Bournemouth University

Faculty of Science and Technology

Department of Computing & Informatics

Unit Title: Systems Design (COMP5002)		
Assessment Title: The Systems Design Challenge 2022		
Unit Level: 5	**Assessment Number:** 1 **of** 1	
Credit Value of Unit: 20	**Date Issued:** 30/09/2022	
Unit Leader: Emili Balaguer-Ballester	**Submission Due Date:** 09/12/2022	**Time:** 12:30 PM
Other Marker(s): N/A	**Submission Location:** Brightspace (Multiple)	
Quality Assessor (QA): Sofia Meacham	**Feedback Method:** Brightspace	

This is a group assignment which carries 50% of the final unit mark.

ASSESSMENT TASK

This assessment consists of completing **Task 1** and **Task 2** described below, showing them in a poster, and then presented in a video by the full team. Both elements to be uploaded in the designated submission boxes on Brightspace

INTRODUCTION

This is a Team assignment. Teams must be of **any 5 colleagues, irrespectively if they are in your lab group or not**, playing the role of a typical DevOps or Agile team of system analysts and developers. The reasons are:

- Teams of developers working in the context of Agile methodologies are typically this size.
- Ability to work in teams of this size is an important skill for systems design.

GROUP SETUP AND CONTRIBUTION

- **Please self-enrol in one of the groups of five in Brightspace/Communications/Groups during the first 3 weeks of the term** if you wish to be part of a specific team**.** Please note that it is your responsibility to find a team, after the 17th of October members will be randomly allocated in the remaining slots of each group.
- **Please contact Emili Balaguer-Ballester as soon as possible if any difficulty on members contributions arises,** I would be delighted to provide my input to the group dynamics. By default, all team members are given the team mark. However, if the team wishes to recognise that different team members put in different levels of effort, the team must provide this information in the Contribution Form, to be submitted on Brightspace (please see below for the relevant form). Please contact me before this if there is any potential contribution issue.
- In this specific coursework, both tasks are designed to be completed synergistically among all group members, as discussed in the lectures. This prevents quantifying individual inputs in this type of exercise, but all members must engage. There will be formative feedback checkpoints during the process to solve any possible difficulty (see details in feedback methods and questions about the brief below). In addition, please contact Emili Balaguer-Ballester (eb-ballester@bournemouth.ac.uk) as soon as possible regarding any issue or question.

SCENARIO

You are a new team of analysts working in a start-up company specialized in developing cutting-edge software. The company was a spin-off of Bournemouth University, until a large technological firm acquired it, and now they are based at Cathect.

The previous team members either left the company or are scattered in other projects and thus, are not available to be contacted. You have inherited incomplete versions of their designs on new software projects; and your team decides to flesh out and to evolve the most promising of their incomplete designs. A virtual conference is taking place in San Francisco, in which stakeholders and decision-makers will be present. Thus, it is a great opportunity to showcase your ideas and to secure financial support for implementing them.

The challenge consists of designing a system, entirely of your choice, that maps to two incomplete diagrams depicted in the context of the Unified Modelling Language (UML) and in its dialect, the System Modelling Language (SysML). You will use them as a leverage to convey your ideas optimally in this venue to fellow software analysts and developers.

The specific goal is thus to use the incomplete information provided by the diagrams shown in **Task 1** and **Task 2** below to create a system of your choice compatible with them. The suggested steps to complete the challenge are shown in **Appendix 1**, please read it for further formatting details.

