



A Level Computer Science

Course Booklet 2020

Contents

Mission Statement of the Xaverian Brothers	3
Department Personnel	4
Getting Started	4
Lesson Notes	4
Standards for all Computer Science students.....	6
About The Course:	7
A Level Computer Science	7
Unit 1.....	7
Unit 2.....	8
1 Fundamentals of data representation.....	8
2 Fundamentals of computer systems	8
3 Fundamentals of computer organisation and architecture	8
4 Consequences of uses of computing	8
5 Fundamentals of communication and networking	8
A Level Computer Science	8
Unit 1.....	8
Unit 2.....	8
NEA - Coursework.....	8
Computer Science Support.....	9
Computers	11
Books	11
The Library	11
Booklist	12
Digital Resources:	12
Software – Visual Studio C#.....	12
The Intranet	13

Mission Statement of the Xaverian Brothers



Jesus Christ taught that God is at the centre of our lives and that the love of truth and concern for the needs of others must be fundamental to our way of living.

Inspired by Jesus Christ and by the missionary zeal of their founder, Theodore James Ryken, the Xaverian Brothers are dedicated to the creation of schools and colleges as communities in which these truths are the guiding principles and in which the spiritual, moral and intellectual talents of their students are nurtured.

A Xaverian college must provide opportunities for growth in the knowledge and practice of the Roman Catholic religion through prayer, worship, study and service to others in and beyond the college community.

The obligation to help students to develop all their talents calls for a commitment on our part to good teaching, dedicated pastoral care and a readiness to relate to students both inside and outside the classroom. Through this commitment, the students will experience and respond to the good will and concern of their teachers.

The cause of justice is an essential theme in the message of Christianity. In Xaverian college, staff and students will be conscious of the demands of social justice in local, national and international issues and will seek to discover ways in which they can most appropriately respond as individuals and as a community.

Our students are living in a secular society where persuasive forces influence them away from a spiritual view of life. In the same spirit of faith and hope which inspired our founder, we wish to commend to our students a way of life which is rooted in the love of God and our neighbour.

Department Personnel

Mrs C Graham	Curriculum Leader: Computer Science
Mrs K Smith	Computer Science
Mr C Poke	Head of Division: Business & Professional Studies

Getting Started

We want you to enjoy Computer Science and to obtain the best possible grade at the end of the course. In the following sections we have given you some advice on how to approach your studies. It is important to get off to a good start - so get yourself organised now!

Look at your timetable and choose which study periods you will use for Computer Science. Look at the various study areas in the college and decide which is the best place for you to go. Details of the IT resource rooms are given in later in this document.

Think about how you are going to organise and keep your work.
Plan a sensible routine and stick to it.

Lesson Notes

In most lessons you will be given notes on printed sheets which you need to get into the habit of annotating & highlighting. You may also be asked to research your own notes. However the work is presented it is important that you keep all your notes organised, folders will be issued at the start of the course.

We recommend that you write your name, the date and the module code on each piece of work. It is necessary that you try to keep your work for different modules in separate folders.

Hopefully, this will make it easier for you to keep your notes in order and, hence, make it easier for you to tackle your homework and to revise.

Homework, Assignments and Tests

Theory homework will be set regularly, and must be completed in accordance with instructions from your teacher. Sometimes you will be asked to revise a particular topic in preparation for a class progress test, and other times you will be asked to look at exam questions in preparation for a lesson. Some of the work will be peer assessed, class tests and CAP tests will be marked by your teacher. Feedback, verbal and written, will also be given.

Homework which is handed in late will be marked at the discretion of your teacher. Homework marks and class test results are recorded and will be used in the preparation of reports.

If ever you are struggling with homework or a particular topic - seek help! Help is available at lunchtimes, in Support Sessions during the week. You can see you teacher at the end of lesson to make an appointment or simply turn up at a support session.

In addition to written homework, you will also be given *practical assessments* to complete. These will either take the form of programming exercises or a programming assignment. Such work needs to be tackled using a computer. Most students find that their programs usually don't work first time. For this reason, you should start programming assignments well before the deadline date to give

yourself time to make modifications and to seek help if needed. There are computers available for student use in the IT resource rooms. Textbooks are available for use in MF 23 as well as in the library.

