

# SP3172: Integrated Science Project (Updated AY19/20)

As part of SPS's vision of nurturing budding scientists, SP3172 gives students a head-start in research opportunities and a chance to plan, execute and analyze their research projects. SP3172 integrated science project serves as a continuation from SP2171 Discovering Science where students translate insights from their literature review into research projects.

**The main idea is for the student to develop a scientific hypothesis, planned and execute experiments to investigate this, and then analyze the experimental data with regards to the original scientific hypothesis.** You are guided in this process by working in a research laboratory based in Singapore and the learning is facilitated by lab mentors and senior SPS mentors. You should analyze, explain and report their findings in a scientific manner.

## Module coordinators for SP3172

1. SP3172 module staff coordinator: Dr Robert Lieu (dbslzz@nus.edu.sg)
2. SPS head mentor for AY19/20 (Headmentors@sps.nus.edu.sg)

## Learning outcomes for SP3172

The module aims to develop students' research skill by directly providing them with (1) the first-hand experience in applying scientific methodology (from hypothesis, to experimental design, to experimentation, and data analysis) in real research environment, and (2) a platform to share, debate and defend their research findings in public setting (i.e. SPS Congress).

### At the end of the module, student should be able to:

1. Design, develop and implement a series of experiments to investigate a scientific question or hypothesis.
2. Able to critically analyze experimental data and present findings coherently.
3. Communicate and discuss experimental data through written and oral communication in the form of a scientific article and/or scientific conference presentation.
4. Develop critical thinking, troubleshooting and collaborative skills

## Important dates for SP3172 (Sem 1 AY19/20) for both student and mentors

- **Week -1 (2nd August 2019):** Confirmation of student grouping, the PI that they will be working with and the SPS mentors for their group.
- **Week 1 (13th August 2019, evening 7 pm to 8 pm):** Beginning of semester briefing for both SP3172 students and mentors.
- **Weekly or biweekly** Updates/meeting with respective SPS mentors (documentation through the writing of learning reflections).
- **Week 6 (21st September 2019, 9.15am to 12.15pm):** Mid-semester poster presentation (practise). Debrief by their respective mentors
- **Week 12 (4th November 2019, 12 noon):** Submission of the final SPS3172 report.

- **Week 12-13 (6th November to 15th November 2019):** Oral examination (Viva) for SP3172
- **Week 13 (16th November 2019, 8.45am to 4.30pm):** SP3172 congress.

NOTE: Any form of non-adherence to deadlines (.eg. late submissions) result in penalization of grades.

## Formation of SP3172 Student Group

1. Students enrolled in SP3172 are required to form groups of strictly **2 or 3 students per project**. The confirmation of the student grouping, SPS mentors and staff supervisor is due **2nd August 2019, 2359hr**
2. As part of the module, students are asked to make contact with potential research labs to check if they will be interested in taking on the supervisor of the research project. SP3172 students may consult senior/graduate or even staff mentors for suggestions or recommendation if they are unsure.
3. 2-3 SPS mentors will guide each group ( comprising of 2 senior mentors and 1 junior mentor, or 1 graduate, one senior and junior mentors).

## Role of SP3172 SPS mentors

1. Mentors supervision, advice and suggestions to students
2. Mentors supervise weekly meetings and comment on the student learning reflections.
3. It is compulsory for all mentors to be present for the entire sessions on week 6 (poster practise session) and week 13 (SP3172 Congress).
4. To set a good example to mentees, all mentors should be punctual for all official SP3172 meetings!
5. Either the senior or graduate mentors in each SP3172 group should be prepared to grade at least two reports. This would need to communicate to the head mentors at the start of the semester.
6. Ask questions during SP3172 Congress to other groups and stimulate discussion.

## Plagiarism policy for SP3172.

Plagiarism is presenting someone else's work or ideas as your own, with or without their consent, by incorporating it into your work without full acknowledgement. All published and unpublished material, whether in manuscript, printed or electronic form, is covered under this definition. Plagiarism may be intentional or reckless, or unintentional. **If any student is found to be plagiarising**, a zero score will be awarded for the module and his/her offence will be reported to the SPS programme director for further disciplinary actions. SPS also reserve the rights to report your offence to the University and further disciplinary action may be taken.

For more information about plagiarism, please use and check the following points

- What is **plagiarism** and how to avoid it?

- Short note on [plagiarism](http://www.cdctl.nus.edu.sg/success/sl7.htm): taken from (<http://www.cdctl.nus.edu.sg/success/sl7.htm>)
- How to check for **plagiarism** before submitting your assignment?
- Click on (<http://cit.nus.edu.sg/plagiarism-prevention/>)

## Research Integrity Policy for SP3172

Taken from [NUS website](#) and [NTU website](#) :

Research conducted with integrity ensures that all research data generated by the researcher is beyond reproach. Research Integrity can be broadly defined as (1) practicing the use of honest and supported methods when performing and reporting research, (2) ensuring accuracy in reporting, (3) maintaining proper records of data generated and (4) adhering to statutory requirements.

