PHYS 3116: Computational Assessment brief

Summary

Assessment title:

Computational assignment

Weighting

20%

Due Date

Monday of Week 7

Groups

You must select/nominate your group for this assessment in Moodle under the *Communication, Forums, and Groups* section no later than the end of week 1. In the subsection *Computational Assessment Group*, select *Create a new group* and name your members. Please also name your grouping.

Students not in groups by then end of week 1 will be assigned a group at random. There will be no changes to group membership after week 1, except in the instance of late-adds or late-drops to the class.

Groups must consist of two or three people. Three people are recommended for the purposes of quorum (see Assessment).

Assessment

The assessment has four components. Components 1 and 2 assess the ability to work in a group and to track individual contributions. Component 3 is the scientific output. Component 4 is self-reflection.

1. Each team will have five-to-ten-minute team meeting each week, either held during the class break or during the tutorial. A quorum must be present for the team meeting to count; more than 50% of members must be present, so either both members of a 2-member team or two members of a 3-member team. Only team members that attend at least three meetings reaching quorum will be awarded full marks. Meeting agenda, notes, and attendance must be uploaded to Github as a markdown file.

2. Group code must be developed on Github. Each team member must commit three lines of code and three lines of documentation each week for at least three weeks to get full marks. These commits must contain meaningful analysis.
3. Each team will submit a joint assignment in the form of a 10-minute video presentation. In the recording, talk through the research process, data curation, and the code you wrote. Include how your team did or did not answer the questions you set out to ask, what you learned along the way, and steps you might take in the future to investigate the questions you asked more deeply. Include labelled figures of results. Each person in the team must speak for at least two minutes. Each team member must be visible, along with the code/figures, in the presentation – a Zoom recording can achieve this.
4. Each person will submit a typed statement of contribution to the project and self-reflection of their experience. Please include a link to your team's Github and a link to your Github profile in your statement of contribution/self-reflection.

Length

Team meetings: 5-10 minutes each.

Team meeting notes, attendance, and agenda: As appropriate to meet assessment criteria.

Github contributions: A commit of at least three lines of code (meaningful changes to code can count) and three lines of documentation for each of at least three weeks.

Recording: close to 10-minutes total. Each team member must speak for two minutes.

Statement of contribution and self-reflection: about 1 page, typed.

Submission requirements

You will submit your meetings notes, attendance, and agenda each week for at least three weeks to your team's Github as a markdown file. You will submit your code/documentation contributions as commits to your team's Github.

You will submit your recording and statement of contribution/self-reflection through Moodle under section *Assessments Hub*, subsection *Assignment Upload Hub*, via the *Computational assessment* link. Please include a link to your team's Github and a link to your Github profile in your statement of contribution/self-reflection.

Feedback Details

Feedback will be given within ten days of the assignment submission.

Aligned CLOs

This assignment is related to CLOs 1, 3, 4, and 5. In this assignment, you will

- "Use mathematical and computational skills to quantitatively **interpret** the structure, formation, and kinematics of the Milky Way compared to other galaxies and **characterise** the beginnings and ultimate fate of the Universe,"

- "**Design** an analysis of astrophysical datasets to reproduce seminal studies in extragalactic astrophysics or cosmology,"
- "**Apply** the tools that are used by professional astronomers in the analysis of galaxies and cosmology," and
- "Effectively **communicate** scientific concepts, both individually and as part of a collaborative team."

Assessment details

Rationale

Modern astronomy research is largely computational in nature, whether that is simulating theoretical galaxies to compare to data or analysing data from telescopes. In this exercise, you will gain experience using some of these tools to explore astronomical data hands-on, including the collaboration platform Github. You will also gain experience with oral communication, by presenting your project via a recorded video that you will upload.

Task description

In this assessment, we will practice locating, curating, and analysing data and drawing basic conclusions. You may choose from one of the following options.

Option 1 Accreted Milky Way Globular Clusters

Using data from the Harris Catalogue of Milky Way globular clusters and vandenBerg et al. (2013), use stellar population (metallicities [Fe/H] and ages) and dynamical information to identify potentially accreted globular clusters. Consider if there are some globular clusters that stand out in the age-metallicity relation or that do not rotate with the bulk of other globular clusters.