TASKS

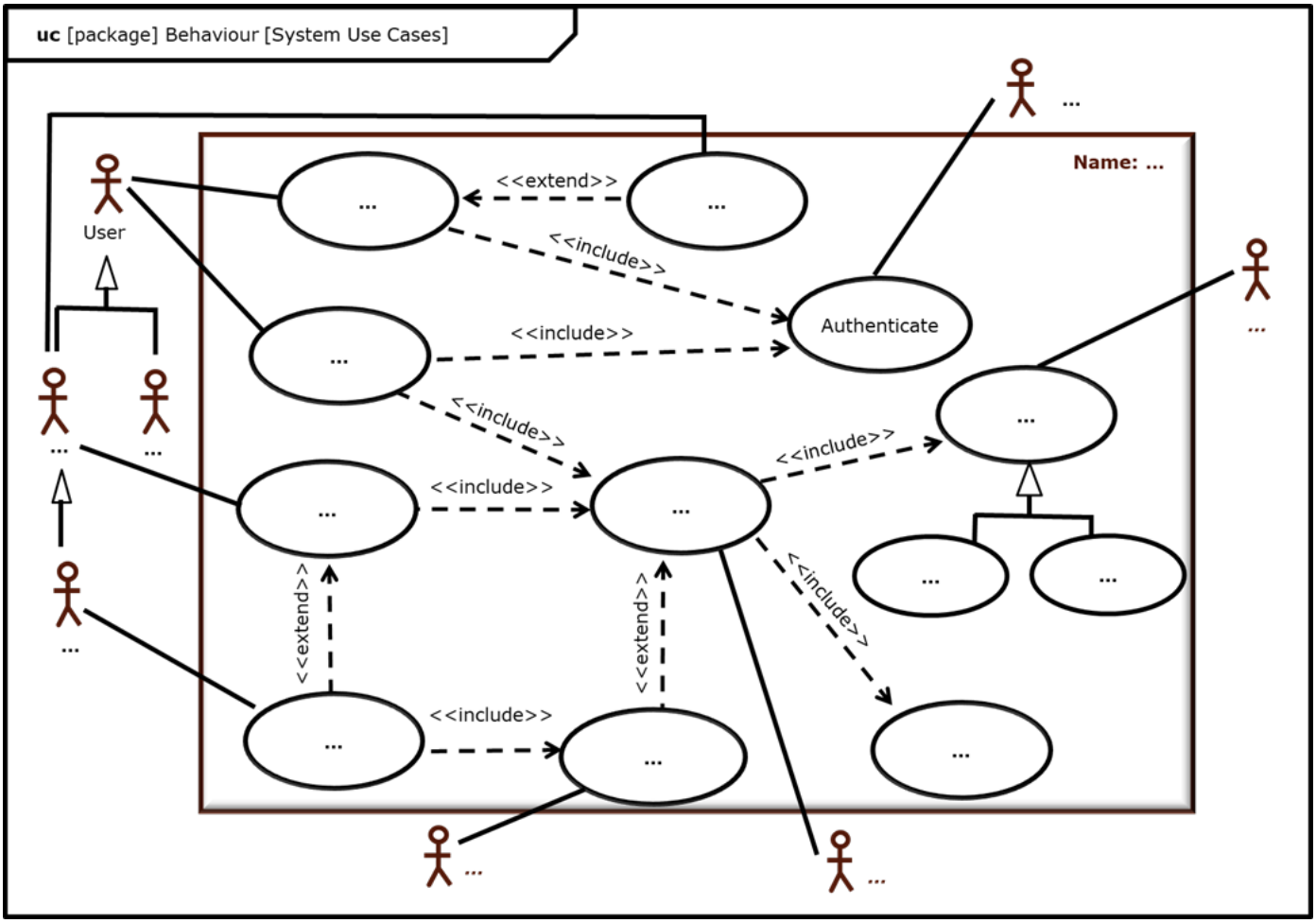
Task 1. High-level system identification: Use Case Description (left side of the poster)

Create a new, original and specific system **entirely of your choice**, but that maps to the incomplete use case diagram below by completing the next three tasks and show them on the **left-hand side** of your poster:

i. Fill the dots (**…**) in the use case diagram below with names of suitable use cases of your choice and of the missing actors.
- You are free to add as many UML/SysML symbols as you like (use cases, actors, relationships) to better fit your system, or to make it more original. If you want to, you can rename the actor and change the inheritance relationship in use cases for other links.
- However, you cannot remove any of the current symbols.

ii. Generate a use case specification(s) that fully describes **one** key cohesive process that your system is capable of that you want to showcase. You cannot choose the use case "Authenticate".

iii. Indicate very succinctly, using two bullet points to be discussed further in the video:
- why this specific use case diagram of your system is correct and,
- why your use case diagram is advantageous over describing your system just verbally, without the aid of it.



