

# TAKE-HOME ONLINE EXAMINATIONS APRIL – JUNE 2021

**Please read through all instructions carefully before you start your exam**

In most cases, the take-home online exam will be available for 23 hours and your answer(s) must be submitted before 9.00am UK time the day after your take-home online exam opens, unless you have been given a different deadline from your School.

## **Completing your take-home online exam**

1. You need to download the question paper and any accompanying documents from Blackboard and your answers can be written in a Word document as you would for coursework (unless you have been given specific instructions from your School).
2. You are advised only to work on your answers for the duration of the time stated on the front page of the take-home online exam paper. You are not expected to work for 23 hours on your answer(s).
3. For some exams a timer will be applied so that, once started, you must submit within the specified time limit. Exams with a time limit will require you to submit either to a Blackboard test or to a Gradescope assignment. These will be clearly identified in Blackboard.
4. For exams which are time-restricted, and where you are required to upload your answers in a file, an extra 30 minutes will be added. This additional time is to allow you to scan any handwritten work and upload your file. Work submitted beyond this 30 minute period will be treated as late, and will not be marked.
5. Please read your exam paper thoroughly before you start to ensure that you understand what you need to do.
6. Do not exceed the specified word limits where they are stated.
7. You should use 12pt font size, Arial and 1.5 line spacing for word processed submissions.
8. Please write your 5-digit anonymous candidate number (from your RISIS exam timetable), module code and the number(s) of the question(s) answered on the top of each piece of work that you submit.
9. Save your work regularly as you are working on it.
10. You are responsible for the content of the work you upload and for the academic integrity of your answer(s).
11. Complete and upload your answer(s) to the submission point(s) in your Blackboard course.
12. You are responsible for organising your time and should aim to submit your answer(s) as early as possible to ensure your work is submitted prior to the deadline specified for your take-home online exam paper.

*Full guidance can be found in the Take Home Exams area of this Blackboard course.*

## Submission

1. Please check the front of your take-home online exam paper and Blackboard for any specific instructions for uploading your work to submission point(s) for each paper.
2. You can submit multiple times for most exams (unless you have been told there is only one submission possible by your School), but you should ensure that your final version is uploaded before the deadline.
3. When submitting to Turnitin the 'submission title' must start with your 5-digit anonymous candidate number, followed by the module code. An example of a submission title is 12345 HS3DR.
4. You are responsible for ensuring that you have uploaded the correct document to the correct submission point. Some exams require submission of answers for different questions to different submission points.
5. You are responsible for ensuring that your file has been uploaded successfully. When you submit to a Turnitin, Blackboard or Gradescope 'variable-length' assignment you will receive an email receipt which you must keep. If you do not get this email receipt your work has not been submitted (check your spam folder).

You will not receive an email receipt when you submit to a Blackboard Test or Gradescope Online Assignment.

Please note that the final stage of a Turnitin submission requires you to confirm your submission by clicking 'Confirm'.

6. Please allow yourself plenty of time to upload and submit your answer(s) by the deadline. If you have problems submitting your answer(s) please email your work to [take-home-exam@reading.ac.uk](mailto:take-home-exam@reading.ac.uk) as soon as possible.
7. We will not be emailing reminders from the University ahead of exam papers and submission points opening, or non-submissions after the take-home exam submission has closed.
8. Guidance on how to submit files for your exams can be found at <https://rdg.ac/takehomeexam>

*Full guidance can be found in the Take Home Exams area of this Blackboard course.*

## Where to get support

If you need support during your exam you can contact us on +44 (0) 118 378 7049

For technical issues (Blackboard and IT) you can also raise a ticket via the [DTS Self Service Portal](#).

For other non-technical queries, please check the exams FAQs on [Essentials](#) or email [take-home-exam@reading.ac.uk](mailto:take-home-exam@reading.ac.uk). Emails need to be sent from your University email account and you should provide your 5-digit candidate number.

Please note that 'live' support is available from 8:00am-5:00pm UK time Monday to Friday and will be available for limited hours 8:00am-9.30am UK time on Saturday morning during the exam period.

### **DAS registered students**

1. If you have been provided with a green sticker, please attach this to the front page of your answer(s), as you would do for coursework submissions.
2. If you have any additional arrangements including extra time, you should consider the necessary requirements prior to the start of your exam and read the advice in the exam FAQs on [Essentials](#).
3. If you still have queries please contact the Disability Advisory Service (DAS) or email [take-home-exam@reading.ac.uk](mailto:take-home-exam@reading.ac.uk). Emails need to be sent from your University email account and you should provide your 5-digit candidate and student number.

### **IMPORTANT - You must read this before you start your exam**

#### **Academic Integrity**

We are treating this online examination as a time-limited open assessment. This means that:

1. You are permitted to refer to published materials to aid you in your answers.
2. Published sources must be referenced. This includes all on-line sources.
3. Over-reliance on published sources is considered to be poor academic practice.

