is available on the A-Z key information on iLearn.)



### Assessment Criteria (Learning objectives covered - all)

Level 5 reflects the continuing development in knowledge, understanding and skills from Level 4. At Level 5, students are not expected to be fully autonomous but are able to take responsibility for their own learning with appropriate guidance and direction. Students are expected to further develop their theoretical knowledge within a more intellectual context and to demonstrate this through more complex forms of expression which move beyond the descriptive or imitative domain. Students are expected to demonstrate skills of analysis in both problem-solving and resolution.

Grade	Mark Bands	Generic Assessment Criteria
<b>First (1)</b>	80%+	An exceptional information base exploring and analysing the discipline, its theory and any associated ethical considerations. There is sophisticated use and management of learning resources and a high degree of autonomy is demonstrated. Writing is exceptionally well structured and accurately referenced throughout. Where appropriate, outstanding professional skills are demonstrated. The work is original and with some additional effort could be considered for internal publication.
	70-79%	An excellent knowledge base within which the discipline is explored and analysed. There is a good degree of originality in the approach. The work demonstrates confidence and autonomy and extends to consider ethical issues. Learning resources have been managed confidently. Writing is exceptionally well structured and accurately referenced throughout. Where appropriate, an excellent level of professional skills are demonstrated and the work demonstrates a high level of intellectual and academic skills.
<b>Upper second (2:1)</b>	60-69%	A very good knowledge base which explores and analyses the discipline, its theory and any associated ethical issues. There is evidence of some originality and independence of thought. A very good range of learning resources underpin the work and there is evidence of growing confidence and self-direction. The work demonstrates the ability to analyse the subject and apply theory with good academic and intellectual skills. Academic writing skills are good, expression is accurate overall and the work is consistently referenced throughout.
<b>Lower second (2:2)</b>	50-59%	A satisfactory understanding of the discipline which begins to analyse the subject and apply some underpinning theory. There may be reference to some of the ethical considerations. The work shows a sound level of competence in managing basic sources and materials. Academic writing skills are good and accurate overall and the work is planned and structured with some thought. Professional skills are satisfactory (where appropriate). The work lacks original thought but academic and intellectual skills are moving into the critical domain. The work is referenced throughout.
<b>Third (3)</b>	40-49%	Basic level of performance in which there are some omissions in understanding the subject, its underpinning theory and ethical considerations. There is little evidence of independent thought and the work shows a basic use of sources and materials. Academic and intellectual skills are limited. The work may lack structure overall. There are some difficulties in developing professional skills (where appropriate). There is an attempt to reference the work.
<b>Marginal Fail</b>	30-39%	A limited piece of work in which there are clear gaps in understanding the subject, its underpinning theory and ethical considerations. The work shows a limited use of sources and materials. Academic and intellectual skills are weak and there are errors in expression and the work may lack structure overall. There are difficulties in developing professional skills (where appropriate). The work lacks original thought and is largely imitative.
	29% and below	A poor performance in which there are substantial gaps in knowledge and understanding, underpinning theory and ethical considerations. The work shows little evidence in the use of appropriate sources and materials. Academic writing skills are very weak and there are numerous errors in expression. The work lacks structure overall. Professional skills (where appropriate) are not developed. The work is imitative.





Criteria and weighting	Outstanding 80% - 100%	Excellent 70% - 79%	Very Good 60% - 69%	Good 50% - 59%	Pass 40% - 49%	Poor 30 – 39%	Fail 0 – 29%
<b>Task 1</b> Design (explanation) (15%)	An outstanding level of documentation and design, which addresses all aspects of the problem specification and the design process and demonstrates a practitioner level of understanding of the process of design.	An excellent level of documentation and design, which addresses all aspects of the problem specification and the design process and demonstrates an excellent level of understanding of the process of design.	A very good level of documentation and design, which addresses most aspects of the problem specification and the design process, with some minor omissions or errors and demonstrates an very good level of understanding of the process of design.	A good level of documentation and design, which addresses some aspects of the problem specification and the design process but there is scope for more depth and/or there are some errors or omissions. Demonstrates a good level of understanding of the process of design.	A basic level of documentation and design, which addresses some aspects of the problem specification and the design process but there is scope for much more depth and/or there are a number of errors or omissions. Demonstrates a basic level of understanding of the process of design.	An insufficient level of documentation and design, which addresses limited aspects of the problem specification, and the design process. Demonstrates a insufficient level of understanding of the process of design.	A very limited or wholly absent level of documentation and design.

