Computer Science Transition workbook

The course is assessed by
2 exams (40% each exam)
and a programming project (20%)
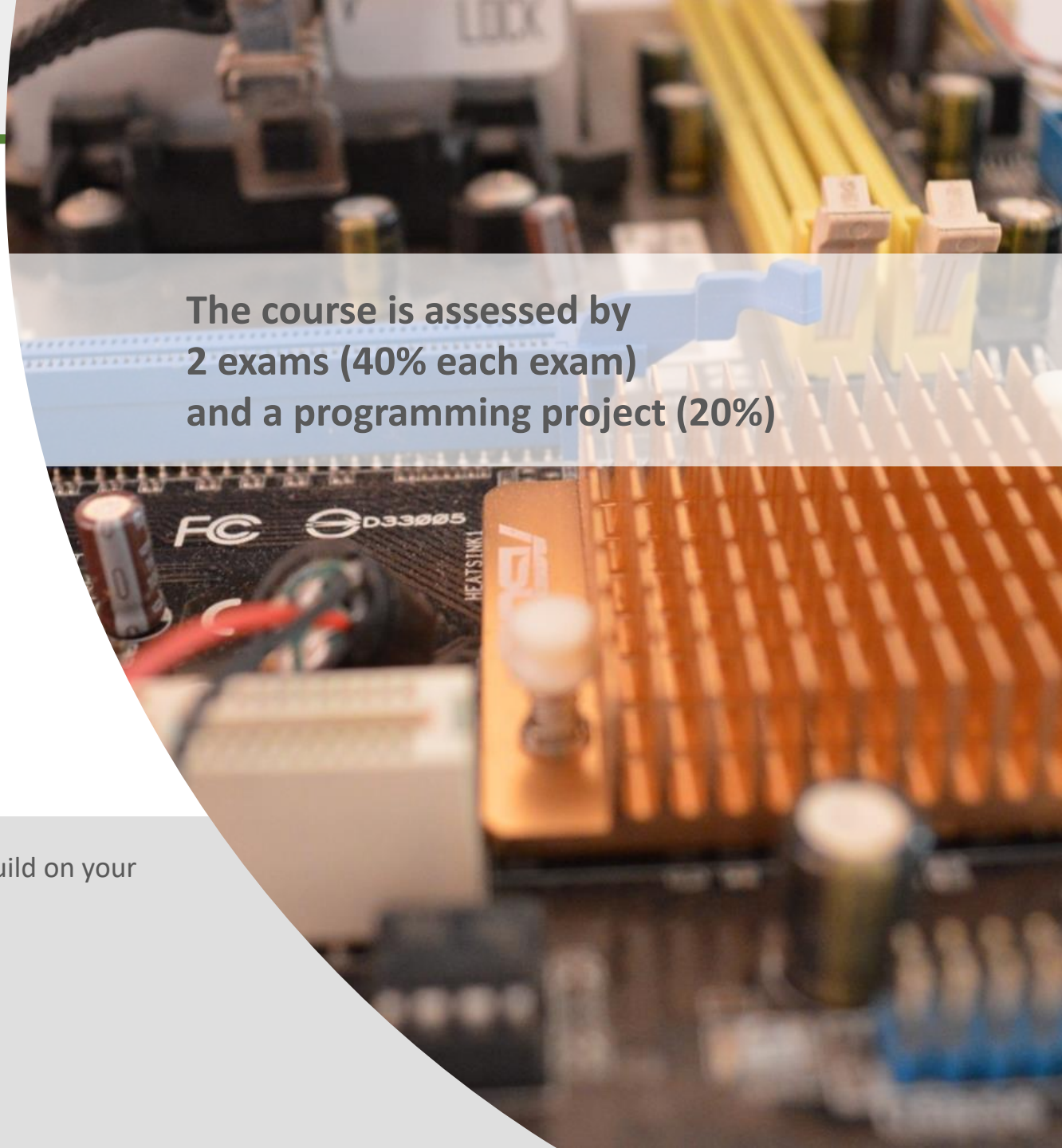
- The topic of **Computer Science** is at the heart of the modern world

- Studying it can make you extremely sought after in todays job market

- The transition from GCSE to A level is significant, this includes:
  - An increased emphasis on **technical content**
  - An increased emphasis **independent research**

This workbook is designed to allow you to practice some of these skills and build on your existing knowledge.

Please complete by your first lesson back in September.

- We use the exam board OCR for A Level Computer Science (code H446), if you are researching the course then make sure that you use this one.

- The tasks have been chosen so that you start year 12 with good coding and algorithm skills, have researched a current topic of your choice and have refreshed your knowledge of a good range of keywords.

- **The easiest way to complete the tasks is to take a copy of the Powerpoint and write your notes / answers in here – add in as many extra slides as you need.**

- **Be ready to submit the tasks in the first week of term.**

Why did you choose Computer Science?

Expected time to complete: ½ hour

In this simple task you get the opportunity to tell me your choices and reasons behind choosing to study Computer Science. Please answer all questions as best you can.

