Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination 2024

Computer Science

Coursework Project Brief

Higher and Ordinary Levels

Time: 12 weeks

90 marks

Information for candidates

The coursework project is worth 90 marks, which is 30% of the overall marks for Leaving Certificate Computer Science. The remaining 210 marks (70%) are for the final examination. You will carry out the project over a period of twelve school weeks, beginning on **Monday December 4th 2023**. The coursework must be completed by **Tuesday March 19th 2024**. You will present the report in the form of a website comprising of one or more webpages.

Carrying out the project involves responding to a brief by producing a computational artefact and an accompanying report. You will submit the project in digital form. You will capture video footage and/or images of the artefact in operation and embed this into your report.

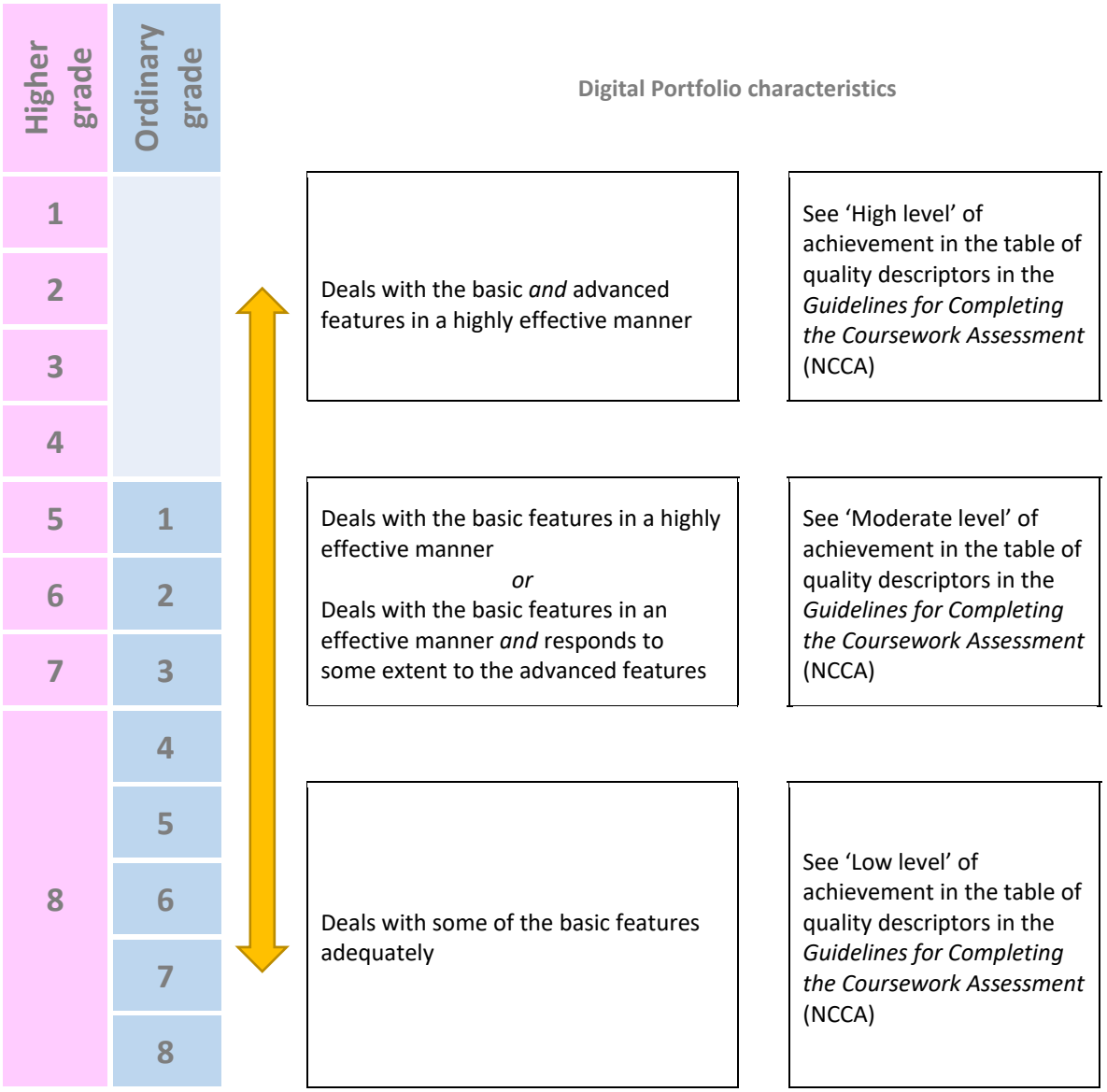
Although you are used to carrying out projects for the *Applied Learning Tasks* in groups, this is an *individual* project. You must carry it out independently of other candidates, and the work you submit must be your own unaided work.