<b>Task 1</b> Code (70%)	A professional level of coding that demonstrates an exceptional level of understanding in terms of structure, use of programming constructs, readability, naming conventions for variables and commenting and satisfies the problem specification at a professional level.	An excellent level of coding that demonstrates an excellent level of understanding in terms of structure, use of programming constructs, readability, naming conventions for variables and commenting and satisfies the problem specification to an excellent level.	A very good level of coding that demonstrates a very high level of understanding in terms of structure, use of programming constructs, readability, naming conventions for variables and commenting, though three may be minor issues or areas for development. A very good attempt at addressing the problem specification.	A good level of coding that demonstrates a good understanding in terms of structure, use of programming constructs, readability, naming conventions for variables and commenting, though there is scope for improvement in a number of areas. A good attempt to address the problem specification but there may be some issues or omissions.	A satisfactory level of coding that demonstrates some understanding in terms of structure, use of programming constructs, readability, naming conventions for variables and commenting, but there is scope much more development in a number of areas. A basic attempt to address the problem specification with scope for further work	An unsatisfactory level of coding that demonstrates a lack of understanding at the required level in terms of structure, use of programming constructs, readability, naming conventions for variables and commenting, An insufficient attempt to address the problem specification with scope for much more work.	Absent level of coding that demonstrates a little to no of understanding at the required level in terms of structure, use of programming constructs, readability, naming conventions for variables and commenting, A lack of evidence that the problem specification has been attempted.
<b>Task 1</b> Execution (15%)	An outstanding level of execution which satisfies all requirements and operates without errors.	An excellent level of execution which satisfies all requirements and operates without errors.	A very good level of execution which satisfies the majority of requirements and operates mostly without errors.	A good level of execution which satisfies most requirements, though there are omissions or errors.	A basic level of execution which satisfies some requirements, though there are major errors omissions.	A sufficient level of execution, where the program runs, but mostly incorrectly.	The program does not run or compile at all.

<p><b>Task 2a</b> (100%)</p>	<p>An exemplary presentation and implementation using requested UML Class diagrams for complex systems e.g. given case-study etc and justified using a highly relevant literature base. Develop a diagram that demonstrates all the advanced relationships such as hierarchy, abstraction, composition that are evident in the case-study. The cardinality is mentioned correctly. The diagram should demonstrate , a high level of complexity, criticality, synthesis and original thought. An exemplary explanation that is free from errors is expected</p>	<p>An Excellent presentation and implementation using requested UML Class diagrams for complex systems e.g. given case-study etc and justified using a excellent relevant literature base. An excellent presentation that is free from errors. Advanced concepts such as relationships and cardinality between the classes are mentioned with minor mistakes.</p>	<p>A good presentation and implementation using requested UML Class diagrams for complex systems e.g. given case-study etc and justified using relevant literature base. Some of the advanced relationships might be missing or the cardinality might be missing. A wide-ranging use of relevant literature, though there are some minor issues. A very good presentation, which is clear and mostly free from errors.</p>	<p>A satisfactory presentation and implementation using requested Class UML diagrams for complex systems e.g. given case-study etc and justified using some relevant literature base. Advanced relationships and cardinality might be slightly wrong. A satisfactory presentation of academic as well as professional skills. Good use of relevant and valid literature appropriately referenced, with some scope for more depth and a good presentation though there are some issues that need to be addressed</p>	<p>Some relevant concepts are presented in terms of Unified Modelling Language (UML). Advanced relationships such as hierarchy etc might not be demonstrated. Cardinality might be missing. Develop some diagrams, demonstrating some level of critical analysis. There is a lack of depth and relevance. Some inclusion of relevant sources with scope for more and a basic presentation which needs further development.</p>	<p>There is limited/no discussion relevant to Unified Modelling Language (UML). The student developed some/no diagrams which do not depict all the classes or there might be 2 - 3 classes which might not be clearly described. There are significant omissions or a significant lack of depth of content and discussion. There are significant issues with the presentation of the document and limited use of valid references</p>	<p>A very limited or wholly absent level of design.</p>