Task 2. Lower-level system identification: Class-level description (right side of the poster)
Focus now on detailing further a subsystem related to the previous system you created in Task 1, which maps to the incomplete class diagram shown below.

Alternatively, if this is not possible, fill the class diagram based on a new system related to Task 1. To do so, complete the next tasks and show them on the **right-hand side** of your poster.

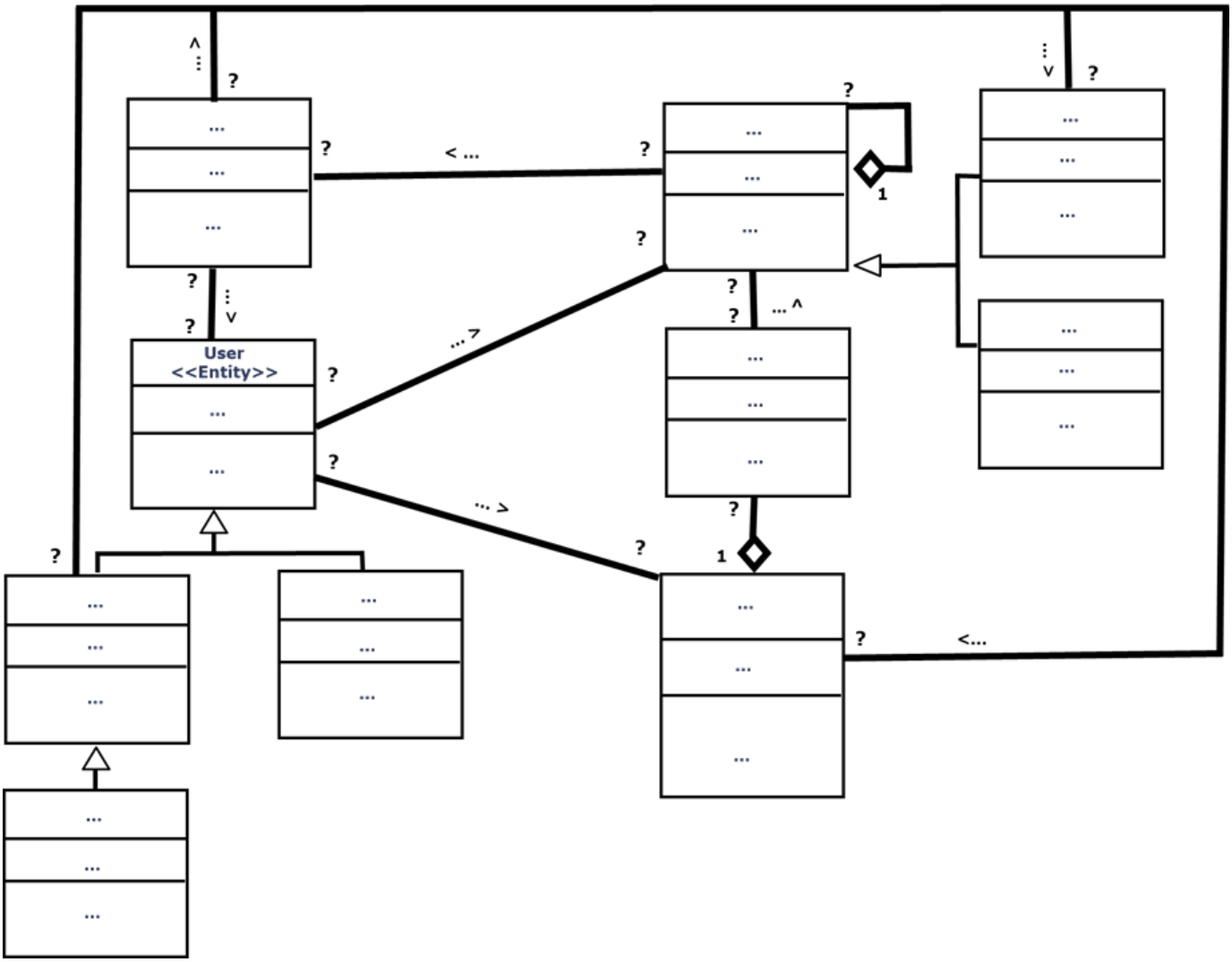
i. Show Class-Relationships-Collaborators cards of your classes.