Consider what the above findings might mean for how the Milky Way formed and how many of its globular clusters could be accreted and how many may have formed within the Milky Way. Consider what further tests could be performed to delineate various possible formation scenarios.

Reformatted .csv versions of relevant data tables have been uploaded to Moodle for convenience.

Option 2 The Faber-Jackson Relation in the SAMI Galaxy Survey

Using publicly available data from the SAMI Galaxy Survey, you will need combine the stellar mass, stellar kinematic and morphological information required to select a galaxy sample. Carefully select the best galaxy sample for the job. Keep track of what galaxies you are choosing and why. Plot and fit the Faber-Jackson Relation in SAMI.

Consider the Faber-Jackson Relation in SAMI. Is it as expected? How does it differ from other fits in the literature, and can you explain how/why? Consider what your findings might mean for how galaxies of different types form and evolve.

Reformatted .csv versions of relevant data tables have been uploaded to Moodle for convenience.

Resources

You are free to use whichever computing language you prefer, though there is a preference for either python or R. Modern astronomical science is done in large collaborations and teams. We therefore welcome cooperation across teams (please acknowledge other teams accordingly). If you get stuck, first give it your best go, then ask questions at drop-in office hours, during tutorials ,and on Moodle. Note the rubric below: in particular, you will not be marked on the sophistication or elegance of your code, but rather your ability to use these tools to produce results and your ability to describe how they are used, and the ability of someone else to follow your logic.

Artificial Intelligence (AI): AI can be a great tool to enhance your writing, check your grammar and provide a starting point. The University of New South Wales has policies in place around the use of AI in course assessments, which you can find at https://www.student.unsw.edu.au/assessment/ai. For all assessments, you may only use AI for "simple editing assistance", i.e. no generative AI is permitted (refer to the website for more information). All AI use needs to be explicitly acknowledged, failing to do so will be considered academic misconduct. If your Convenor has concerns that your submission contains passages of AI-generated text or media, you may be asked to account for your work.

You cannot copy/paste code from AI and pass it off as your own. Assessments that require coding will be compared to common outputs from generative AI during the marking process, and any significant overlap will be considered misconduct.

Final grade

This assessment is marked based on competency grading. To obtain full marks, you must fulfil all described criteria at a competent level upon first submission. Please refer to the assessment marking grid below for the description of each criterion. Should you fail to achieve a competent level in all criteria, you may resubmit your assessment once with a new deadline of up to 1 week from receiving feedback. Resubmissions will result in a 30% marks reduction.

If a member of the team did not attend at least three team meetings reaching quorum, then that member will receive a further 30% marks reduction (from maximum).

If a member of the team did not contribute three lines of code and three lines of documentation to Github each week for at least three weeks, then that member will receive a further 30% marks reduction (from maximum).

Assessment Marking Grid:

Criterion	Description	Rating		
		Competent	Developing	Not applicable
Quantity of science content	• Presentation covers the relevant scientific content. • Analysis includes ideas not suggested in the brief. • Work performed is explained in detail.	☐	☐	☐
Quality and accuracy of science content	• The information provided is accurate and placed in context • Figures of results are included.	☐	☐	☐
Functionality of the analysis and methodology	• Project mostly accomplishes its intended goals as described by the team. • Limitations are clearly explained.	☐	☐	☐
Structure	• Information is presented clearly and logically. • The written code is easy to follow.	☐	☐	☐
Length	• The video fulfills the length requirements of the assignment.	☐	☐	☐
Team contribution, motivation and reliability	• Students participate in at least 3 teams meetings reaching quorum, and detailed meeting notes including attendance, agenda, and action items are organised on Github. • Student provides a statement of contribution and self-reflection. • Commits of at least 3 lines of code and 3 lines of documentation per week are recorded on Github for at least 3 weeks.	☐	☐	☐
Delivery	• Speaking is generally well-paced and engaging. • Each student speaks for at least 2 minutes. • Few noticeable vocalised pauses. • Good use of visual aids, including labelled figures	☐	☐	☐