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<p><b>Task 2 b</b> (100%)</p>	<p>An exemplary presentation and implementation using requested UML Activity/Sequence diagrams for complex systems e.g. given case-study etc and justified using a highly relevant literature base. The activity and sequence diagrams must develop at least one complete functionality either from the customer view of the system or the admin view of the system. The sequence of operations must be correct. Develop fully annotated requested diagrams, demonstrating a high level of complexity, criticality, synthesis and original thought. An exemplary presentation that is free from errors is expected</p>	<p>An Excellent presentation and implementation using requested UML activity/sequence diagrams for complex systems e.g. given case-study etc and justified using a excellent relevant literature base. An excellent presentation that is free from errors. One complete functionality might be not represented but atleast 80 – 90 % of the functions must be represented.</p>	<p>A good presentation and implementation using requested UML activity/sequence diagrams for complex systems e.g. given case-study etc and justified using relevant literature base. At least 70% of the functions of the customer or admin for one functionality should be presented. A wide-ranging use of relevant literature, though there are some minor issues. A very good presentation, which is clear and mostly free from errors</p>	<p>A satisfactory presentation and implementation using requested UML diagrams for complex systems e.g. given case-study etc and justified using some relevant literature base. One complete functionality might not be represented. The sequence of actions might be incorrectly depicted. A satisfactory presentation of academic as well as professional skills. Good use of relevant and valid literature appropriately referenced, with some scope for more depth and a good presentation though there are some issues that need to be addressed</p>	<p>Some relevant concepts are presented in terms of Unified Modelling Language (UML). Develop some diagrams, demonstrating some level of critical analysis. There are errors in the representation of the sequence of activities or the incorrect. There is a lack of depth and relevance. Some inclusion of relevant sources with scope for more and a basic presentation which needs further development.</p>	<p>There is limited/no discussion relevant to Unified Modelling Language (UML). The activity/sequence diagram incorrectly demonstrates the sequence of operations with just one or two messages or actions shown. The student developed some/no diagrams. There are significant omissions or a significant lack of depth of content and discussion. There are significant issues with the presentation of the document and limited use of valid references</p>	<p>A very limited or wholly absent level of design.</p>
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<p><b>Task 3</b> Design(15%)</p>	<p>An outstanding level of documentation and design, which addresses all aspects of the problem specification and the design process and demonstrates a practitioner level of understanding of the process of design.</p>	<p>An excellent level of documentation and design, which addresses all aspects of the problem specification and the design process and demonstrates an excellent level of understanding of the process of design.</p>	<p>A very good level of documentation and design, which addresses most aspects of the problem specification and the design process, with some minor omissions or errors and demonstrates an very good level of understanding of the process of design.</p>	<p>A good level of documentation and design, which addresses some aspects of the problem specification and the design process but there is scope for more depth and/or there are some errors or omissions. Demonstrates a good level of understanding of the process of design.</p>	<p>A basic level of documentation and design, which addresses some aspects of the problem specification and the design process but there is scope for much more depth and/or there are a number of errors or omissions. Demonstrates a basic level of understanding of the process of design.</p>	<p>An insufficient level of documentation and design, which addresses limited aspects of the problem specification, and the design process Demonstrates a insufficient level of understanding of the process of design.</p>	<p>A very limited or wholly absent level of documentation and design.</p>
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<p><b>Task 3</b> Code (65%)</p>	<p>A professional level of coding that demonstrates an exceptional level of understanding in terms of structure, use of programming constructs, readability. The names for classes, variables must be representation of the case-study, meaningful and appropriate comments, minimising duplication of code and consistent formatting/ indentation of code. Students need to demonstrate the understanding of OOP principles (such as encapsulation) with correct notations for the classes. Demonstration of getter and setter methods, constructors must be demonstrated.</p>	<p>An excellent level of coding that demonstrates an excellent level of understanding in terms of structure, use of programming constructs, readability. The names for classes, variables must be representation of the case-study, meaningful and appropriate comments, minimising duplication of code and consistent formatting/ indentation of code. Students need to demonstrate the understanding of OOP principles (such as encapsulation) with correct notations for the classes. Demonstration of getter and setter methods, constructors must be demonstrated.</p>	<p>A very good level of coding that demonstrates a very high level of understanding in terms of structure, use of programming constructs, readability. A very good attempt at addressing the problem specification. There might be minor errors such as irrelevant naming of classes but constructors, getter and setter methods are demonstrated.</p>	<p>A good level of coding that demonstrates a good understanding in terms of structure, use of programming constructs, readability, naming conventions for variables and commenting, though there is scope for improvement in a number of areas. A good attempt to address the problem specification but there may be some issues or omissions. Not all the classes in the class diagram might be represented. Constructor or getter/setter methods might be missing.