ii. Fill the dots (**...**) and question marks (?) in the class diagram below with names of suitable classes and relationships (links). You can add attributes or methods when relevant for understanding your class, otherwise you can omit them.

- Your team is free to add more UML symbols (e.g., more classes and links) to better fit your system or to make it more accurate and original (see Marking Criterion section).
- You can rename the class. If you want to, you can turn associations into more specific link types and change one of the concrete relationships (an inheritance or an aggregation) to other types.
- However, you cannot remove any of the current symbols.
- Strong solutions should typically show several object-oriented design patterns like the ones discussed in the lectures.

iii. Indicate very succinctly, using two bullet points to be discussed further in the video:

- why this specific class diagram of your system is correct and,
- why your class diagram is advantageous over just coding your system without the aid of it, and if there is any other type of diagram that should be done.



SUBMISSION FORMAT
A single poster for a team of 5, the poster size is A1, which is submitted by:

1. Self-enrolling in any of the groups of 5 members under the Communications/Groups tag in Brightspace.
2. Submitting the poster in a Turnitin box in Brightspace by a single team member before the deadline as explained in the Brief and
3. submitting a 5'-10' (up to 10') video presenting the poster.

Details are indicated in the ASSESMENT TASK section.

Feedback methods:

Formative Feedback

- Oral, formative feedback of the intermediate work will be provided in tutorial times, discussions in lectures and in a dedicated discussion session in the lab during the fourth/fifth academic week. Please see contact times of Emili Balaguer-Ballester below -no appointment needed. Your group is encouraged to use them.
- In addition, the week of the submission has lectures but no laboratories, and it is dedicated fully to contact Emili Balaguer-Ballester before submitting with regards to the poster. Please drop a MS Teams message to talk during office times.

Summative feedback

- Formal feedback will be in video/audio or written.
- Your team can request further summative feedback before and/or after receiving the mark, by arranging a MS Teams meeting, this feedback will be video recorded. You are encouraged to ask for this verbal feedback.

MARKING CRITERIA
The following criteria will be used to assess the assignment:

[Total 100 marks]:

Task 1 [40 marks, ILOS 1 and 2**]**

- **Quality of individual use cases:** Are the individual use cases correct i.e., are they at the right level of abstraction? They should not be neither individual actions nor overambitious.
  [10 marks]
- **Quality of the diagram:** Are the actors and the connection between use cases meaningful? I.e., can the diagram be read seamlessly as a whole; does the diagram make sense overall with these use case names?
  [10 marks]
- **Quality of the specification(s):** Is the specification delivering correct and understandable information, is it readable? If specifications are extended, is the extension shown?
  [10 marks]
- **Insight:** Is the explanation of the new system based on the use case model sound? Will it be useful for understanding the system without further information?
  [10 marks]

Task 2 [40 marks, ILO 2**]**

- **Connection strength with Task 1 system:** How thematically linked is the system shown in Task 1 with this subsystem or new system in Task 2? (That is, if the class diagram in Task 2 is related to the use case model developed in Task 1). Is the link weak or absent?
  [10 marks]
- **Quality of individual classes**: Are the names and responsibilities of the individual classes in the CRC correct i.e., at the right level of abstraction? Classes should not be just individual attributes or methods neither overambitious classes i.e., to have too heterogeneous responsibilities. They must be the same as in the class diagram.
  [10 marks]
- **Quality of the diagram:** Does the diagram make sense with these classes? i.e., do the links in the diagram, collaborators in the CRC and multiplicities enable the analyst to read it and envisage its implementation for instance in Java or Python? Are multiple object-oriented design patterns incorporated and correctly used?
  [10 marks]
- **Insight:** Is the explanation of the new system based on the class diagram sound? Will it be useful for coding this specific system?
  [10 marks]

Extra elements [20 marks, connected with ILOS 1 and 2**]:**

- **Professionalism of video presentation and originality:** Is the poster professionally presented? How novel is the system conception and different from the examples provided in the unit?

