



Assessment Item Task Sheet

Course Code and Name

PHY3306: Solar and Stellar Astronomy

Assessment Item Number and Name

Assessment 3: Report

Assessment Item Type

Report

Due Date & Time

11:59pm Thursday 24th April, 2025

Length

Max 5 A4 pages, 12pt font., single spaced, excluding references. Any content past 5 pages will not be marked.

Marks and Weighting

Marked out of 20; worth 20% of the total mark for this course

Assessed Course Learning Outcomes

CLOs 1-5

Rationale

This assessment is designed to test your skills in performing scientific analysis of astronomy data and in communicating scientific ideas.

Task Instructions

See instructions document below.

Acceptable AI Use Level

For this Assessment Item, acceptable AI use is set at:

Level 1: AI Assisted Structure Checking

Description: Students may use Artificial intelligence (AI) tools to organise and check the structure and flow of their Assessment Item. This includes grammar checks, coherence, and flow of arguments but excludes using AI to generate new text and/or new content.

Additional Information Required: Indicate the AI tool(s) used for structure checking at the beginning of the Assessment Item and include the prompts you have used. Save copies of your drafts and content before/after AI was used, to produce upon request.

Academic Integrity

Students should be familiar with, and abide by, UniSQ's [policy on Academic Integrity](#) and the [definition of Academic Misconduct](#). [Penalties](#) apply to students found to have breached these policies and procedures. Please ensure you have completed the mandatory Academic Integrity training and have familiarised yourself with [Academic Integrity at UniSQ](#).

Relevant Information and Resources

For more information, see the assessment area of the Study Desk

Assessment Marking Criteria

See Below

Refer to the Rubric / Marking Guide / OSCE for this Assessment Item [below](#).

Submission Information

Please submit the assessment as a single PDF via the relevant submission portal under the Assessments section of the course study desk.

Return of Assessment Items and Feedback for Learning

The results for this assessment will be released, at the latest, three weeks after the last submission date for students who have been offered an extension for their submission.

Extensions and Penalties for Late Submission

Information on extensions and late penalties can be found [here](#).

Rubric / Marking Guide / OSCE for this Assessment

Criteria	Grade HD: 85-100%	Grade D: 75-84%	Grade C: 65-74	Grade P:50-64%	Grade F:25-49%	Grade low F: 0-24%	Marks
Abstract	Clear, concise summary covering all key elements (aim, methods, results, conclusions) with excellent clarity and precision.	Well-structured summary covering key elements with minor omissions or slight lack of clarity.	Covers most elements but lacks conciseness or clarity in some areas.	Includes basic elements but is vague or lacks clarity.	Missing key elements, poorly structured, or unclear.	Absent or completely inadequate.	/2
Introduction:	Provides a compelling background, clear research aim, and justification with excellent use of sources.	Strong background and justification with minor gaps in clarity or supporting evidence.	Adequate background and aim, but justification or source use could be stronger.	Basic background and aim with limited justification or sources.	Weak background, unclear aim, minimal justification or use of sources.	Absent or completely inadequate.	/3
Observations and Methods	Clearly and thoroughly describes data and methods; precise and replicable.	Well-detailed methods and data description with minor omissions or unclear explanations.	Methods and data adequately described but some details lack clarity.	Basic data and methods described, but lacks some key details or explanations.	Descriptions of data and methods are unclear, incomplete, or poorly explained.	Absent or completely inadequate.	/5
Analysis of results and discussion	Strong, insightful analysis with clear and well-supported interpretations; logical and critical discussion.	Good analysis with well-supported interpretations, though minor gaps in depth or clarity.	Adequate analysis but lacks depth, clarity, or full support in interpretations.	Basic analysis with minimal interpretation; lacks depth or logical flow.	Weak or flawed analysis; misinterpretations or lack of logical discussion.	No analysis or discussion provided.	/5
Conclusion	Strong, clear conclusions directly tied to data and broader implications.	Well-stated conclusions, mostly aligned with data, but slightly lacking in depth or clarity.	Adequate conclusions, but missing connections to broader implications.	Basic conclusions with limited connection to findings.	Weak or unsupported conclusions.	No conclusions provided.	/2

Criteria	Grade HD: 100%	Grade P:50%	Grade F: 0%	Marks
Tables and Figures	Tables and figures all have appropriate labels and captions with sufficient level of detail for the figure to be understood	Tables and figures have labels and captions, but there are errors and/or they lack sufficient detail.	Poor or absent figure labels and captions	/1
Error Estimation	Error estimation with results present, with an appropriate number of significant figures.	Some error estimation and correct significant figures present, but inconsistent.	Poor or absent error estimation.	/1
References	Excellent use of appropriate referencing style, consistently applied with no errors.	References are present but the use of referencing style is inconsistent and/or contains errors	References are absent, or insufficient.	/1

Project Description

You have been transported to a galaxy far far away! Your task in this assessment is to explore its stellar populations with broadband photometry, and report on your findings. Feel free to come up with your own name for the fictitious observatory you took the data from and the name for your galaxy. Remember: you're not on Earth.

