Assessment Brief

Module title:	Machine Learning
Module code:	COM7022
Assignment title:	Final Assignment – Machine Learning
Assignment format:	Microsoft Word / PDF
Word/time limit:	3000 words
File type	.docx / .pdf
Percentage of final grade	This assignment is worth 100% of your final grade for this module.
Submission deadline	See module iLearn page for date of submission
Grade release	You will normally receive your provisional grade and feedback within 20 working days of the submission deadline

Useful terms:

Learning outcomes (LOs)	The skills and knowledge that you should be able to show in your work.
Rubric	A set of rules or guidelines used to grade or assess work.

Task summary:

As part of the formal assessment for the programme, you are required to submit a **Machine Learning** assignment. Please refer to your Student Handbook for full details of the programme assessment scheme and general information on preparing and submitting assignments. The assignment brief will specifically give details and instructions for the assignment. No examination or details are included within this module.

Assignment instructions:

Description: The assignment is given as two tasks. All the tasks are to be completed individually. Task 1 has been designed to check your understanding of Machine Learning methodologies for critical analysis, through a real-world mini–Machine Learning project. All of which will be written in Python

In addition, task 2 is designed to give you the opportunity to demonstrate your Machine Learning critical reporting skills, comprehensively written in an easily understandable manner, based on your investigation.

A clear, concise analysis for all Tasks is to be given within the submission, complemented with screenshot evidence of all processes and results. You are to submit a single Word document for all tasks, and your code for Task 1 is to be included within an appendix, so that it can be checked and verified it is working correctly. Your student ID number must be clearly displayed on the uploaded file

Learning outcomes (LO)

By completing this assessment, you will have shown and be assessed on **all** four of the learning outcomes:

	Coursework
Demonstrate a practical understanding of the characteristics of various Machine Learning methods and their applications in data analysis **LO 1**	X
Select and apply appropriate machine learning techniques for a given Scenario. **LO 2**	X
Critically evaluate the results from the application of Machine Learning techniques and propose improvements. **LO 3**	X
Graduate Attribute Critically evaluate and further contextualise understanding of the subject area with the ability to link the discipline(s) to local, national and global issues, research and pursue evidence-based arguments within the discipline using an extensive range of academic and professional body resources. Show clear ability to engage with different traditions of thought and the ability to apply their knowledge i practice, including in multi-disciplinary or multi-professional contexts. **LO 4**	X

Your assignment will include: a title page, containing your student number, the module name, the submission deadline, and word count; the appendices if relevant; and a reference list in the AU Harvard system(s). You are required to address all the elements of the assignment tasks listed below. Please note that tutors will use the assessment criteria set out below when assessing your work.

Maximum word count: 3000 words

Please refer to the full word count policy which can be found in the Student Policies section here: Arden University | Regulatory Framework

The word count includes everything in the main body of the assessment (including in text citations and references). The word count excludes ***numerical data in tables, figures, diagrams, footnotes, reference list and appendices. All other printed words ARE included in the word count.***

Students who exceed the word count up to a 10% margin will not be penalised. Students should note that no marks will be assigned to work exceeding the specified limit once the maximum assessment size limit has been reached.

Assignment Task: Machine Learning Project

Task 1 Details:

You have recently joined *ScentTech Analytics*, a start-up focused on using data science to enhance customer experiences in the fragrance industry. Your first task as a machine learning analyst is to develop clustering models using the '**Fragrance Dataset 4037.csv'** to group perfumes based on user preferences or scent composition (e.g., top, heart, base notes).

The purpose of this analysis is to uncover underlying scent categories and user affinity groups. Your insights will help the company provide personalized perfume recommendations and improve marketing strategies.

You are expected to:

- Pre-process and explore the fragrance dataset effectively.
- Apply multiple clustering techniques (e.g., K-Means, Hierarchical, DBSCAN).
- Justify your choice of features and number of clusters.
- Use dimensionality reduction techniques (PCA, t-SNE) for visualization if appropriate.
- Evaluate and compare clustering models using internal validation measures (e.g., Silhouette Score, Davies-Bouldin Index).
- Recommend the most suitable model and describe the characteristics of each cluster.

(60 Total marks)
(LO's: 1, 2)
(2000 Words equivalent for the code)

Task 2 Details:

In addition, based on your clustering analysis, you will now prepare a management-facing report that can be presented to the executive team at ScentTech Analytics.

The reflective report should:

- Clearly summarize your data analysis, feature selection, and modeling process.
- Compare and critically evaluate the clustering methods used.
- Explain the rationale for your final model selection and its business relevance.
- Discuss how your findings can support personalized marketing, product development, or user segmentation.
- Be written in a professional and accessible tone, suitable for non-technical stakeholders.

Include visuals, cluster profiles, and strategic recommendations based on your findings.

(40 Total marks)
(LO's: 3, 4)
(1000 Words equivalent for the reflective report)

Note: All analysis must be done in Python, and your notebook should reflect clean code, adequate comments, and informative visualizations.

As technology and platforms may change, your module tutor will provide you with up-to-date details.

End of questions

Formative Feedback:

You are encouraged to submit your assignment for feedback **once** and it is 30% of your entire submission. You, the student, are to choose 30%, **not the tutor**. The last day for guaranteed feedback hand-in is Monday of week 9 at 23:58. No formative feedback will be given after the time specified above, either blended or distance learning.

The Feedback is designed to help you develop areas of your work, encouraging academic skills and independent learning.

If you are a Distance Learning student, then you are encouraged to send 30% of your assignment for feedback by email to your tutor, no later than two weeks before your final submission date. Dates will be given to you by your tutor on a module-by-module basis.

Guidelines:

You **MUST** underpin your analysis and evaluation of the key issues with appropriate and wide ranging academic research, ensuring all cited literature is referenced using the AU Harvard system(s).

Additional notes:

Students are required to indicate the exact word count on the title page of the assessment.

The word count excludes the **title page, tables, figures, diagrams, footnotes, reference list and appendices.** Where assessment questions have been reprinted from the assessment brief these will also be excluded from the word count. **ALL other printed words ARE included in the word count** See ‘Word Count Policy’ on the homepage of this module for more information.

Submission Guidelines:

Assignments submitted late will not be accepted and will be marked as a 0% fail.

Your assessment should be submitted as a single *Word (MS Word) or PDF* file. For more information, please see the "Guide to Submitting an Assignment" document available on the module page on iLearn.

You must ensure that all parts of the submitted assignment are your own work and that all sources used are correctly attributed. Penalties apply to assignments which show evidence of academic unfair practice. (See the Student Handbook which is on the homepage of your module and also in the Induction Area).

You will be graded based on how well you meet these learning outcomes. Your marker will use a rubric to grade your work, and you can find this on the "My Assessment" tab on the module iLearn page.

Guidelines and policies

You can find links to more useful information about the assignment and university policies below.

Word/time limit policy	Click here to view the Arden University word count/time limit policy
Referencing guidelines	Click here for Harvard referencing guidelines
Please follow the referencing guidelines that are appropriate for	

your degree programme. If you are unsure which you should be using, please contact your module team.

Academic integrity and misconduct policy	Click here to view Arden University's policy on academic integrity and misconduct
Statement on use of artificial intelligence on assessment	Click here to view Arden University's statement on the use of artificial intelligence on assessment
Support information	Click here to view guidance on how to apply for short-term extensions Click here to view guidance on how to apply for extenuating circumstances Please click here for link to academic skills team support