AQA AS Level Computer Science Textbook ISBN: 978-1-910523-02-5 PM Heathcote and RSU Heathcote

Interactive Resource:

<http://www.educational-computing.co.uk/>

Tests will be set regularly to ensure understanding and to test recall of information and its application to problems. Near to the end of a course the tests may be past examination papers. Tests will be graded, broadly in line with external examination grades. These grades will be recorded and will be used in the preparation of reports and estimated grades, so it is important that you revise thoroughly for all tests.

The work set is only the minimum that you should be doing. A good student should research the subject further by reading relevant books and publications, some of which are kept in the college library.

Standards for all Computer Science students

1. **Punctuality.** You must arrive to lessons on time. If you are late, make sure that enter the classroom quietly so as not to interrupt the flow of the lesson and make an explanation to teacher, as soon as possible. All lateness will be recorded on the register by your teacher.
2. **Attendance.** Students must at least meet the college target of 94%. If you miss a lesson then it is your responsibility to find the work on the college intranet to catch up with any missed work. You must also check if any homework has been set.
3. **Homework.** Written homework must be legible and handed in on time to the class teacher.
4. **Coursework.** Year 13 projects: students must stick to internal deadlines to get feedback from the teacher. See year 13 schemes for details of deadlines.
5. **Time wasting.** No misuse of Internet in practical lessons.
In practical lessons no personal use of music/ mobile devices unless needed for class.
6. **Environment.** Absolutely **no food or drink** is allowed in Computing rooms (only water allowed).
7. **Students below Target.** Students performing below target range in homework must attend extra support.

Students must revise for progress tests, if test results are below **target range** they will have to re-sit at an arranged time.
8. **Progress.** If your subject teacher feels that you are not making sufficient progress or putting in enough effort then your class teacher will inform your Pastoral Manager, Faculty Head and Curriculum Leader to enable a plan of action to be drawn up.

ASSESSMENT OF LITERACY COLLEGE POLICY

- All routine assignment cover sheets will have a box on SPG/ Lit skills for a brief comment.
- The teacher will aim to identify at least three spellings of key vocabulary that the student needs to improve.
- The teacher will highlight errors of spelling , punctuation and grammar **at least once** in a piece of work.

The following key will be used:

Sp – spelling error P – punctuation error // new paragraph needed / new sentence needed

About The Course:

A-Level Computer Science

The first year is split into two modules called Unit 1 and Unit 2. Both modules are tested in the summer.

We are going to cover the theory work for Unit 1 in the first term and the theory work for Unit 2 in the second term.

We will be studying programming throughout the year. The third term will be spent preparing for the programming and theory exams.



Unit 1 Problem Solving & Programming

Unit 1 is about problem solving, programming, data representation and includes a **practical exercise**.

The main topic covered in Unit 1 are as follows:

Subject content for Paper 1

- 1 Fundamentals of programming
- 2 Fundamentals of data structures
- 3 Systematic approach to problem solving
- 4 Theory of computation

The Practical Exercise

When the programming lessons are complete, the skeleton program will be undertaken as a practise for the programming paper. We will spend class time looking at the code to see what it does and experimenting with it to add new features to it.

In the exam:

- You will be given a 'normal' question paper but you will word-process your answers.
- You will be given a clean copy of the skeleton program and you will be asked questions about it.
- You will also be asked to make amendments to it. These you will be able to test on the computer.
- The code should then be copied into the word-processed document.
- You will also be asked 'normal' theory questions based on the syllabus shown above.

This exam will be 1 1/2 hours in length and will be done on the computer at the end of Year 1.

Unit 2 Theory

Unit 2 is about the basic computer components, the stored program concept and the Internet. This module is worth 50% of the first year marks. The exam for this module is 1 1/2 hour in length and is paper-based.

Details of the main topic covered in Unit 2 are as follows:

- 1 Fundamentals of data representation
- 2 Fundamentals of computer systems
- 3 Fundamentals of computer organisation and architecture
- 4 Consequences of uses of computing
- 5 Fundamentals of communication and networking

A Level Computer Science

The linear A-level comprises of two units, Unit 1 and Unit 2 as well as Coursework (NEA). Entry to the second year is not automatic. You need to have shown during the first year that you are committed to the subject and you must have a good record of attendance and punctuality.