1. Why did you choose to study A level Computer Science?

2. What other courses have you chosen to study at Key Stage 5, and what made you choose this combination?

3. What are you hoping to achieve from studying Computer Science?

4. How would you describe yourself as a learner at GCSE? What skills where you good at, what areas would you like to improve on?

5. What are your other hobbies and interests outside of school? Anything related to Computing?

Emerging computer technology

In this task you get to investigate any area of emerging computer technology which interests you.

You can pick any area which interests you, but examples could be:
• Artificial intelligence
• Robotics
• Automated self driving cards
• Quantum computing

In no more than ONE side of A4 summarise the area you have chosen under the following four headings:
1. What is it?
2. What are the possible Social, Moral, Cultural and Ethical **benefits** of this technology on society
3. What are the possible Social, Moral, Cultural and Ethical **risks** of this technology on society
4. My conclusion on this technology and what it will mean for our world 10 years from now

Additional help:

For additional help and support in structuring your answer you might like to watch some of the videos from the following Craig 'n' Dave playlists:

OCR:
SLR 17 – Ethical, morale and cultural issues
https://student.craigndave.org/videos/slr-17-ethical-moral-and-cultural-issues

AQA:
SLR 19: Moral, social, legal, cultural issues
https://student.craigndave.org/videos/slr19-moral-social-legal-cultural-issues

Getting to grips with terminology

Expected time to complete: 2 hours

An important aspect of being successful with your study of Computer Science is getting to grips with subject related terminology. There are over 240 specific terms you will need to learn!

Below are a handful of the key terms you will need to become familiar with.

Control Unit	**Register**	**Busses**
Von Neuman Architecture	**Optical Storage**	**Operating System**
Intermediate Code	**Device Driver**	**Compiler**
Assembly Language	**Machine Code**	**Lossy Compression**
Hashing	**Normalisation**	**TCP/IP Stack**
Packet Switching	**ASCII**	**Problem Decomposition**

1. Research each of the key terms and write a definition.

2. Resist the urge to simply cut and paste a definition from the first website you find. Many definitions found on The Internet are overly complicated and wordy.

3. Ask yourself:
   - Does my definition make sense?
   - Is it succinct, to the point?
   - Does the definition have appropriate depth and detail for A'Level?
   - Could I give this definition to another student so they could revise from it?

Programming basics

Expected time to complete: 6 hours

Learning to "code" is a fun and essential part of A Level Computer Science. This task is ideal if you haven't done the GCSE in Computer Science or you simply want a nice refresher ahead of starting your A Level course.

1. Head over to the web site: https://www.learnpython.org/
2. Complete the following python tutorials under the heading:
    - Hello, World!
    - Variables and Types
    - Lists
    - Basic Operators
    - String Formatting
    - Basic String Operations
    - Conditions
    - Loops
    - Functions
3. Each section presents you with theory, code to run and exercises to try out.
4. If you want to practice writing your own python programs you can download and install a simple python development tool here: https://www.python.org/downloads/

Additional note:

This task is most suited to students who intend to do the A Level and have not previously gained much / or any programming experience from the GCSE Computer Science course.

The language chosen here is Python, and that is what you will be using at A Level.

The list of topics above cover the standard set of programming concepts you would be expected to know having completed a GCSE and Computer Science and so will prepare you well for the A level.

Algorithms: from theory to practice

Expected time to complete: 4 hours

A core concept of computer science is that of data structures and algorithms.

It is also an area which many students struggle with during examinations.

Probably the most basic algorithm is that of the "linear search".

If you have done the GCSE course you will have learnt about this searching algorithm already.

Start by learning or refreshing your knowledge of the linear search algorithm by using the videos on this page:
*   https://www.craigndave.org/algorithms-linear-search

Once you are happy with the theory complete the exercises on the following slides.

Algorithms: from theory to practice

Expected time to complete: 2 hours

1. Describe what the linear search algorithm does.

2. What are the applications of the linear search algorithm?

3. Write out the steps of the linear search algorithm in simple-structured English.

4. Draw a simple diagram which illustrates the linear search algorithm.

Algorithms: from theory to practice

Expected time to complete: 2 hours

5. Write out pseudocode for the linear search algorithm.

- The algorithm should use an array called items which is pre-populated with the following values: "Florida","Georgia","Delaware","Alabama","California"
- The algorithm should ask the user to "Enter the state to find:"
- If the algorithm locates the state entered by the user in the array it should report back to the screen "Item found at position n"
- If the algorithms can not locate the state entered by the user in the array it should report back to the screen "Item not found"

Algorithms: from theory to practice

6. Have a go at coding the linear searching algorithm in a programming language of your choice.

- The program should work use an array called items which is pre-populated with the following values: "Florida","Georgia","Delaware","Alabama","California"
- The program should ask the user to "Enter the state to find:"
- If the program locates the state entered by the user in the array it should report back to the screen "Item found at position n"
- If the program can not locate the state entered by the user in the array it should report back to the screen "Item not found"

Cut and paste the code you have written into the box below: