

Information for Students

The Capstone Project aims to provide hands-on experience for students in scientific research by offering attachment to a research laboratory. Students have the freedom to take up any project from the list of approved research projects. However students are strongly encouraged to choose projects which are relevant to the specialization track that they plan to embark on for the MSc-ABM. Students are expected to reach out to a principal investigator (PI) who is eligible to become the supervisor before the start of the first semester. Upon mutual agreement, the PI and the student will undertake a novel and hypothesis-driven research project, generate results, and communicate the work by the end of the course through an oral presentation and a dissertation.

The list of available projects and supervisors will be made available on the [MSc-ABM website](#).

Please note that this list is not exhaustive. Students are **strongly encouraged** to contact supervisors beyond our list whose research programs better suit their research interests. Once they decide to move forward, the supervisor/student team can communicate with the Capstone administrators and coordinators for the required approvals.

Based on the feedback of our previous batch of ABM students, we are delighted to offer alternatives to the traditional research-based capstone project. These options provide a welcome flexibility, allowing students to choose to work in the industry or focus on coursework, relieving any pressure associated with a research project as a graduation requirement.

Students who plan to take an industry capstone project should contact an industry partner and secure a supervisor. The roles and responsibilities of the supervisors, the registration process, and the assessments will be the same as the standard capstone projects, except their reports will be examined by NUS faculty member(s).

Students who choose to prioritize their coursework can opt to read **MDG5229 Advanced Topics in Signal Transduction and MDG5102 Techniques in Biomedical Research** to meet the graduation requirements.

The duration of the capstone project is expected to be two regular semesters. Students should discuss with their supervisors about their expected workload and goals before the start of the project, taking into account that they will have to juggle their coursework requirements at the same time.

In summary, students are expected to:

- Approach the supervisor(s) proactively to secure their project of choice
- Communicate with the supervisor regarding the workload and their expectations
- Act professionally (e.g. being self-motivated, conscientious, attendance, etc.)

Should students face any issues regarding the capstone project, they can seek the assistance of either the administration team or the coordinators below.

ABM5004 Capstone Project Coordinators and Administration Team

Coordinators

Dr Sham Lok To (Chris) lsham@nus.edu.sg; Department of Microbiology and Immunology
A/Prof Gautam Sethi phcgs@nus.edu.sg; Department of Pharmacology

Administration Team

Mr Michael Lim medlspm@nus.edu.sg; Division of Graduate Studies, Dean's Office
Ms Michelle Chan michelle.chan@nus.edu.sg; Division of Graduate Studies, Dean's Office

Assessment and Examination

By the end of the capstone module, students will be assessed by:

- a. Their general work performance (by the supervisor).
- b. An oral presentation (by two examiners).
- c. A written report (by the supervisor and the two examiners).

The project presentation will typically take place between week 9 and week 11 (late October or late March, depending on the intake). After the presentation, the examiners may give feedback and suggestions. Students are expected to incorporate these elements and submit a final dissertation on week 12 (April or October). For late submission of the dissertation, a penalty of 5% will be deducted per day (inclusive of non-working days) after the deadline. However, in the event that the student is unable to meet the stipulated deadline for legitimate reasons, the student and the supervisor should inform the course coordinators and they will be reviewed on a case-by-case basis.

General guidelines for the oral presentation

Students are expected to give a 20-minute presentation with a 10-minute question-and-answer session. Details of the presentations (time and venue) will be provided prior to the stipulated time frame. Overall, the presentations will be assessed based on the following criteria:

- Organization and the logical flow
- Quality of the visual aids (e.g. whether the slides are neat and clear, are the fonts too small, etc.)
- Ability to explain the overall goals and the methods
- Ability to communicate the results and their significance
- Ability to respond to the examiners' questions

For more general guidelines on how to give a good presentation, students may check out this [video](#).

General guidelines for the written dissertation

By the end of the project, students are expected to write a report to describe their findings. The report has a maximum limit of 5,000 words and comprises the following sections:

1. A title page
2. Acknowledgments
3. An abstract with less than 200 words
4. Introduction (around 20 to 30% of the report)
5. Materials and Methods (no more than 20% of the report)
6. Results (around 20 to 30% of the report)
7. Discussion (around 20 to 30% of the report)
8. References
9. (Optional) Appendix

Word counts do not include references and the appendix.