</p>	<p>A satisfactory level of coding that demonstrates some understanding in terms of structure, use of programming constructs, readability, naming conventions for variables and commenting, but there is scope much more development in a number of areas. A basic attempt to address the problem specification with scope for further work. A minimal representation of the class diagram is shown with no proper representation of the variables or object creation and initialisation.</p>	<p>An unsatisfactory level of coding that demonstrates a lack of understanding at the required level in terms of structure, use of programming constructs, readability, naming conventions for variables and commenting, An insufficient attempt to address the problem specification with scope for much more work. Incorrect representation of the classes and minimal demonstration of coding.</p>	<p>Absent level of coding that demonstrates a little to no of understanding at the required level in terms of structure, use of programming constructs, readability, naming conventions for variables and commenting, A lack of evidence that the problem specification has been attempted.</p>
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<b>Task 3</b> Execution (20%)	An outstanding level of execution which satisfies all requirements and operates without errors.	An excellent level of execution which satisfies all requirements and operates without errors.	A very good level of execution which satisfies the majority of requirements and operates mostly without errors.	A good level of execution which satisfies most requirements, though there are omissions or errors.	A basic level of execution which satisfies some requirements, though there are major errors omissions.	A sufficient level of execution, where the program runs, but mostly incorrectly.	The program does not run or compile at all.
<b>Task 4a</b> Design (15%)	An outstanding level of documentation and design, which addresses all aspects of the problem specification and the design process and demonstrates a practitioner level of understanding of the process of design.	An excellent level of documentation and design, which addresses all aspects of the problem specification and the design process and demonstrates an excellent level of understanding of the process of design.	An very good level of documentation and design, which addresses most aspects of the problem specification and the design process, with some minor omissions or errors and demonstrates an very good level of understanding of the process of design.	A good level of documentation and design, which addresses some aspects of the problem specification and the design process but there is scope for more depth and/or there are some errors or omissions. Demonstrates a good level of understanding of the process of design.	A basic level of documentation and design, which addresses some aspects of the problem specification and the design process but there is scope for much more depth and/or there are a number of errors or omissions. Demonstrates a basic level of understanding of the process of design.	An insufficient level of documentation and design, which addresses limited aspects of the problem specification, and the design process Demonstrates a insufficient level of understanding of the process of design.	A very limited or wholly absent level of documentation and design.
<b>Task 4a</b> Coding (65%)	A professional level of coding that demonstrates an exceptional level of understanding in terms of structure, use of programming constructs, readability, naming conventions for variables and commenting and satisfies the problem specification at a	An excellent level of coding that demonstrates an excellent level of understanding in terms of structure, use of programming constructs, readability, naming conventions for variables and	A very good level of coding that demonstrates a very high level of understanding in terms of structure, use of programming constructs, readability, naming conventions for variables and commenting, though three may be minor	A good level of coding that demonstrates a good understanding in terms of structure, use of programming constructs, readability, naming conventions for variables and commenting, though there is scope for improvement in a	A satisfactory level of coding that demonstrates some understanding in terms of structure, use of programming constructs, readability, naming conventions for variables and commenting, but	An unsatisfactory level of coding that demonstrates a lack of understanding at the required level in terms of structure, use of programming constructs, readability, naming conventions for	Absent level of coding that demonstrates a little to no of understanding at the required level in terms of structure, use of programming constructs, readability, naming conventions for



	professional level. Students should correctly implement all the steps for class hierarchy involving a base class and up to three derived classes and implement this hierarchy in Java.	commenting and satisfies the problem specification to an excellent level. The hierarchy of classes is represented but all three derived classes are not coded.	issues or areas for development. The hierarchy of classes is coded but only two derived class is demonstrated. A very good attempt at addressing the problem specification.	number of areas. The base class and a derived class are coded . A good attempt to address the problem specification but there may be some issues or omissions.	there is scope much more development in a number of areas. A basic attempt to address the problem specification with scope for further work. Class hierarchy is mentioned with the base class coded but the derived classes are not coded.	variables and commenting, An insufficient attempt to address the problem specification with scope for much more work. No hierarchy of classes is coded or the demonstrated class hierarchy is incorrect.	variables and commenting, A lack of evidence that the problem specification has been attempted. No code presented.
