

National University of Singapore
Department of Statistics and Applied Probability (DSAP)

HONOURS PROJECT GUIDELINES

The Honours Programme in Statistics

Students (*matriculated in AY2016/17*) in the Honours programme are required to read at least five lecture modules at level 4000 and above, including ST4231 and ST4233, selected from the options offered in their year of study. Each module will be the subject of a two-hour written examination. In addition, each student must complete a project constituting 12 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 ST4199 will be preallocated to eligible students before the first semester starts.

Objectives of the Honours Project

The Honours project consists of a systematic study and elaboration of a topic. It is intended to

1. give students the opportunity to work independently;
2. encourage students to develop and exhibit aspects of their ability that may not be revealed by a written examination;
3. foster skills that will be of continuing usefulness in their later career, such as
 - determination of relevant sources;
 - statistical applications;
 - critical analysis of source material;
 - organization of relevant material;
 - presentation in written and spoken form.

Format of the Honours Project

Students who start project work in AY 2019/20 will either work on an individual project or participate in a project-seminar group.

- Students with a CAP of at least 4.00 will work on an individual project.
- Students with a CAP of at least 3.95 but less than 4.00 would be given the option to choose between working on an individual project and participating in a project-seminar group. *Students will not be permitted to switch between working on an individual project and participating in a project-seminar group after they have made their choice.*
- Students with a CAP below 3.95 will participate in a project-seminar group.

A student’s project grade is strictly performance-based and takes into consideration factors such as the level of difficulty of the topic, clarity of presentation, findings in the thesis/report, and quality of the thesis/report. In particular, there is no a priori maximal or minimal mark for students working on an individual project or those participating in a project-seminar group. The project grade will be given *at the end of the second semester*. Students are graded individually and projects graded A– and above must involve substantial research effort and content in statistics, probability and/or applied probability.

Individual Project

In an individual project, a student proposes to work on a project based on his interest. This work is done under the guidance of a supervisor and consists of a systematic study and elaboration of an approved topic. An account of the knowledge gained is given in a thesis.

Project-Seminar Group

In a project-seminar group, a number of students are allocated with the same topic and will work together with the supervisor, but will each submit a final report upon completion. The structure of the project-seminar group complements the format of an individual project. The majority of the students will participate in project-seminar groups.

An important purpose of this project structure is to widen the training of students to cover more “skills” than the individual project, which is “content oriented”. While the statistical content of such projects is still essential, students are expected to put in more effort to improve their communication and presentation skills of academic subjects and the ability to work within a team.

Guidelines for the Individual Project

Students who are eligible to work on an individual project are required to solicit project supervision on their own. They may refer to

<https://www.stat.nus.edu.sg/index.php/about-us/people/faculty-members>

for the research interests of faculty members in the department. Once a student has confirmed project supervision with a faculty member, the student should email the details (student name, supervisor name, project title) to Lihah at stamm@nus.edu.sg immediately. *Students are expected to confirm their project supervisors by the end of week 3 of the first semester.*

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:

- Honours thesis submission 50%
- Oral presentation 25%
- Question & answer 20%
- 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

Two bound copies of the Honours thesis *must* be submitted by 4:00 pm on the *Friday of week 7 of the second semester*, to the DSAP General Office (S16-07-100). Use only plastic comb binding with clear cover sheets (both front and back) for the hardcopies. **One softcopy** of the thesis in PDF format **must be uploaded into LumiNUS** (instructions in due course) for an originality check. The assessors will use the originality report to assess the thesis. Program codes, if any, **must also be uploaded into LumiNUS** (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 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. Attendance will be marked. Students who start their projects in Semester 2 may attend talks given by students who start their projects in Semester 1, for interest and to meet the minimum quota as there may be fewer students starting their projects in Semester 2.