Unit 1

This unit is an extension to the programming work covered in the first year. This module is worth 40% of the final A Level marks. It is an on- screen exam for a duration of 2 ½ hours.

Details of the main topic areas covered in Paper 1 can be found on the Intranet.

Unit 2

This unit is an extension to the theory work covered in the first year. This module is worth 40% of the final A Level marks. Details of the main topic areas covered in Paper 2 can be found on the Intranet.

This exam is 2 ½ hours in length and is a written exam.

NEA - Coursework

This Unit is a **coursework module**. For this module you will required to analyse a problem, design a solution to it, implement the solution then document and evaluate the solution. The coursework is marked in college initially and then is sent for moderation. This module is worth 20% of the final assessment. (Max mark is 75)

Computer Science Support



It is essential that you attend support, particularly where Computing is a new subject. If you have no prior knowledge of programming then it is likely that during the term you will need help with some aspect of the practical work. **Do not leave it to the last minute.**

Let your teacher know if you are struggling and arrange an appointment for support or simply turn up at one of the lunch-time sessions.

	Monday	Tuesday	Wednesday	Thursday	Friday	
9.00	1 A	1 B	1 Curriculum Development Time	1 D	1 C	9.00
9.45						9.45
10.00			2 E			10.00
10.15						10.15
10.30	BREAK	BREAK		BREAK	BREAK	10.30
10.45						10.45
11.00	2 A	2 B		2 D	2 C	11.00
11.15			BREAK			11.15
11.30			3 E			11.30
11.45	3 U6 E	3 U6 F		3 U6 E	3 U6 F	11.45
12.15	L6 LUNCH	L6 LUNCH		L6 LUNCH	L6 LUNCH	12.15
12.30						12.30
12.45	U6 LUNCH	4 L6 E	4 LUNCH	U6 LUNCH	4 L6 E	12.45
1.15		U6 LUNCH		U6 LUNCH	U6 LUNCH	1.15
1.30		4 L6 F	5 F		4 L6 F	1.30
1.45	5 D	5 C		5 A	5 B	1.45
2.15						2.15
2.30						2.30
2.45	BREAK	BREAK	BREAK	BREAK	BREAK	2.45
3.00	6 D	6 C	6 F	6 A	6 B	3.00
3.45						3.45
4.00						4.00

Support is available in MF23 at lunchtimes (ask your teacher for details) and support sessions. Your class teacher will tell you when the additional support sessions are timetabled. Mark them on the timetable given below:

Note - we are sometimes available for support at other times. Feel free to come to the staff room to check.

Resources

Computers

It is essential for you to develop and practise your programming skills outside lesson time.

Visual Studio is available on all the computers in the classrooms on the top floor of Mayfield. You are welcome to use any of the rooms if one is available. If the room is locked come to the staff room for the key.

The computers in MF23 are available for use at lunch-times and from 8.30 to 8.55. You may also be allowed to use a computer during other classes' lesson times, subject to availability and the discretion of the teacher. Just knock on the door and ask.

Visual Studio is also available on a number of the computers in the Ryken centre. You will need to check with the library staff which ones.

Most of your work should be saved in your own directory on the network however it is advisable for you to have your own memory stick for back-up purposes and to enable you to use computers at home. Make sure that your memory stick is labelled so that it can be returned to you if you lose it.

NB: Computers should be used in compliance with the college's ICT code of conduct which you were required to sign. Breaking the code of conduct may result in your access rights to the network being withdrawn which could seriously affect your progress in this subject. More serious offences could result in you being expelled from the college.

Books

You will be issued with a textbook (AQA Computer Science) at the beginning of the course. This book has been written specifically for the syllabus we are following. For most homework you will be required to read a specific chapter. The chapter will give additional information which you will need to answer particular questions in the homework.

Additional copies of this textbook are available in MF23 and in the library. There is a selection of useful textbooks available both in MF23 and in the Computing/Computer Science section of the library.

The Library

The books in the library have a number and a set of letters on the spine. The following gives you a broad guide to where books relating to Computing may be found.