Apart from your initial investigation and research, you must carry out the project in school under the supervision of your teacher. This allows your teacher to authenticate your work to the State Examinations Commission. Because you are carrying out the work under teacher supervision, the teacher is able to guarantee to us that it is your own work, and that nobody gave you any inappropriate help. If you include work that was not supervised by your teacher, then they cannot authenticate it, even if they believe that you really did do it yourself. We cannot accept work for assessment if your teacher cannot authenticate it, so you will forfeit the marks for the project work. Note also that we cannot give partial marks for 'partially authenticated' work. That is, unless *all* of your work can be authenticated by your teacher, we cannot accept *any* of it for marking.

The same project brief applies to Higher and Ordinary level candidates. However, you do not need to make a final decision about which level you are taking when you submit your project. We will grade your project in line with the standards that apply to the level at which you take the final examination.

The project brief sets out some *basic requirements* and *advanced requirements* of the artefact. The way that the standards at the two levels are aligned with each other is illustrated on the left-hand side of the graphic on the next page. This means that, for example, a project that would get a grade 2 at Ordinary level will automatically get a grade 6 at Higher level. You can also see that any project that would get a grade 4 or better at Higher level exceeds the highest standard of work expected at Ordinary level. Because of this, a project of this quality would automatically get full marks at Ordinary level.

It should be noted that it is possible to achieve full marks at Ordinary level by attempting the basic features only.


Higher grade
Ordinary grade
Digital Portfolio characteristics
1
2
3
4
5
6
7
8
1
2
3
4
5
6
7
8
Deals with the basic *and* advanced features in a highly effective manner
See 'High level' of achievement in the table of quality descriptors in the *Guidelines for Completing the Coursework Assessment* (NCCA)
Deals with the basic features in a highly effective manner
or
Deals with the basic features in an effective manner *and* responds to some extent to the advanced features
See 'Moderate level' of achievement in the table of quality descriptors in the *Guidelines for Completing the Coursework Assessment* (NCCA)
Deals with some of the basic features adequately
See 'Low level' of achievement in the table of quality descriptors in the *Guidelines for Completing the Coursework Assessment* (NCCA)

The project brief

Context of the brief

In today's fast-paced, highly interconnected, and technologically driven world, individuals often face more complex and demanding challenges compared to the past. Therefore, it could be argued that the importance of individual health and wellbeing in today's society has never been greater.

According to the Government's Wellbeing Policy Statement and Framework for Practice, wellbeing is comprised of many interrelated aspects including being active, responsible, connected, resilient, appreciated, respected and aware. Wellbeing is of paramount importance as it encompasses the holistic state of an individual's physical, mental, and emotional health. The following definition of wellbeing from the World Health Organisation aims to take account of its multi-dimensional nature.

> *Wellbeing is present when a person realises their potential, is resilient in dealing with the normal stresses of their life, takes care of their physical wellbeing and has a sense of purpose, connection and belonging to a wider community. It is a fluid way of being and needs nurturing throughout life.*

(World Health Organisation (WHO), 2001)

Computer science and wellbeing

Computer science can be used to play a pivotal role in enhancing our overall wellbeing. The learning outcomes described in the three strands of the Leaving Certificate Computer Science Curriculum Specification can be used to create practical technological solutions to problems relating to wellbeing. Examples of areas that could be covered by such systems include, but are not limited to:

- Health monitoring
- Exercise and fitness
- Relaxation, mindfulness
- Improving our diet
- Improving our hydration
- Improving our concentration levels
- Enhancing or monitoring sleep quality
- Improving our mood and motivation levels
- Reducing screen time
- Reducing anxiety and stress
- Reducing tendencies to procrastinate
- Reducing negative feelings about ourselves

Further context

Below are some links to more detailed information relating to the context of the brief. The list is neither exclusive nor exhaustive and is supplied to assist you with your own ideas and research. Some may provide inspiration for the task set out in the next section of this document.