You can explore your galaxy through the JUPYTER-NOTEBOOK (or GOOGLE COLAB) that accompanies your dataset, or through any other means more comfortable to you. The JUPYTER-NOTEBOOK contains interactive sliders that will help you solve all the problems in the project. You do not need programming background beyond that demonstrated in the tutorials to complete this project. You have been given a folder of data for your galaxy labeled with your student ID number¹. The STARS.CSV file contains the colours and magnitudes of $\sim 100,000$ stars in your galaxy². The JUPYTER-NOTEBOOK provides a visualisation of the galaxy in sky coordinates (RA, DEC), each of the clusters and dwarf galaxies are labelled (Figure 1).

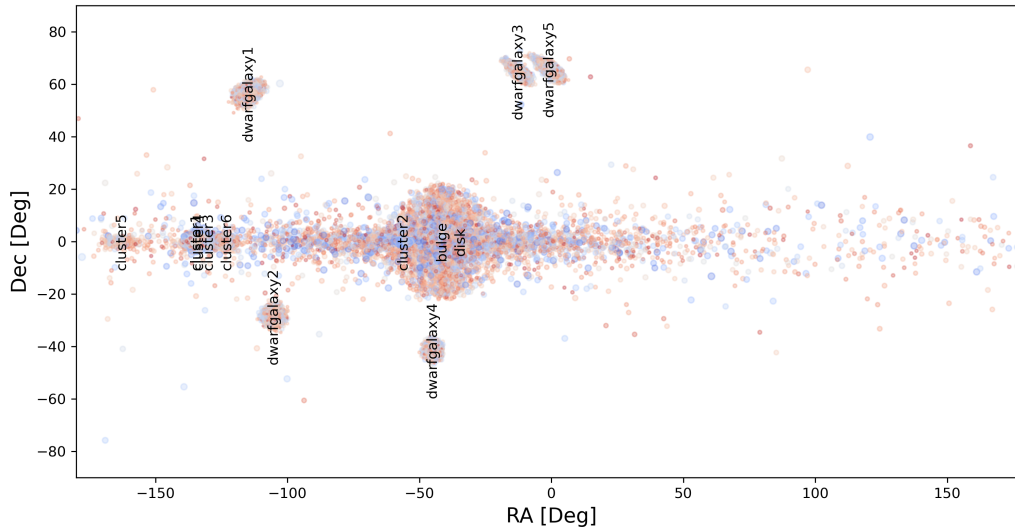


Figure 1: The sky projected view of an example galaxy. Each cluster and dwarf galaxy is labelled.

The JUPYTER-NOTEBOOK also demonstrates how you can isolate the colour magnitude diagram of each cluster, and overlay stellar evolution models. The evolution tracks and isochrones can be modified in age and magnitude offset. You will fit these free parameters to your observations to determine the key properties of your galaxy. Note that in the JUPYTER-NOTEBOOK, DMAG slider corresponds to the distance modulus. The AGE slider corresponds to the \log_{10} age of the stellar evolution model. The MASS slider corresponds to the mass of the model in solar masses.

¹Each student is given a different simulated galaxy.

²We are working on smaller scales than galaxies in our own universe, in order for this project to be feasible!

Objectives and marking scheme

In this project, you are expected to demonstrate an understanding of stellar clusters and stellar evolution (Chapter 13) along with other aspects of the course. As with research projects, where an observer has gathered a set of observations, there are many questions that can be answered. Three questions are listed below. To receive the maximum marks for this project, you need to answer the following questions:

- What is the distance to each cluster? What is the 2D/3D structure of your galaxy?
- What is the age of the galaxy? Do all the stars have the same age? What can you tell about the history of the galaxy?
- Are stars still forming in this galaxy?

You are expected to produce one report that addresses your analysis of the dataset you have been given. The report is expected to be formatted as a **short** journal article (max. 5 pages including figures and tables, but excluding references) describing the galaxy, encapsulating research questions, and the results of your analyses. The mark allocation within this report is as follows (refer to the rubric for further details):

1. Abstract: This should summarise and lay out the key findings of your project in 250 words or less. [2 mark]
2. Introduction: An introduction should describe the aims of this project by identifying the research questions you are answering. Provide relevant background information and literature citations on how similar techniques were used previously. [3 marks]
3. Observations and methods: Describe how you are answering the research questions. The methods should provide sufficient detail such that an educated colleague can follow and replicate the work. For example, if multiple clusters are analysed with the same technique, use only one such cluster as an example in your methods write-up. [5 marks]
4. Analysis of results and Discussion: Analyse the observations and summarise the results. Provide a write-up of the analysis and results, and present numerical results in an appropriate table or figure. You do not need to include a CMD fit for every cluster, but instead provide a summary and interpretation of results in an appropriate plot or table, with a supportive description and interpretation in the text. Place your results into context with your understanding of the Milky Way. [5 marks]
5. Conclusion: End your report with a concluding summarising your key findings and their implications for your galaxy. [2 marks]
6. Provide appropriate error estimation, with results presented with an appropriate number of significant figures. [1 mark]
7. All tables and figures must have appropriate labels and captions for the reader to understand what the plot is showing. [1 mark]
8. References are included; all references adhere to a single referencing style of your choice. References are to scientific publications only, not websites, press releases, or other non-professional forms of media. [1 mark]