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 submits **two bound copies** of the thesis by 4:00 pm, *10 days after the oral presentation*, to the DSAP General Office (S16-07-100). Refer to component 2 for specifications/requirements of the hardcopies. **One softcopy** of the thesis in PDF format and program codes (if any) must be **uploaded into LumiNUS** (instructions in due course). It is stressed that this is an important part of the formal requirement, and also will be assessed.

Guidelines for the Project-Seminar Group

Students who are eligible to participate in a project-seminar group will receive an email announcement containing a list of topics shortly before the first semester starts. They will be invited to indicate their preference of topics and the department will allocate projects to them shortly after the first semester starts.

Students working in a project-seminar group will be individually graded on the basis of three components. The following weightage applies to the component marks:

- Ongoing (individual) presentations 40%
- Feedback (on other students' presentations) 20%
- (Individual) Final report 40%

The following guidelines/expectations apply to students working in a project-seminar group:

1. Each Group shall have 4 to 5 students.
2. Each Group is led by one supervisor who is an academic staff of the department. The supervisor will coordinate all activities including seminars, discussions, individual work, presentations and report-writing within a Group.
3. Each Group should meet regularly from *week 2 of the first semester* (or, if this is not possible, no later than week 3 of the first semester). The last meeting should be no later than *week 8 of the second semester*.
4. The supervisor will normally assign some (smaller) topics within the broad theme of the Group and it is expected that students' abilities and performance will be reflected adequately in this framework.
5. The supervisor may give one or two preliminary lectures to lay down some foundations for the students in a Group.
6. Each student in a Group is expected to give several talks throughout the project period. The talks should be comprehensible to other students within the same Group as they are expected to learn from such presentations. Students should be graded mainly on the clarity of their presentations and the pedagogical effectiveness of their presentation material.
7. Students are expected to share their knowledge by circulating their presentation notes within the Group after submitting the notes to the supervisor for grading. Recommended weightage of this activity is 10% ($\frac{1}{4}$ of the marks for ongoing presentations).
8. Students are strongly encouraged to hold regular study sessions outside formal regular meetings.
9. Students who have shown excellent potential may be given more substantial material to work with.
10. Each student in a Group is required to write an individual final report consisting of essential topics for the Group and material that has been covered in his/her presentations.

The report 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), and is, on average, likely to be about 40 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.

One bound copy of the report *must* be submitted by 4:00 pm on the *Friday of week 12 of the second semester*, to the supervisor. Use only plastic comb binding with clear cover sheets (both front and back) for the hardcopy. ***One softcopy*** of the report in PDF format must be **uploaded into LumiNUS** (instructions in due course) for an originality check. The supervisor will use the originality report to assess the report. Program codes, if any, must also be **uploaded into LumiNUS** (instructions in due course). In particular, lengthy program codes should not be reproduced in the report.

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.*

The format for the summary follows. Examples of the *Statement of the author's contributions* are also given.

SUMMARY

(Nature and scope of the written thesis/report)

(Statement of the author's contributions — see examples given below)

Example 1.

Theorem 3.2 is new and is a generalization of Theorem 2.1 ([1], page 188) for nonlinear regression. The proof is modified for the nonlinear case. The simulations in Chapter 4 are new and I developed the computer programs.

Example 2.

I have extended some bootstrap methods to longitudinal data in Chapter 2. Some asymptotic properties of these bootstrap methods have been considered in Chapter 3. Theorem 3.2 is my own contribution and it is similar to Theorem 6 ([3], page 26). I also have run some simulations in Chapter 4.

Example 3.

I have applied statistical models to forecast the trend of stock markets. The models I used are: (i) the simple nonparametric regression; (ii) local linear nonparametric model and (iii) logistic regression. The data I used are: (i) Hong Kong Heng Seng Index; (ii) Japan Nikkei Index and (iii) IBM computer Corporation stock.

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



Title of Thesis/Report

**By
Name**

Supervisor:

**ST4199 Honours Project in Statistics
Department of Statistics and Applied Probability
National University of Singapore
2019/2020**