A collection of guided mindfulness exercises and wellness activities for young people.	https://www.walkinmyshoes.ie/young-people/resources
Ten of the most popular health and fitness apps in Ireland.	https://evoke.ie/2021/01/26/wellness/these-are-the-top-10-most-popular-health-and-fitness-apps-in-ireland
A list of mental health apps from Jigsaw, the National Centre for Youth Mental Health.	https://jigsaw.ie/mental-health-apps/
The Keep Well campaign is aimed at showing people of all ages how we can mind our own physical and mental health.	https://www.sportireland.ie/keepwell
A resource created by University College Dublin Psychologists that explains a range of different mental health apps for young people.	https://www.ucd.ie/all/t4media/YMH_Apps_young_people.pdf
Webwise promotes the autonomous, effective, and safer use of the internet by young people.	https://www.webwise.ie/
A list of apps suitable for children and young people covering mental health management.	https://www.sensationalkids.ie/good-health-apps-for-children-and-young-people/
A wide variety of apps aimed at senior citizens to help maintain social interaction, track health and wellness, and sharpen the mind.	https://www.seniorlifestyle.com/resources/blog/top-8-mobile-apps-active-seniors/
Children and Young People's Mental Health in the Digital Age Shaping the Future.	https://www.oecd.org/els/health-systems/Children-and-Young-People-Mental-Health-in-the-Digital-Age.pdf
A range of features that are available on iPhone devices to help support physical health, mental health and general wellbeing.	https://www.apple.com/ie/newsroom/2023/06/apple-provides-powerful-insights-into-new-areas-of-health/
A range of features that are available on Android devices to help support physical health, mental health and general wellbeing.	https://www.android.com/digital-wellbeing/

The task
For this project you are required to identify a situation where computer science can be applied to enhance some aspect of health and wellbeing in people's lives.

Specifically, you are required to design and develop:
1. An embedded system that can be used to enhance some aspect of wellbeing.
2. A computer model that can be used to provide insights into some aspect of wellbeing.

The phrase 'enhance some aspect of wellbeing' can be interpreted very broadly. For example, it may be taken to mean improving a person's mental or physical health and it may also be taken to mean any change in behaviour that could lead to an improvement is a person's mental or physical health. A system could be used to encourage greater participation in certain activities, promote new habits that lead to better health or changes in behaviour.

You could use the list below of 'top tips for enhancing wellbeing' to inspire some ideas, or ideas may be inspired from your own personal life experience – either way it is important to target a specific problem or issue that you wish to address.

- Get regular physical activity e.g. walking, running, sports, gym.
- Do things to help you relax e.g. breathing exercises, mindfulness, yoga.
- Maintain a healthy balanced diet including good hydration
- Get enough sleep
- Monitor health markers and symptoms
- Help others
- Express gratitude
- Do things you enjoy
- Connect with others
- Do something creative
- Learn something new
- Ask for help if you need it
- Be kind to yourself and others

Basic requirements
1. Create a fully automated embedded system that utilises digital/analogue inputs and digital/analogue outputs to support the theme of wellbeing.
2. Validate and store the data gathered from the embedded system.
3. Create an analysis component that can be used to calculate or predict certain information and inform future decisions relating to wellbeing.

Advanced requirements
1. Using Python and/or JavaScript, create a computer model based on your own personally created dataset of wellbeing data or one that you have sourced externally (suggestions included on the next page). Your personal dataset could be generated manually, programmatically or by the embedded system. The dataset should contain multiple descriptive features of wellbeing and the model should be capable of answering a minimum of **two** 'what if' type questions which you will need to devise yourself.