Apart from appropriate referencing, you must ensure that:

- a. the work you submit is entirely your own;
- b. you do not communicate with other students on the topic of this assessment for the whole time the assessment is live;
- c. you do not obtain advice or contribution from any third party, including proof-readers, friends, or family members.
- d. For advice on academic integrity, you can see the University Library's [Academic Integrity Toolkit](#).

You should note that:

1. Failure to adhere to these requirements will be considered a breach of the Academic Misconduct regulations ([available here](#)), where the offences of cheating, plagiarism, collusion, copying, and commissioning are particularly relevant.
2. Your exam answers will be run through Turnitin, and the usual similarity reports will be available to markers.

**Please read and note this statement of originality:**

**By submitting this work I certify that:**

- 1. it is my own unaided work;**
- 2. the use of material from other sources has been properly and fully acknowledged in the text;**
- 3. neither this piece of work nor any part of it has been submitted in connection with another assessment;**
- 4. I have read the University's definition of plagiarism, guidance on good academic practice and the guidelines set out above; and**
- 5. I will comply with the requirements these place on me.**

**I acknowledge the University may use appropriate software to detect similarities with other third-party material, in order to ensure the integrity of the assessment.**

**I understand that if I do not comply with these requirements the University will take action against me, which if proven and following the proper process may result in failure of the year or part and/or my removal from membership of the University.**

With best wishes and good luck for your take-home online exams over the coming period.

Please read the instructions below before you start the exam.

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April/May 2021

CS3VI18 2020/1 A 800

UNIVERSITY OF READING

VISUAL INTELLIGENCE (CS3VI18)

Two hours

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Answer any **THREE** out of FOUR Questions.

If a word limit is not specified next to a QUESTION then EACH QUESTION (e.g. Q1, Q2, Q3, etc.) has a word limit of 1000 words.

This limit excludes scanned images of diagrams or hand-written formulas but includes images with hand-written text.

Submit your answers to **EACH QUESTION SEPARATELY** to the relevant submission point on Blackboard.

**EACH** Question is worth 20 marks.

SECTION A

1.
  - (a) Outline the form and function of the primary visual area (Area V1) in the human brain.  
(5 marks)
  - (b) Compare and contrast TWO different human visual systems for detection of movement.  
(6 marks)
  - (c) Consider the following statement: “Researchers have taught computers to ‘see’ visual illusions.” Discuss the implications of this statement for developing more robust artificial vision systems. Illustrate your answer with one or more suitable examples.  
(9 marks)

2. (a) L. G. Roberts in 1965 published a landmark thesis on the recognition of unspecified polyhedral objects, now recognised as the forerunner to modern computer vision research into 3D geometric-based object recognition. Describe the main steps in Robert's approach to recognition.  
(4 marks)
- (b) Behavioural analysis, as part of a visual surveillance system, is an important application of computer vision. Explain how behaviour analysis may be applied for the task of anomaly detection in maritime surveillance. You may assume the input to the process is a set of vessels' (boats') detections and their trajectories (tracks).  
(6 marks)
- (c) "Artificial vision has often been described as one of the key remaining challenges to be solved before machines can act intelligently. Recent developments in deep learning have enabled impressive gains in machine vision - giving a sense that the problem of vision is getting closer to being solved." Discuss this statement including examples where appropriate to support your views.  
(10 marks)

SECTION B

3. (a) Describe the models, with diagram assistance, of “supervised learning” and “unsupervised learning” with the context of image based pattern classification. Compare and contrast the two learning methods. (8 marks)
- (b) In a video sequence, it contains a road scene with a moving car. A frame of the video sequence is shown in Figure Q3-1. You are asked to remove the moving car from the video sequence and recover the road scene in it. Design an integrated algorithm that can:
- identify the moving car,
  - outline the shape of the car either automatically or semi-automatically,
  - remove the car from each frame of the video sequence, and
  - finally fill the hole (where the car used to be) in each frame to recover the road scene.



Figure Q3-1. A video frame containing a road scene with a moving car

State any assumptions you make in your answer, and identify possible flaws.

(12 marks)



4. (a) In statistical pattern recognition with numerical features, derive a general model of classifier, and describe ONE method by which the performance evaluation of a classifier can be carried out. (8 marks)
- (b) In a satellite image as shown in Figure Q4-1, there are mainly three categories of different regions, lakes (in light blue), burned scar areas (in dark brown), and normal mountain areas (in red). You are required to design an integrated approach to automatically or semi-automatically:
- segment the image into the three categories of regions,
  - find the largest area of the burned scar,
  - outline the shape of the largest burned area by using active contours with B-spline functions, and
  - describe the process of establishing the active contour.



Figure Q4-1. A satellite image containing three regions

State any assumptions that you make in your answer, and identify possible flaws.

(12 marks)

(End of Question Paper)