<b>Task 4a</b> Execution (20%)	An outstanding level of execution which satisfies all requirements and operates without errors.	An excellent level of execution which satisfies all requirements and operates without errors.	A very good level of execution which satisfies the majority of requirements and operates mostly without errors.	A good level of execution which satisfies most requirements, though there are omissions or errors.	A basic level of execution which satisfies some requirements, though there are major errors omissions.	A sufficient level of execution, where the program runs, but mostly incorrectly.	The program does not run or compile at all.
<b>Task 4b</b> Design (15%)	An outstanding level of documentation and design, which addresses all aspects of the problem specification and the design process and demonstrates a practitioner level of understanding of the process of design.	An excellent level of documentation and design, which addresses all aspects of the problem specification and the design process and demonstrates an excellent level of understanding of the process of design.	An very good level of documentation and design, which addresses most aspects of the problem specification and the design process, with some minor omissions or errors and demonstrates an very good level of understanding of the process of design.	A good level of documentation and design, which addresses some aspects of the problem specification and the design process but there is scope for more depth and/or there are some errors or omissions. Demonstrates a good level of understanding of the process of design.	A basic level of documentation and design, which addresses some aspects of the problem specification and the design process but there is scope for much more depth and/or there are a number of errors or omissions. Demonstrates a basic level of	An insufficient level of documentation and design, which addresses limited aspects of the problem specification, and the design process Demonstrates a insufficient level of understanding of the process of design.	A very limited or wholly absent level of documentation and design.



					understanding of the process of design.		
<b>Task 4b</b> Coding (65%)	A professional level of coding that demonstrates an exceptional level of understanding in terms of structure, use of programming constructs, readability, naming conventions for variables and commenting and satisfies the problem specification at a professional level. Students should correctly implement all the steps for entering the number of days and price per day in the text file. The total price for the duration of stay should be calculated and displayed on the screen. There should be no errors in the code and the data should be entered/read from a text file and is not part of the program code.	An excellent level of coding that demonstrates an excellent level of understanding in terms of structure, use of programming constructs, readability, naming conventions for variables and commenting and satisfies the problem specification to an excellent level. The hierarchy of classes is represented but all three derived classes are not coded. The data is entered and read from the text file. The price of the stay is calculated but not displayed.	A very good level of coding that demonstrates a very high level of understanding in terms of structure, use of programming constructs, readability, naming conventions for variables and commenting, though there may be minor issues or areas for development. The hierarchy of classes is coded but only two derived class is demonstrated. A very good attempt at addressing the problem specification. The price of stay is calculated but there might be errors in either the reading or writing the data.	A good level of coding that demonstrates a good understanding in terms of structure, use of programming constructs, readability, naming conventions for variables and commenting, though there is scope for improvement in a number of areas. The base class and a derived class are coded. A good attempt to address the problem specification but there may be some issues or omissions. The calculation might be correct or the data is not entered/saved in the txt file in an easily readable format. The result is not displayed.	A satisfactory level of coding that demonstrates some understanding in terms of structure, use of programming constructs, readability, naming conventions for variables and commenting, but there is scope much more development in a number of areas. A basic attempt to address the problem specification with scope for further work. Class hierarchy is mentioned with the base class coded but the derived classes are not coded. The data file is created but the calculation is not shown. The	An unsatisfactory level of coding that demonstrates a lack of understanding at the required level in terms of structure, use of programming constructs, readability, naming conventions for variables and commenting, An insufficient attempt to address the problem specification with scope for much more work. No hierarchy of classes is coded or the demonstrated class hierarchy is incorrect. The code does not demonstrate reading/writing to a text file or the	Absent level of coding that demonstrates a little to no of understanding at the required level in terms of structure, use of programming constructs, readability, naming conventions for variables and commenting, A lack of evidence that the problem specification has been attempted. No code presented.