2. Each ‘what if’ question must use a minimum of **three** validated parameters (using at least **two** different data types) and, based on the information provided, offer the user insights in relation to some aspect of their wellbeing.
3. Users can view data in a graphical format which displays information such as their progress using the system or the results of a ‘what if’ scenario.

Links to datasets

You can either choose to develop your own dataset or source one yourself from an online repository such as:

- https://www.who.int/data/gho/data/major-themes/health-and-well-being
- https://www.cso.ie/en/releasesandpublications/hubs/p-wbhub/well-beinginformationhub/
- https://www.cso.ie/en/interactivezone/censusatschoolsreleases/censusatschool2022/
- https://www.kaggle.com/datasets/ydalat/lifestyle-and-wellbeing-data
- https://www.kaggle.com/datasets/shariful07/student-mental-health
- https://public.tableau.com/app/learn/sample-data
- https://data.gov.ie/

Coursework report – content and structure

The report should be presented as a website and be structured using the headings outlined in the following pages. Marks will only be awarded for information provided under the relevant heading.

The report should contain no more than 2500 words. You should ensure that the file structure of your artefact is clear, so that you can clearly reference files or programs in your report.

1. Meeting the brief (max 400 words)

As part of your report you are required to include a video showing the artefact in operation. The video must not be more than five minutes in duration and be no more than 1GB in size.

The video should be used to demonstrate how your artefact meets the basic and/or advanced requirements of the brief. You should deal with each requirement you attempted in the video and demonstrate how you have achieved it.

Your 'what-if' questions, that will be examined by your model, can be explained in this section.

You may wish to include a brief written description, with images, demonstrating how your artefact meets each of the requirements. You will not be penalised marks for not including any text if your video is sufficient in describing how you meet each of the requirements.

2. Investigation (approximately 400 words)

In this section of the report you should show evidence of your own research on the thematic brief, including research on existing solutions, systems or ideas that are aligned to the brief. As a starting point you may consider using the URLs provided earlier in this document, but please note that this list is neither exclusive nor exhaustive. All references should be included in the reference section of your report.

You should carry out some research, such as an interview, a survey or a questionnaire, with potential end user(s) so that you fully understand their needs.

3. Plan and design (approximately 400 words)

This section of the report should contain a clear description of the design of your project and how it will meet the requirements set out in the brief and meet the requirements of your end user(s).

You should include a detailed flowchart or a detailed architecture diagram which gives an overview of how your system will work.

You should explain each of the technologies that you plan to use and how they will be used within your project. This should cover both hardware and software.

4. Create (approximately 850 words)

This section should include a progress log which gives an overview of the development process. It is suggested that this progress log is updated weekly or fortnightly. This should include the key milestones from that week/fortnight. An example of how one week of this log might look is shown below.

Week 5:

- Wrote code to collect data from the MicroBit, clean it and store it in a csv file.
- Tested and fixed the code – it would not accept float values.
- Created code to read the data from the database back to the main programme.

You should explain and detail some unit testing which has taken place during the development process.

You should explain one of the problems that you encountered during the implementation and describe how you overcame the problem.

You should select and clearly explain an important piece of code that you have designed and created. This should be supported by using screen shot(s) of the code you are referring to.

5. Evaluation (approximately 450 words)

You should evaluate the final artefact in relation to the requirements set out in the brief.

You should consider how the project has met the needs of the end user(s) that you have referred to in section two of the report.

You should suggest, with justification, how your artefact could be improved or iterated upon in the future.

6. References

You must reference and acknowledge all research sources used such as: publications including books, professional journals and government reports; online sources and other types of media; source code; any material generated using artificial intelligence (AI) software or applications; and material from specialist organisations and relevant individuals. To include such material without properly referencing the source will be considered plagiarism. In addition, the copying from, or reproduction of, material from such sources may also be considered plagiarism.

7. Summary word count

You must include a summary of the word count of your report. This could be presented in the form of a table, as shown below, and should show the word count for each section as well as the overall word count.

