

Student Assignment Brief

This document is intended for Coventry University Group students for their own use in completing their assessed work for this module. It must not be passed to third parties or posted on any website. If you require this document in an alternative format, please contact your Module Leader.

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The work you submit for this assignment must be your own independent work, or in the case of a group assignment your own groups' work. More information is available in the '[Assignment Task](#)' section of this assignment brief.

Assignment Information

Module Name: Programming for Data Science

Module Code: 7042SCN

Assignment Title: Individual Coursework

Assignment Due: Monday 27 October 2025 at 6pm UK time

For assessments that are submitted through Turnitin, the University allows a 24-hour grace period for receipt of submission. Therefore, submissions will only be accepted up until the 28 October 2025 by 6pm. This should NOT be viewed as extra time to complete the assessment but is provided to allow for any unforeseen technical issues that may occur around the submission deadline, especially when Turnitin is handling large numbers of submissions.

Please note that this assessment is eligible for an extension. Please note there is no grace period for extensions.

If you do not pass this assessment you may have an opportunity to resit it. If you do need to resit, you will be asked to use the feedback provided to revise your original submission, so that it meets the pass requirements for the module. You must clearly indicate the changes you have made in the new submission. Please check your SOLAR results and the submission links on your Aula module page to see when the resit is due.

Assignment Credit: 20 credits

Word Count (or equivalent): 2500 words + 10% (not including reference list or output)

You should state your word count at the end of written work. If you exceed the word limit by more than 10% (i.e. if you exceed 2750 words), then your work will only be read up to the allocated limit.

Assignment Type: Percentage Grade (Applied Core Assessment). You will be provided with an overall grade between 0% and 100%. To pass the assignment you must achieve a grade of 40% or above.

Assignment Task

This *Individual Coursework* assessment consists of two tasks (carrying equal marks). You are encouraged to explore these topics, use your initiative, and show some originality, within the time available. Make sure you read each task through carefully, and concentrate on producing a clear and concise answer to each subtask. Aim to demonstrate your understanding of the topics and the module learning outcomes.

Task 1. Design, build, test, explain, adapt, critique (MLO1, MLO2)

Consider the following dice-based “football match” simulation for two players. The dice game involves five 6-sided dice (red, black, blue, yellow and green). *Full details of the writing on each side of the coloured dice is given in the Python code given on the next page.*



A full explanation of the dice-game is given in the rules below.

Soccer Dice Rules

Soccer Dice is a game for two players playing for a pre determined time period and the winner being the one who has scored the most goals when time is called. Alternatively, it can be played to a set number of goals. The toss of a coin decides who starts first

Player one throws the dice individually in the following sequence:

Red, Black, Blue, Yellow and Green unless otherwise instructed by a throw of the dice

If a player throws up “Tackled and Lost” on any dice then his turn ends and the opposing player begins their turn on Red. Likewise if they throw “offside” on the Yellow dice, or “Saved”, “Over-Bar” or “Wide” on the Green dice then their turn is over and the opposing player begins their turn.

The Green dice is the shooting dice and the only dice that can be thrown to score a goal. Therefore, if a player throws “Shoot”, “Penalty”, “Long Shot at Goal” or “Header at Goal” on any of the other dice then they move directly on to the Green dice and tries their luck at scoring

Finally on the Blue dice, one of the sides reads “Opponents Yellow Card Shown” When a player throws this, it means that they have been badly fouled and the player in possession has a free shot at goal with the Green dice.

Before you write any Python code, it is worth playing this game using a pencil, paper and a 6-sided dice (or use <https://rolladie.net/>).

- (a) Implement this dice game as at least two Python functions. Follow the steps and logic you would take in the physical dice game. You should follow good Python coding style and your functions should be designed with high cohesion and low coupling. Your Python code should include enough print statements to generate a clear nontrivial example illustrating a play of the football match, telling the story as the dice are rolled and the match score changes. The Python code given below gives details of the writing on each side of the coloured dice (you must not edit this code).

```
red = ['through ball/to yellow', 'inside pass/to blue',
       'dribble/throw again', 'short pass/to black',
       'through ball/to green', 'tackled and lost']
black = ['pass back/to red', 'throw in/to blue', 'shoot',
          'free kick/to yellow', 'long shot at goal', 'tackled and lost']
blue = ['header at goal', 'shoot', 'opponent shown yellow card',
        'pass back/to red', 'long shot at goal', 'tackled and lost']
yellow = ['pass back/to black', 'off side', 'tackled and lost',
           'penalty', 'shoot', 'shoot']
green = ['goal', 'wide', 'goal', 'over bar', 'saved', 'corner/to yellow']
```

Please provide the full Python code of your implementation and the output from one sample match (to a maximum of two pages of output, carefully chosen). You must not implement a Python class. Do not attempt to produce a graphical visualisation. The storytelling should be sufficient to be able to check the logic of your code by looking only at the output it produces. Marks will be given for both the quality of the code and the quality of the story telling.

[15 marks]

- (b) Explain carefully (with clear evidence) how you have gone about designing your implementation (including any assumptions you have made), how you have used "incremental development" while implementing your Python code, and how you have tested your code.

[15 marks]

- (c) Modify your Python code from part (a) to estimate at least two performance measures of interest to a football manager, e.g., that you may find in the match statistics at the end of a match. Investigate how these measures change if you implement a restrictive "shot clock" similar to that used in basketball. Model and evaluate adding a realistic version of a "Hail Mary" shot at goal if the shot clock is about to expire.

Please use one dice roll as the unit of time. Marks will be given for the clarity of your implementation and for different types of performance measure calculations. Please provide your Python code, clearly highlighting in your code the modifications you have made to your code from part (a). Also include a small amount of carefully selected output that is useful for checking your logic. Give a robust conclusion based on comparing your results.

[20 marks]

Task 2. Critically assess, select and apply data science libraries and algorithms (MLO3)

This task involves investigating data science libraries in Python to solve an applied problem related to data science.

- (a) Carefully describe and define an application area (problem or task) of data science using unstructured data, i.e., a problem or task using image, audio, video or text data. Give a specific example instance (or case) of the problem or task to be solved using the context of a Coventry University “fresher”. Explain and demonstrate how you would solve your specific problem or task “by hand” (not using a computer).

[15 marks]

- (b) Select (with justification) two Python libraries that address the applied problem or task you have described in part (a). Briefly describe and compare the capabilities of these Python libraries. Using your specific example instance or case from part (a), apply both Python libraries to solve the problem or task independently and briefly explain the central concept or algorithm used to solve the problem or task. *Please provide both Python code and any output (plots or text) produced. Aim to give enough detail in your code and explanation to “teach” the main idea of the central concept or algorithm to the reader and to explain the basic setup needed to apply the library to the problem.*

[25 marks]

- (c) Drawing on your experience from part (b) and using additional sources, critically assess the Python libraries you chose, e.g., in terms of difficulty of coding, adaptability of code, level of control and quality of the solution. To what extent would you recommend these libraries for solving your chosen applied problem or task. *Ensure you clearly reference any sources you use.*

[10 marks]

Use of Artificial Intelligence (AI) tools

This assessment is rated as “Amber” for use of Artificial Intelligence (AI) tools. In this case, Generative AI may be used for “inspiration” but not for generating answers to the questions or for analysis of datasets. You must clearly acknowledge any use of Generative AI, explain clearly how you have used it (mention the app or website used, any prompts entered and screenshots of information returned), and reference by citation (using APA style) where in your answers you have used information gained from Generative AI. Please check the guidance at <https://student.ai.coventry.domains/> for further information.

Submission Instructions:

Ensure that your coursework is all your own work and you clearly cite and reference any sources you have used using APA style referencing. Please include both in-text citations and a list of references for each task (where relevant). **No collaboration with other students is permitted.**

Please submit one report (e.g. as a single Microsoft Word document or a single PDF document) covering all of the tasks above, clearly organised by subtask. Start each task on a new page. Make sure you include all of your Python code and relevant output and plots directly in the report. You must not submit a zip file. You must not submit a Jupyter notebook (but you can print a Jupyter notebook to a PDF file and submit the PDF file). Do not use screenshots to include Python code or text output into your report. If your report is a Microsoft Word file, then please use a syntax highlighter (such as <http://hilite.me/>) and copy-and-paste the coloured Python code into your report. Also simply copy-and-paste text output into your report.

Submission is online via Aula using the submission box provided. *Do not leave uploading too late.*

If you have used any AI tools in completing this assessment, you must clearly acknowledge this and explain clearly how you have used it. Include these details in an Appendix to your report. You should also include a summary of where and how you used AI tools at the end of your work before your reference list. This could include the adaptation of the following table:

Tool	How used in this assignment
e.g. ChatGPT-3.5	Key word search on topics related to learning outcomes
e.g. Microsoft Copilot	Summarising documents as part of background research

If you experience any technical problems when trying to submit your work, please consult Aula help via the question mark link. If these problems are experienced at the time of the submission deadline and cannot be quickly resolved, please capture screenshots as evidence and email these and your completed assessment to the module leader as soon as possible. Whilst this cannot be marked it could be used as evidence that you've gained no time advantage on your work should this be needed for an appeal.

Development of Skills and Attributes:

Both assessment tasks will require student to think creatively (TC) and students will need to adapt approach (AA) in applying what we have learned in the module to the assessment tasks. Student will also need to communicate effectively (CE) using appropriate code, output and written explanations.

Marking and Feedback

How will my assignment be marked?

Your assignment will be marked by the module team.

How will I receive my grades and feedback?

Provisional marks will be released once internally moderated. Feedback will be provided by the module team alongside grades release. Students will be able to access their feedback via Aula/Turnitin. Your provisional marks and feedback should be available within 2 weeks (10 working days).

What will I be marked against?

Details of the marking criteria for this task can be found at the [bottom of this assignment brief](#).

Assessed Module Learning Outcomes

The Learning Outcomes for this module align to the [marking criteria](#) which can be found at the end of this brief. Ensure you understand the marking criteria to ensure successful achievement of the assessment task. The following module learning outcomes are assessed in this task:

MLO1. Demonstrate critical knowledge and systematic understanding of essential concepts of computer programming relevant for data science.

MLO2. Design, build, test, explain, adapt and critique small programs in a high-level programming language.

MLO3. Critically assess, select and apply data science tools, libraries or algorithms appropriate for various applications and tasks in data science.

Assignment Support and Academic Integrity

If you have any questions about this assignment please see the [Student Guidance on Coursework](#) for more information.

Spelling, Punctuation, and Grammar:

You are expected to use effective, accurate, and appropriate language within this assessment task.

Academic Integrity:

The work you submit must be your own, or in the case of groupwork, that of your group. All sources of information need to be acknowledged and attributed; therefore, you must provide references for all sources of information and acknowledge any tools used in the production of your work. We use detection software and make routine checks for evidence of academic misconduct.

It is your responsibility to keep a record of how your thinking has developed as you progress through to submission. Appropriate evidence could include: version controlled documents, developmental sketchbooks, or journals. This evidence can be called upon if we suspect academic misconduct.

If using Artificial Intelligence (AI) tools in the development of your assignment, you must reference which tools you have used and for what purposes you have used them. This information must be acknowledged in your final submission.

Definitions of academic misconduct, including plagiarism, self-plagiarism, and collusion can be found [on the Student Portal](#). All cases of suspected academic misconduct are referred for investigation, the outcomes of which can have profound consequences to your studies. For more information on academic integrity please visit the [Academic and Research Integrity](#) section of the Student Portal.

Support for Students with Disabilities or Additional Needs:

If you have a disability, long-term health condition, specific learning difference, mental health diagnosis or symptoms and have discussed your support needs with health and wellbeing you may be able to access support that will help with your studies.

If you feel you may benefit from additional support, but have not disclosed a disability to the University, or have disclosed but are yet to discuss your support needs it is important to let us know so we can provide the right support for your circumstances. Visit [the Student Portal](#) to find out more.

Unable to Submit on Time?

The University wants you to do your best. However, we know that sometimes events happen which mean that you cannot submit your assessment by the deadline or sit a scheduled exam. If you think this might be the case, guidance on understanding what counts as an extenuating circumstance, and how to apply is [available on the Student Portal](#).