  [10 marks]
- **Additional links and combinations of object-oriented patterns:** Does the solution include additional and correct modelling elements not shown in the initial diagram? Does the solution use original combinations of object-oriented design patterns of classes, that is, can solution-specific patterns be identified?

  [10 marks]

Expected performance to achieve a pass:

- In Task 1, use cases must be processes, that is, named using verbs or verbal sentences. Many omnipotent use cases, unfocused will probably not suffice.
- Likewise use cases that are just single individual actions will be probably unsuitable. Thus, about half of use cases identified should have a reasonably focused scope and the right level of abstraction, coherent and balanced among them; they must not be too ambitious or too trivial and all at a similar footage.
- The diagram and specifications may not be sharp, but it can be understood without many explanations. There is some value and there are some lessons learned from the system developed in Task 1. All in all, there is understanding of what a use case diagram is and why it is useful in this example.
- In Task 2, CRC and class diagrams show about half of the relevant classes, each containing at least half of the correct collaborating classes and their responsibilities. Classes in the diagram are reasonably correct, though not exhaustive.
- Like before, about half of the classes cannot be trivial or overambitious: classes that have several different non-cohesive roles at a time or on the other extreme, they are just attributes or functions i.e., simple methods will not do.
- The class diagram is readable and conveys the essential information for understanding the new system without much explanation; it provides non-trivial insights in the new system and adds value. All in all, there is understanding of why a class diagram is needed in this example.
- In the professionalism of the approach: The system is originally developed by the team and not copied. Is specific enough, not too generic. Highly unspecific, generic solutions are to be avoided. The poster is professionally presented to a reasonable extent, it can be understood.

Estimation of the performance to achieve a higher mark:

In Tasks 1 and 2:

- Use cases are largely focused; the level of abstraction is the right one in most of them i.e., they have been defined professionally. Similarly, CRC cards represent most of the classes for understanding the system. The main responsibilities and collaborators are shown, although there may be some imprecisions on them.
- The class diagram is fundamentally informative, the less obvious multiplicities may not be fully correct but there is a robust attempt to represent the system faithfully. Object-oriented design patterns are attempted to some extent.
- For 70+, use case and class diagrams will have almost all core, relevant elements both in the diagrams and in the specification or specifications for inferring the new system without any explanation.
- Classes, responsibilities and collaborators are just what are needed to implement the system; and hence link names and cardinalities are basically precise. Object-oriented design patterns are used where appropriated. Thus, diagrams represent a faithful model of the scenario, with a few minor errors.

In the professionalism of the approach:

- The system is quite original and specific, and new UML/SysML elements are correctly added. Task 2 class diagram extracts the information from Task 1 specification(s) like in a real case study. The poster layout is professionally and carefully crafted, showing capacity for synthesis. There is awareness of object-oriented design patterns in classes.
- For 70+, creativity and precise understanding of models has been demonstrated. Out-of-the-box thinking and excellent skills in reverse engineering are evident from the presentation. Original (solution-specific) combinations of object-oriented design patters are correctly used.

Please note that this assignment assesses only ILOs 1 and 2 below. The remaining two unit ILOs will be assessed by examination (assessment 2 of 2 in the unit).

INTENDED LEARNING OUTCOMES (ILOs)
This unit assesses your ability to:

1. Develop and execute an elicitation plan employing common techniques.
2. Understand, evaluate and apply the various concepts and techniques of Object Oriented Analysis (OOA) and Object Oriented Design (OOD).
3. Select a method to suit a given environment and process and criticise a given systems development process in terms of its management, methods and environment.
4. Evaluate human computer interfaces which consider the processing needs of different classes of user.
5. Understand the issues associated with method selection, working in a potentially highly heterogeneous team of software engineers and the evaluation of systems.