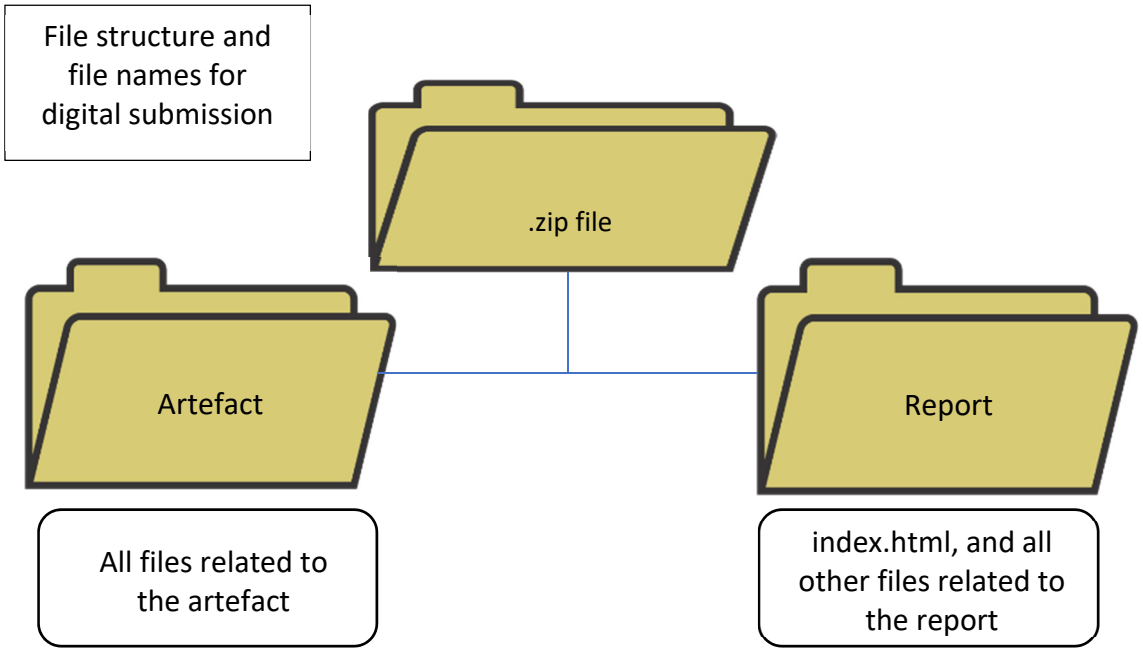
Section	Word Count
1. Meeting the brief	
2. Investigation	
3. Plan and design	
4. Create	
5. Evaluation	
Total:	

Outline marking scheme

Coursework (90 marks in total)	
1. The report	***Marks***
• Quality of report website structure and layout. • Evidence of adherence to the principles of good user interface design when creating the website.	**4**
2. Meeting the brief	
• Meeting the basic requirements of the brief. • Meeting the advanced requirements of the brief.	**24**
3. Investigation	
• Research into the context of the brief, and existing solutions. • Conduct research with potential end user(s) to understand their needs.	**10**
4. Plan and design	
• A clear, detailed description of the project. • A flowchart/architecture diagram to show how the project will work. • A description of the technologies you will use and their role within your project.	**15**
5. Create	
• A progress log covering the key milestones of the development process. • Explanation of unit testing applied during development. • Explain a problem that was encountered in the development of the project and how it was overcome. • An explanation of a piece of code that you have designed and created, which was important in the development of the project.	**25**
6. Evaluation	
• An evaluation of your project based on the requirements set out in the brief. • An evaluation of how your project has met the needs of the end user(s). • Suggest how you would further improve/iterate this project.	**12**
References and summary word count	
• You must also include references and/or a bibliography. • Include a summary of the word count of the report, including the total word count.	**0**