Overall report formatting

- Page numbers should be included in all sections. Before the Introduction (except the title Page), the text should be paginated in Roman numerals (e.g., i, ii, iii, iv, v, etc.) at the bottom center of the page. All other pages should be numbered with Arabic numerals (e.g., 1, 2, 3, 4, 5, etc.) Appendices will be numbered as A-1, A-2, A-3, A-4, A-5, etc.
- Set the page size to A4 and the background to white
- Double line spacing except for references
- For fonts, use Arial with a font size of 10
- Normal margin (1" margin on each side)

Before submitting the report, students should have their drafts reviewed by their supervisors, or someone proficient in English, especially when they are unsure of their language proficiencies.

Citing references

For the references, students have the liberty to choose the style of any scientific journal. Please use the same format throughout the report. Here are some examples from the American Society of Microbiology (ASM):

1. Caserta E, Haemig HAH, Manias DA, Tomsic J, Grundy FJ, Henkin TM, Dunny GM. 2012. In vivo and in vitro analyses of regulation of the pheromone-responsive *prgQ* promoter by the PrgX pheromone receptor protein. *J Bacteriol* 194:3386–3394.
2. Bina XR, Taylor DL, Vikram A, Ante VM, Bina JE. 2013. *Vibrio cholerae* ToxR downregulates virulence factor production in response to cyclo(Phe-Pro). *mBio* 4:e00366-13.
3. da Costa MS, Nobre MF, Rainey FA. 2001. Genus I. *Thermus* Brock and Freeze 1969, 295, AL emend. Nobre, Truˆpper and da Costa 1996b, 605, p 404–414. In Boone DR, Castenholz RW, GarrityGM(ed), *Bergey's manual of systematic bacteriology*, 2nd ed, vol 1. Springer, New York, NY.

Title

The title should summarize the key findings of the study. Avoid fragmented titles, long titles, and complete sentences.

Abstract

The abstract should have less than 200 words and is arguably the most important part of your report. Spend time on it to make sure it significantly helps the readers to understand the work. It should be concise and communicate the following information:

- The overall scope of the project. What is it about?
- The scientific question that is being addressed and why it is an important problem in biology. Alternatively, you can communicate the unmet medical need.
- The punch line. For example, "Here, we show.....{your main finding}"
- A summary of other results.
- The significance of the project, or how your results help answer the scientific question.

Introduction

This section should provide sufficient background knowledge such that a general scientist should be able to understand the importance and the context of the project. It should present the overall hypothesis that the student is testing, with the rationale of the approach clearly defined. It typically consists of:

- The overall scope of the project and the significance
- A literature review of what has been known about the issue
- The central hypothesis of the project and the knowledge gap
- A brief overall of the approach
- A summary of the findings, which will be elaborated in the Results section

Make sure the statements are well-supported by citations. Give credits to the prior work when they are due.

Results

This part is often thought to be more straightforward to write as it should be a plain description of your findings. Nevertheless, do make sure the rationale of the experiments is clearly stated. Do not attempt to have extensive discussions about the results (as you can see, they belong to the Discussion).

"Next to torture, art persuades best". The descriptions of the results can often use well-designed figures with figure legends to facilitate the process. However, please ensure these figures are concise without any unnecessary information. Avoid exceedingly large tables if they do not convey the main experimental results. Otherwise, they become "fillers" that do no good to the quality of the writing other than to waste space and word limits.

Discussions

This section should provide interpretations of the results that are beyond typical conclusion statements. Usually, it contains the following parts:

- A very brief reiteration of the hypothesis and the major findings. Do not overdo it.
- State clearly how your findings fit in the literature and help us to fill the knowledge gap.
- Explain and discuss any data that do not fit your expectations.
- Make speculation about what the data may suggest.
- Propose a working model, if any.
- Future directions, if any.

Material and Methods

This part should contain sufficient information such that a competent scientist in the field can reproduce your result. State all the technical details as in your working protocol. These include:

- The source and references to the materials.
- The parameters for running the experiments (e.g. centrifugation speed and temperature).
- List the strains and the primers used in the study.
- Check that all methods are indeed used in the study.

Students should consult their supervisors and other references available on how to write a scientific report. For example, the information for authors in many journals provides guidance on writing. Additionally, the article written by Kelly LaMarco and Rebecca Ward "How to write a paper" provides very good advice (available online and upon request).

Plagiarism prevention

NUS provides two plagiarism prevention services: Turnitin (for instructors) and iThenticate (for students).

Please note that all students are required to use iThenticate to check their dissertation before submission.

NUS students will have to create an account using this [request form](#) before they can log into [iThenticate](#).

After uploading their dissertation to iThenticate for checking, students will have to download the [similarity report](#) as a pdf file and submit the similarity report together with the dissertation.