Administration of Assessment

Module Leader Name: Dr Mark Harrison

Module Leader Email: ae5022@coventry.ac.uk

Assignment Category: Written

Attempt Type: All

Component Code: CW2

Assessment Marking Criteria

Mark band	Outcome	Guidelines
90-100% Distinction		<p>Distinction - Exceptional work with very high degree of rigour, creativity and critical/analytic skills. Mastery of knowledge and subject-specific theories with originality and autonomy. Demonstrates exceptional ability to analyse and apply concepts within the complexities and uncertainties of the subject/discipline.</p> <p>Innovative research with exceptional ability in the utilisation of research methodologies. Demonstrates, creativity, originality and outstanding problem-solving skills. Work completed with very high degree of accuracy, proficiency and autonomy. Exceptional communication and expression demonstrated throughout. Student evidences the full range of technical and/or artistic skills. Work pushes the boundaries of the discipline and may be strongly considered for external publication/dissemination/presentation.</p>
80-89% Distinction	Meets learning outcomes	<p>Distinction - Outstanding work with high degree of rigour, creativity and critical/analytic skills. Near mastery of knowledge and subject-specific theories with originality and autonomy. Demonstrates outstanding ability to analyse and apply concepts within the complexities and uncertainties of the subject/discipline.</p> <p>Innovative research with outstanding ability in the utilisation of research methodologies. Work consistently demonstrates creativity, originality and outstanding problem-solving skills. Work completed with high degree of accuracy, proficiency and autonomy. Outstanding communication and expression demonstrated throughout. Student demonstrates a very wide range of technical and/or artistic skills. With some amendments, the work may be considered for external publication/dissemination/presentation</p>
70-79% Distinction		<p>Distinction - Excellent work undertaken with rigour, creativity and critical/analytic skills. Excellent degree of knowledge and subject-specific theories with originality and autonomy demonstrated. The work exhibits excellent ability to analyse and apply concepts within the complexities and uncertainties of the subject/discipline.</p> <p>Innovative research with excellent ability in the utilisation of research methodologies. Work demonstrates creativity, originality and excellent problem-solving skills. Work completed with very consistent levels of accuracy, proficiency and autonomy. Excellent communication and expression demonstrated throughout. Student demonstrates a very wide range of technical and/or artistic skills.</p>

60-69%		Merit - Very good work often undertaken with rigour, creativity and critical/analytic skills. Very good degree of knowledge and subject-specific theories with some originality and autonomy demonstrated. The work often exhibits the ability to fully analyse and apply concepts within the complexities and uncertainties of the subject/discipline. Very good research evidence and shows very good ability in the utilisation of research methodologies. Work demonstrates creativity, originality and problem-solving skills. Work completed with very consistent levels of accuracy, proficiency and autonomy. Very good communication and expression demonstrated throughout. Student demonstrates a wide range of technical and/or artistic skills.
50-59%		Pass - Good work undertaken with some creativity and critical/analytic skills. Demonstrates knowledge and subject-specific theories with some originality and autonomy demonstrated. The work exhibits the ability to analyse and apply concepts within the complexities and uncertainties of the subject/discipline. Good research and shows some ability in the utilisation of research methodologies. Work demonstrates problem-solving skills and is completed with some level of accuracy, proficiency and autonomy. Satisfactory communication and expression demonstrated throughout. Student demonstrates some of the technical and/or artistic skills.
40-49%		Pass - Assessment demonstrates some advanced knowledge and understanding of the subject informed by current practice, scholarship and research. Work may be incomplete with some irrelevant material present. Sometimes demonstrates the ability to analyse and apply concepts within the complexities and uncertainties of the subject/discipline. Acceptable research with evidence of basic ability in the utilisation of research methodologies. Demonstrates some originality, creativity and problem-solving skills but often with inconsistencies. Expression and presentation sufficient for accuracy and proficiency. Sufficient communication and expression with professional skill set. Student demonstrates some technical and/or artistic skills.
30-39%	Fails to achieve learning outcomes	Fail - Very limited understanding of relevant theories, concepts and issues with deficiencies in rigour and analysis. Some relevant material may be present but be informed from very limited sources. Fundamental errors and some misunderstanding likely to be present. Demonstrates limited ability to analyse and apply concepts within the complexities and uncertainties of the subject/discipline. Limited research scope and ability in the utilisation of research methodologies. Limited originality, creativity, and struggles with problem-solving skills. Expression and presentation insufficient for accuracy and proficiency. Insufficient communication and expression and with deficiencies in professional skill set. Student demonstrates deficiencies in the range of technical and/or artistic skills.

20-29%		Fail - Clear failure demonstrating little understanding of relevant theories, concepts, issues and only a vague knowledge of the area. Little relevant material may be present and informed from very limited sources. Serious and fundamental errors and virtually no evidence of relevant research. Fundamental errors and misunderstandings likely to be present. Little or no research with no evidence of utilisation of research methodologies. No originality, creativity, and struggles with problem-solving skills. Expression and presentation insufficient for accuracy and proficiency. Insufficient communication and expression and with serious deficiencies in professional skill set. Student has clear deficiencies in range of technical and/or artistic skills.
0-19%		Fail - Clear failure demonstrating no understanding of relevant theories, concepts, issues and no understanding of area. Little or no relevant material may be present and informed from minimal sources. No evidence of ability in the utilisation of research methodologies. No evidence of originality, creativity, and problem-solving skills. Expression and presentation deficient for accuracy and proficiency. Insufficient communication and expression and with deficiencies in professional skill set. Student has clear deficiencies in range of technical and/or artistic skills.