Books shelved @

- 004 :** Computing
- 004.076 :** Revision guides
- 005.13 :** Programming C#
- 005.369 :** Spreadsheets
- 006.3 :** Artificial Intelligence
- 006.6869 :** Photoshop

If you can't find what you are looking for, please ask!

Booklist

General/Comprehensive Coverage			
Title	Author	Publisher	ISBN
AQA AS Level Computer Science	PM Heathcote and RSU Heathcote	PG-Online	978-1-910523-02-5
The New Turing Omnibus	A. K. Dewdney	Palgrave Macmillan	978-0805071665
Programming & Data Structures (See Links)			
Title	Author	Publisher	ISBN
Teaching Theory and Practice of Object-Orientated Programming		Educational Computing Services Ltd.	
Dictionaries			
Title	Author	Publisher	ISBN
A Glossary of Computing Terms	The British Computer Society	Longmans	0-582-27544-X
Dictionary of Computing		P Collins Pub. Ltd	0-948549-44-0

Digital Resources:

Software – Visual Studio C#

YOU WILL NEED TO INSTALL VISUAL STUDIO AT HOME:

<https://visualstudio.microsoft.com/>

<https://dotnet.microsoft.com/download/dotnet-framework/thank-you/net461-developer-pack-offline-installer>

It would be a good idea to start learning C#, as an introductory guide use

<https://www.w3schools.com/cs/>

All Class materials will be shared on **ONE-DRIVE**



The Intranet

You need to get used to using the Intranet regularly. There two main areas you need to check out.

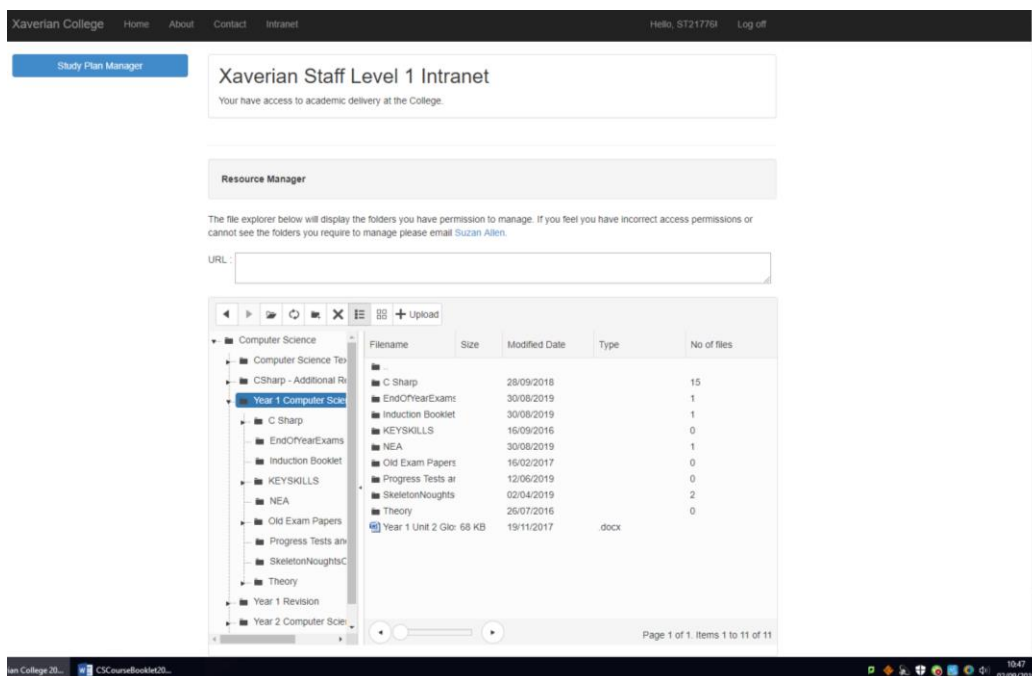
- The **WorkPlan**
- The Subject Resource Area

The **WorkPlan** at the end is a week by week guide as to what we will be covering. It indicates which sets of notes we will be working through, which chapters you need to read and which homework is due to be set.

It also has links to useful outside web sites, additional exercises and other relevant material.

If you are absent you can use the Assessment Plan to find out what you have missed so that you can catch up. Copies on the notes, Powerpoint presentations and homework sheets are stored in the Subject Resource Area and **ONE DRIVE** so that it can be downloaded if required.