Instructions on completing and submitting the coursework

1. Your coursework project that is submitted for assessment must comprise of the following two components:
   - The digital components of the computational artefact, including all relevant programs in the prescribed languages.
   - A coursework report, submitted on a website, of no more than 2500 words, including a video presentation of no longer than 5 minutes. The video should be no more than 1GB in size. This readily can be achieved by using standard definition (720 x 480) at 25 frames per second and a suitable commonly used format. Individuals should not be identifiable in the video but you may include a voiceover in order to explain the features of your artefact. The video must not be hosted online and must be accessible within the folder structure described below.
     Penalties may apply where the overall word count or video length or size is exceeded.
2. Some of the research and investigation that you carry out for the project and describe in section two of your report, 'Investigation', can be completed outside of class time. However, the actual writing of the report and all of the work on the artefact itself must be done in class under the supervision of your teacher so that they can authenticate your work.
3. Your coursework project must be saved in a single zipped file (.zip). The project will be submitted through the online Schools Portal, with details, including the naming convention for the zip file, following in advance of the submission date.
4. You will not be submitting the physical embedded system. It is essential that your video demonstrates fully how your artefact works.
5. The .zip file, when extracted, should be a folder that contains exactly two subfolders, as in the diagram below.



a. One of these sub-folders should be called “Report” and should contain all of the files relating to the report. It should be possible to access the complete report by opening a file named “index.html” at the top level within the “Report” folder. That is, all of the content of the report should either be in this file itself or be accessible via links from within this file to local files. Any subsidiary files, such as additional html files, css stylesheets, image files, and so on, must also be in the “Report” folder, either at the same level as index.html or within a further suitable folder structure.

b. The other sub-folder should be called “Artefact” and should contain the essential digital components of your artefact. The file structure of your artefact should be made clear. For example, if there is a main, supervising program, from which other programs are imported or called, this program should be clearly named in the sub-folder and referenced in the description in the coursework report.

6. The website must **not** be an online website (e.g. Google Site, Wix, etc.). It must be saved as an accessible HTML file in the folder structure described in this section. Failure to present your website in this way will result in you forfeiting marks.

7. It is **your** responsibility to ensure that all electronic materials submitted are free from viruses, so that examiners can open all required files for assessment, and all code supplied can be evaluated.

8. All data and information in the artefact should be anonymised and comply with GDPR. If an artefact uses programming languages other than Python and JavaScript, these files can also be included in this sub-folder. In such cases, you cannot assume that the examiner will be familiar with the programming language concerned, so the responsibility for demonstrating its accuracy rests with you.

9. It is your responsibility to ensure that all of the required files are contained in the zipped file prior to submission of the work. You may lose marks if required files are omitted. Marks may be lost for not conforming to the filing structure outlined above, and for not using a clearly labelled file structure for the artefact. A **backup copy** of the submitted files must be retained in your school until the assessment process is complete.

IMPORTANT
It is essential that you double check that your artefact and report can be accessed by the examiner or you will not be credited for the work you have done. If a particular element of your project, such as the video, artefact files or report, is not included you may forfeit marks.
Once completed, put the zipped project on a removable medium, bring it to a device that was not used when working on any part of the project. Disconnect that device from the internet. Unzip the project and check that the artefact and the report including all images, video(s), and other files are present and that all links between them are working correctly.

Authentication

- The project and report must be your own individual work – authenticated by yourself, your teacher and the management authority of your school. Authentication is an important part of how we in the State Examinations Commission ensure fairness to everybody in the assessment of coursework.

- Your teacher must supervise your completion of both the project and the reporting booklet. If your teacher cannot confirm that the project is your own work, and that you carried out the project and completed the report under his or her supervision, the State Examinations Commission will not accept it for assessment. In that case, you will forfeit the marks for this component of the examination. Teachers and the authorities of schools are familiar with the detailed requirements to ensure that practical and project work is valid for examination purposes. You should comply fully with all requests that are made by the teacher and the school in order to enable authentication of your work.

- Any case of suspected copying, plagiarism (which includes the use of AI software), improper assistance, or procurement of work prepared by another party will be thoroughly investigated. These actions are breaches of examination rules and attract the penalties described in the Rules and Programme for Secondary Schools. The penalties include: loss of the marks for the coursework, loss of the subject, loss of the entire examination in all subjects, or being debarred from the Certificate Examinations in subsequent years. There may be serious consequences for any persons who provides you with inappropriate assistance, as this is an offence under the Education Act 1998.

- Further information relating to coursework authentication can be found in circular S76/22.

Note: Responsibility for complying with examination requirements rests with you, the candidate. If the requirements are not followed, your teacher and school will have no choice but to bring this to the attention of the State Examinations Commission.