					calculation of the price might be done manually or the result is not displayed.	calculation of the price.	
<b>Task 4b</b> Execution (20%)	An outstanding level of execution which satisfies all requirements and operates without errors.	An excellent level of execution which satisfies all requirements and operates without errors.	A very good level of execution which satisfies the majority of requirements and operates mostly without errors.	A good level of execution which satisfies most requirements, though there are omissions or errors.	A basic level of execution which satisfies some requirements, though there are major errors omissions.	A sufficient level of execution, where the program runs, but mostly incorrectly.	The program does not run or compile at all.
<b>Task 4c</b> Design (15%)	An outstanding level of documentation and design, which addresses all aspects of the problem specification and the design process and demonstrates a practitioner level of understanding of the process of design.	An excellent level of documentation and design, which addresses all aspects of the problem specification and the design process and demonstrates an excellent level of understanding of the process of design.	An very good level of documentation and design, which addresses most aspects of the problem specification and the design process, with some minor omissions or errors and demonstrates an very good level of understanding of the process of design.	A good level of documentation and design, which addresses some aspects of the problem specification and the design process but there is scope for more depth and/or there are some errors or omissions. Demonstrates a good level of understanding of the process of design.	A basic level of documentation and design, which addresses some aspects of the problem specification and the design process but there is scope for much more depth and/or there are a number of errors or omissions. Demonstrates a basic level of understanding of the process of design.	An insufficient level of documentation and design, which addresses limited aspects of the problem specification, and the design process Demonstrates a insufficient level of understanding of the process of design.	A very limited or wholly absent level of documentation and design.

<b>Task 4c</b> Coding (65%)	A professional level of coding that demonstrates an exceptional level of understanding in terms of structure, use of programming constructs, readability, naming conventions for variables and commenting and satisfies the problem specification at a professional level. Students should correctly implement all the steps for the demonstration of abstraction. The abstract class and methods should be correctly coded. They should represent the price calculation code.	An excellent level of coding that demonstrates an excellent level of understanding in terms of structure, use of programming constructs, readability, naming conventions for variables and commenting and satisfies the problem specification to an excellent level. The abstract class is shown and the methods are correctly identified/coded but there might be errors in the calculation of the price.	A very good level of coding that demonstrates a very high level of understanding in terms of structure, use of programming constructs, readability, naming conventions for variables and commenting, though there may be minor issues or areas for development. Abstract class is shown but not for the calculation of the price of the hotel stay.	A good level of coding that demonstrates a good understanding in terms of structure, use of programming constructs, readability, naming conventions for variables and commenting, though there is scope for improvement in a number of areas. Abstract class is shown but is not relevant to the case-study or is incorrectly identified.	A satisfactory level of coding that demonstrates some understanding in terms of structure, use of programming constructs, readability, naming conventions for variables and commenting, but there is scope much more development in a number of areas. A basic attempt to address the problem specification with scope for further work. Abstraction is mentioned but not demonstrated.	An unsatisfactory level of coding that demonstrates a lack of understanding at the required level in terms of structure, use of programming constructs, readability, naming conventions for variables and commenting. An insufficient attempt to address the problem specification with scope for much more work. No demonstration of abstraction but a generic class is shown and the price is calculated incorrectly.	Absent level of coding that demonstrates a little to no of understanding at the required level in terms of structure, use of programming constructs, readability, naming conventions for variables and commenting. A lack of evidence that the problem specification has been attempted.
<b>Task 4c</b> Execution (20%)	An outstanding level of execution which satisfies all requirements and operates without errors.	An excellent level of execution which satisfies all requirements and operates without errors.	A very good level of execution which satisfies the majority of requirements and operates mostly without errors.	A good level of execution which satisfies most requirements, though there are omissions or errors.	A basic level of execution which satisfies some requirements, though there are major errors omissions.	A sufficient level of execution, where the program runs, but mostly incorrectly.	The program does not run or compile at all.