The **Subject Resource Area** for the course is split up into the 2 units in Year 1:



Unit1 and Unit2

Each module has a section on Homework, Class Notes, Revision and Tests.

Remember that if you are absent from a class for whatever reason you must take responsibility to get the notes and any homework that you have missed so that you do not fall behind with the work.

Year 1 A-Level Computer Science - Work Plan 2020 Draft

****This is subject to change****

Term One

	Week Beg.	Theory1	Theory2	Programming (C#)
		Fundamentals of data representation: Number systems: Natural numbers, Integers, Reals, Rational, Irrational and Ordinal numbers.		Logging on, introduction
1	7/09	Number bases: Decimal, Binary and Hexadecimal. Bits and bytes. Unsigned binary.	Unsigned binary. Fixed point numbers	C#1: Variables, Constants and Data Types & Input/Output
2	14/09	Binary Arithmetic Unsigned binary arithmetic - addition and multiplication	Two's complement Subtraction	*Prog Challenge 1 C#2: Selection
3	21/09	COURSE ADJUSTMENTS Floating point		Prog Challenge 2
4	28/09	*Progress Test 1: Information Coding Systems: ASCII code and Unicode	Error checking and correction: Parity bits, majority voting and check digits	C#3: Iteration
5	5/10 No Monday	Bitmapped and Vector Graphics		
6	12/10 No Friday	Analogue and digital - data and signals How an ADC works How a DAC works	Representing sound. MIDI - purpose of MIDI and use of event messages. Advantages of MIDI	*Prog Challenge 3 & 3b
	19/10			
7	26/10	Data compression.	Encryption	C#4: Arrays
8	2/11	*Progress Test 2. <i>Writing and Following algorithms</i>		Prog Challenge 4
9	9/11 No Monday	Hardware and software Classification of Software - role of an OS	Classification of Programming language and types of translator	C#5: String and Numeracy Handling

10	16/11	*ASSESSMENT POINT 1 CAP1		Prog Challenge 5
11	23/11 No Friday	Logic gates	Boolean algebra	C#6: User Defined Functions
12	30/11	More Logic and Boolean Algebra - Special circuits	*Progress Test 3	
13	07/12	Computer Architecture - Internal hardware components and stored program concept	The processor and its components, the fetch-execute cycle, factors affecting performance	C#7: Procedures & Menus
14	14/12 Fin	Give out notes: Hardware Devices.		
	21/12			

Term two Computer Science

15	4/01	Processor instruction set including Assembly languages operations	Assembly Language operations Programming Test 1	C#8: Bitwise Operations
16	11/01	More Assembly Language - <i>Practical</i>		C#9: Text Files
17	18/01	<i>Logic problems</i>	Progress Test 4	C#10: Records and User Def Types
18	25/02	<i>Aspects of software development Analysis, Design, Implementation, Testing and Evaluation</i>	<i>Structured Programming</i>	
19	1/02	<i>Abstraction, Information Hiding, etc.</i>		C#11: Binary Files
20	8/02 No Friday	<i>Finite State Machines</i>		C# Challenges (Advanced)
	15/02			
21	22/02	ASSESSMENT POINT 2 – Full Report	CAP Test 2	Intro to Visual C#
22	8/03	Databases: Conceptual Data Modelling		Ex 1 Visual C# (Pizza)
23	15/03	Databases: Relational Databases and Normalisation		Ex 2 Start School Bank

24	22/03	Databases: SQL- Creating a database & SQL		
25	29/03			
26	05/04	Progress Test 5 - Just on databases Networking 1		Practice Skeleton (Warships)
	12/04			
	19/04			
27	26/04 No Monday	Networking 2		Skeleton
28	03/05	Networking 3		Skeleton
29	10/05 No Friday	Consequences of uses of computing/laws		Paper 1 Exam - Skeleton Sections B, C and D
30	17/05	ASSESSMENT POINT 3	End Of Year Exams	
31	24/05	Study Leave		
	31/5			
32	07/06	Working on NEA – Choosing a Title		
33	14/06	Complete Analysis: NEA		Developing Prototype
34	21/06			
35	28/06			
36	05/07	Design		