QUESTIONS ABOUT THE BRIEF
For further questions, no appointment is needed from Monday to Wednesday 8:30-10:30 on campus P256c (above Dylan's pub)/in MS Teams. Other times can be also OK, but I may not be available, please drop Emili Balaguer-Ballester an email during office times, and I will call you when possible.

There is also a dedicated forum for Q&A, the Padlet Systems Design Live! but I would be delighted to talk, I think it is often better than emails.

In addition, we plan to have a surgery seminar before the submission date, and we will be available during the submission week for Q&A sessions virtually at any time. Details will be announced in Brightspace.

Unit Leader Signature Emili Balaguer-Ballester

Group Assessment - Individual Contribution Form

Department of Computing & Informatics

Unit Name: Systems Design (COMP5002)

Element: Coursework 01 - Submission

This is an **optional form**, meaning that if your group believes all members have contributed **fully and equally** towards to the group element of the assessment, there is **no requirement to complete this form**. The below form should be completed **individually** by **ALL** members of the group, for the Unit Leader to consider when marking, if there were significant issues with engagement or contribution from one or more group members.

Please Note: In the event where forms are submitted, the following will apply:

- If **only part of the group** submits this form, the Unit Leader reserves the right to adjust any member's marks accordingly, based on the evidence **detailed in the form below**.
- Any group where the forms submitted provide **insufficient information** to support Unit Leader to make a judgement, the Unit Leader reserves the right to award every group member an **equal mark**.
- Any group where the forms submitted provide **clear contradictory information**, the marks awarded will be at the discretion of the Unit Leader.

IMPORTANT: Every member of the group takes **full responsibility** to work collaboratively and professionally as a group. The Unit Leader will provide guidance on the next steps if there is a dispute between group members, Unit Leaders would not normally be expected to intervene to resolve disputes between group members.

Your Name and Student Number	**Contribution** (Please Circle)			**Comments** (Required when less than full contribution)
	None	Partial	Full	

Other Group Member Names and Student Numbers	**Contribution** (Please Circle)			**Comments** (Required when less than full contribution)
	None	Partial	Full	
	None	Partial	Full	
	None	Partial	Full	
	None	Partial	Full	
	None	Partial	Full	
	None	Partial	Full	
	None	Partial	Full	
	None	Partial	Full	

Your role within the group and actions/tasks which you completed or significantly contributed to:
Any other comments you would like to make on your group, particularly anything related to the group work:

Student Signature: _____ **Date:** ____ / ____ / _____

Help and Support

Undergraduate Coursework Assessments

If a piece of coursework is not submitted by the required deadline, the following will apply:

1. If coursework is submitted within 72 hours after the deadline, the maximum mark that can be awarded is 40%. If the assessment achieves a pass mark and subject to the overall performance of the unit and the student's profile for the level, it will be accepted by the Assessment Board as the reassessment piece. This ruling will apply to written coursework and artefacts only; This ruling will apply to the first attempt only (including any subsequent attempt taken as a first attempt due to exceptional circumstances).
2. If a first attempt coursework is submitted more than 72 hours after the deadline, a mark of zero (0%) will be awarded.
3. Failure to submit/complete any other types of coursework (which includes resubmission coursework without exceptional circumstances) by the required deadline will result in a mark of zero (0%) being awarded.

The Standard Assessment Regulations can be found on **Brightspace or via** https://www1.bournemouth.ac.uk/students/help-advice/important-information (under Assessment).

Exceptional Circumstances

If you have any valid **exceptional circumstances** which mean that you cannot meet an assignment submission deadline and you wish to request an extension, you will need to complete and submit the online Exceptional Circumstances Form together with appropriate supporting evidence (e.g. GP note) normally **before the coursework deadline**. Further details on the procedure and links to the exceptional circumstances forms can be found on **Brightspace or via** https://www1.bournemouth.ac.uk/students/help-advice/looking-support/exceptional-circumstances. Please make sure that you read these documents carefully before submitting anything for consideration. For further guidance on exceptional circumstances please contact your Programme Leader.

Referencing

You must acknowledge your source every time you refer to others' work, using the **BU Harvard Referencing** system (Author Date Method). Failure to do so amounts to plagiarism which is against University regulations. Please refer to https://libguides.bournemouth.ac.uk/bu-referencing-harvard-style for the University's guide to citation in the Harvard style. Also be aware of Self-plagiarism, this primarily occurs when a student submits a piece of work to fulfill the assessment requirement for a particular unit and all or part of the content has been previously submitted by that student for formal assessment on the same/a different unit. Further information on academic offences can be found on **Brightspace** and from https://www1.bournemouth.ac.uk/discover/library/using-library/how-guides/how-avoid-academic-offences

Additional Learning Support

Students with **Additional Learning Needs** may contact the Additional Learning Support Team. Details can be found here: https://www1.bournemouth.ac.uk/als

Primary Research (Undergraduate Levels)

You should not be conducting any primary research (i.e. carrying out an investigation to acquire data first-hand, for example, where it involves approaching participants to ask questions or to participate in surveys, questionnaires, interviews, observations, focus groups, etc.) unless otherwise specified in the brief. However, if there is a genuine requirement to collect primary research data you will require ethical approval before doing so. In the first instance, please discuss with the Unit Leader. The collection of primary data without appropriate ethical approval is a serious breach of Bournemouth University's Research Ethics Code of Practice and will be treated as Research Misconduct.

IT Support

If you have any problems submitting your assessment please contact the IT Service Desk - +44 (0)1202 965515 - immediately and before the deadline.

Disclaimer

The information provided in this assignment brief is correct at time of publication. In the unlikely event that any changes are deemed necessary, they will be communicated clearly via e-mail and Brightspace and a new version of this assignment brief will be circulated.

Appendix 1. The Steps to complete the challenge

1. Self-enrol in one of the groups of five in Brightspace/Communications/Groups **during the first 3 weeks of the term**. If your team is approached by someone, please admit her/him in your group, thank you very much. Flexible thinking is important for this challenge.

   After the 17th of October, any unenrolled members will be randomly allocated in the remaining slots of each group. Please contact Emili Balaguer-Ballester if you want me to facilitate the process of joining a group.

2. Attendance to all online lectures and labs, because each single element of the assignment will be discussed during them.

   Optional: register a tentative title for the poster. To do so, upload in the 'locker' of your team (a link next to the group number in Brightspace) a file with a title/draft. Importantly, this is not a submission neither the final title, nor it is marked. It just declares the intellectual property of your original idea, and other teams will be asked to have a different title.

3. Read please the Scenario section above for inspiration for the system creation. Read also the MARKING CRITERIA section below this section. Remember please, plagiarism is an Academic Offence.

4. During the fourth/fifth academic week of the course, we will run surgery/discussion forums during the seminar/lectures/tutorials to help to complete the Systems Design Challenge tasks. Your group is encouraged to contact Emili Balaguer-Ballester during the process.

5. **Show your system in a pdf poster of A1 size, the left side containing the answer to Task 1 and the right side to Task 2.** The **title** of the poster should be **"Team [group number]. [poster title]"** for instance "Team 35. An e-shopping system for Nintendo Switch". Please use this format in the pdf to be correctly identified.

6. **Submission. Upload a pdf of the poster in the designated submission box in Brightspace before the deadline**, please name the file with the group number first and a short title of the poster, such as "20_eShopNintendo.pdf". In the first page of the pdf please put the names of the team members and your student IDs.

7. **Team members should also upload a 5'-10' video (10' maximum) briefly explaining their system.** This video just provides supporting information to help to understand the system shown in the poster. Please avoid large file sizes if possible (over 100 mb).

   To do so, a suggested process is to create a MS Teams team or any other tool in which all team members connect, and they explain the poster by sharing the screen. The explanation is recorded and uploaded next to the poster in the submission box in Brightspace.

8. Feedback and marks: For more details and knowing how marks will be awarded to your work, please see the section MARKING CRITERIA below Your Task section in this brief.