**National University of Singapore**
**Department of Mathematics & Department of Statistics and Data Sciences**
**DSA4199 HONOURS PROJECT IN DATA SCIENCE GUIDELINES**

## Introduction

Students in the Data Science and Analytics degree programme are required to complete an Honours-level project as part of the programme requirements and must have completed at least 100 modular credits and passed all 14 essential modules up to level 3000 (namely, CS1010S or its equivalent, DSA1101, MA1101R, MA1102R, CS2040, DSA2101, DSA2102, MA2311 or MA2104, ST2131, ST2132, CS3244, DSA3101, DSA3102 and ST3131).

Each student must complete a project constituting 16 modular credits under the supervision of an academic staff. The duration of the project is two semesters (termed "first" semester and "second" semester). The Honours project module DSA4199 will be preallocated to eligible students before the first semester starts.

## Objectives

The objectives of the module are to develop skills for independent data-driven research and to promote the application of novel problem-solving strategies in data science. On completion of the module, students should be able to demonstrate an appreciation of the current state of knowledge in a particular field of research, to master the techniques required for the study of a research question, and to communicate research findings clearly and concisely in written and spoken English.

## Format of the Project

A student proposes to work on a project based on his interest. This work is done under the guidance of a supervisor (from Department of Mathematics or Department of Statistics and Data Sciences) and consists of a systematic study and elaboration of an approved topic. An account of the knowledge gained is given in a thesis.

## Guidelines for the Project

Students are required to solicit project supervision on their own. Once a student has confirmed project supervision with a faculty member, the student should email the details (student name, supervisor name, project title) to Ms Valerie at val.soh@nus.edu.sg immediately. Students are expected to confirm their project supervisors by the end of week 3 of the first semester.

**Assessment**

There are five components for an individual project. Marks are given independently for components 2–5 by the supervisor and an examiner (nominated by the department), collectively known as the assessors. The following weightage applies to the component marks:

1. Honours thesis submission 50%
2. Oral presentation 25%
3. Question & answer 20%
4. Final submission 5%

1. Progress Presentation(s) (Optional)

   At the discretion of the supervisor, the student may be required to make progress presentation(s) to demonstrate his/her understanding of the existing literature relevant to the topic of the project and for the supervisor to provide feedback on his/her presentation skills and ability to answer questions.

2. Honours Thesis Submission

   ***One softcopy*** of the Honours thesis in PDF format *must* be uploaded into Canvas (instructions in due course) by 4:00 pm on the *Friday of week 7 of the second semester* for an originality check. The assessors will use the originality report to assess the thesis. Program codes, if any, must also be uploaded into Canvas (instructions in due course). In particular, lengthy program codes should not be reproduced in the thesis.

   There are no strict limits on the length of the thesis; on average, it is likely to be about 65/50 pages, excluding front matter (e.g., title page, content page, abstract/summary, list of figures and/or tables, etc.), back matter (e.g., references, appendixes, etc.), figures and/or tables. However, significant variations from the average may occur because of the nature of some projects. In any case, the thesis should not exceed 100 pages in length. The Honours thesis should be typed on A4 size paper (12-pt font, double-spacing, single-sided or double-sided, 1-in margins), with the standard format of the cover page (as shown on the last page).

3. Oral Presentation

   The student will also be required to give a 40-minute oral presentation of the work done. It will be assessed by the assessors.

   The oral presentations will be held during *weeks 10 – 11 of the second semester*. Each student will be required to attend at least 6 oral presentations.

4. Question & Answer (Q&A)

   After his/her oral presentation, the student will have to appear in a Q&A session conducted by the assessors. The questions will deal with the subject matter of the project.

   The Q&A session will last about 30 minutes and will give the student an opportunity to clear up misunderstandings or uncertainties about the material presented in the thesis. The assessors will give the student a list of matters requiring attention (ranging from typographical to mathematical errors requiring correction) and the student is required to amend the thesis accordingly for final submission.

5. Final Submission
   After addressing the matters raised by the assessors, the student uploads into Canvas (instructions in due course) ***one softcopy*** of the thesis in PDF format by 4:00 pm, *10 days after the oral presentation*. It is stressed that this is an important part of the formal requirement, and also will be assessed.

**Report Writing**

Notes and Referencing

Principal original sources of the material for the project should be consulted as far as possible, in addition to accounts that may be found in textbooks or surveys. All sources that have been used should be *explicitly* acknowledged in the thesis/report. The status of the results in the thesis/report, whether they are new and obtained by the student or whether they are obtained by others, should be stated.

Writing the Summary

The student, in consultation with the supervisor, should prepare a summary of about 300 words on the nature and scope of the thesis/report. The summary should be bound with the thesis/report. It should also contain a statement highlighting the contributions made by the student. The statement should include, if any,

(a) *the student's own ideas, own results, own proof, own interpretations, own applications; own examples or counterexamples, own computer programs which he/she does not obtain from other sources. The relevant parts of the written thesis which contain such contributions should be explicitly stated.*

(b) *improvements made by the students on existing theorems, proofs, etc., found in books or papers. The sources from which the results are improved upon should be mentioned explicitly.*

**Pointers for Oral Presentation**

(I) Things to do

*(A) Before the presentation*

- Identify the main results and main ideas in your thesis. Focus on them
- Try to put across a few main ideas to give the "flavour" of your project
- Prepare and organize presentation aids in advance
- Make sure your notation is consistent throughout the presentation
- Draw diagrams, give tables and plots to help bring across the ideas to the audience
- Have a practice presentation with a friend (not your supervisor)
- Time yourself, allowing the audience plenty of time to read each slide *(B) During the presentation*
- Give an outline for the presentation
- Highlight the main results. Give motivation as to why you think they are interesting
- Give some applications and/or connections with other topics you know of
- Speak clearly and maintain eye contact with the audience
- Be enthusiastic about your presentation
- Work out some examples during the presentation to illustrate definitions and theorems
- Make sure the audience can follow the presentation to some extent; be prepared to pause and clarify if the audience looks puzzled

- Use only 35 minutes for presentation and leave some time for questions
- Give a brief summary before concluding the talk

(II) Things not to do

- Write up a set of notes and read them out loud word for word
- Introduce lots of definitions and notation
- Carry out proofs in full detail
- State a long list of Theorems and Lemmas
- Stand right in front of the overhead projector all the time
- Give excessive details of proofs without the main idea
- Cram everything in the thesis into the presentation
- Go over time
- Rush
- Try to say in 35 minutes everything you have learnt in the previous 6 months
- Pretend to know everything

(III) Reading material on giving effective lecture/talks

- Chapter 3 of *"Handbook on Teaching"* by Daphne Pan et al, printed by NUS
- *"Effective Presentation"* by Pat Levy, Longman
- *"The Art of Lecturing: Some Practical Suggestions"* by Clark and Clark, Cambridge, Heffer
- *"Handbook of Writing for Mathematical Science"* by N.J. Higham, SIAM
- *"How to Write Mathematics"* by P.R. Halmos