Any dishonesty of any kind in academic research, be it plagiarism, data fabrication, falsification and misrepresentation or a failure to properly attribute credit, erodes trust in the student researcher and his/her work. This is a serious offence. **If any SPS student is found to have falsified data or have committed action related to academic fraud**, a zero score will be awarded for the module and his/her offence will be reported to the SPS programme director for further disciplinary actions by the University.

## Deliverables for student taking SP3172

1. Graded updates/learning reflections every three weeks (one per group), a total of 4 per semester. (10%)
2. Mid-semester poster practises presentation. (not graded)
3. Graded Written report in the format of a scientific article (30%). ( The link to past SP3172 report)
4. Graded Oral Viva (20%).
5. Graded Poster presentation (10%)
6. Group Oral presentation (20%) at the SP3172 Congress.
7. Continuous Assessment by host Lab supervisor (10%)

## Assessments for SP3172

The student should demonstrate to their examiners that they have fulfilled the *two learning outcomes*.

1. Demonstrate the ability to critically and with scientific accuracy, identify and formulate hypotheses, to plan and, through the use of adequate methods and carry out research work.
2. Analyze science research and topics, and communicate effectively as a scientist with colleagues and lay audiences through written, oral communication.

## Written report (30%, group mark)

The SP3172 report should outline in detail all the choices made during the research process and why, as well as the outcomes of each phase of the research process. It should not be merely factual or explanatory; it should also be interpretive and persuasive in nature. It should be the goal of the writer to use acceptable academic reasoning and argumentation to persuade the audience that your choice of experiments, results and conclusions are relevant to, and appropriate within, the context of the main theme you have chosen. Furthermore, the research process must be described in sufficient detail to allow other researchers to replicate your study, test the findings, or assess whether the conclusion derived is scientifically acceptable. The written report should be accessible to a broad audience of a scientist who may not be from the same field of research.

## Submission instructions

The finalized written report will have to be submitted to SPS Headmentors in SPS room no later than *12 noon, 4th November 2019 (Monday, Week 12)*. Early submissions are welcomed. The written report will be assessed on a group basis. Any submission beyond the deadline will be subjected to a penalty as illustrated below.

First 30 mins	1% of the report component <b>per minute</b>
Subsequent 1 hr	5% of the report component <b>per hour</b>
After 4 pm	0 marks for report

Students are required to submit both hardcopies and soft copy of their written report.

1. **Hard copies:** You must prepare hard copies of your report for submission. The number of hard copies needed from each group varies, depending on whether your assessors request for hard copies. You will be informed at a later date on the number of hard copies to submit.
2. **Soft copy:** Each group must also submit soft copies of your report via IVLE both in PDF format and in an editable format (such as Word or LaTeX, including any figures, BibTeX files, etc. required to compile the report). The file should be titled as "groupnumber*projecttitle*", e.g. "3Fluorescence Spectroscopy of FBP3a". The deadline of your soft copies of your reports follows the deadline mentioned.
3. Each report will be graded by four assessors who will also grade your oral Viva. The assessors' panel for your written report includes the principal investigator of your host lab, an SPS staff, an external SPS mentor (graduate/senior) and your group internal grading mentor (graduate/senior).

## Structure of the written report

The format of the written report should follow a typical scientific journal article as list below.

**Title:** A specific statement that conveys the topic and conclusion of the paper.

**Abstract:** A complete summary of the article designed for experts and non-experts.

**Introduction:** The beginning of a paper that transitions from a general background to a specific research question or goal.

**Materials and Methods:** A brief but detailed description of the tools and methods you used to perform experiments and analyze results.

**Results:** A presentation of all your experiments and data, represented both as text and in tables, charts, diagrams, and photographs.

**Discussion:** An opportunity to discuss your interpretation of your results and explore your findings within the context of the larger scientific record.

**References:** Your citations. There is no specific style required, **students can use either APA or Harvard style of referencing**. Once you have determined the method to follow, use it consistently in your report.

**Supplemental Material/appendix:** Additional figures, videos, and elaboration on methods and computational analysis.

You may put extra material as an appendix, but do note that essential data for understanding your report should be in the main section, not the annex. Examiners are not obliged to read your appendix for grading.

A more [detailed written report guide](#) for SP3172 is provided and grading is provided according to the report guide.

## Format for the written report

- **Length:** The primary content of your report must not exceed 30 (thirty) pages, not including the cover page, abstract page, contents page, acknowledgement, appendix or bibliography.
- **Font:** The required font type is either Computer Modern (for LaTeX) or Times New Roman/ CMU Serif (for Microsoft / Open Office documents). Please use font size 12 and double spacing.
- **Margin:** Please use 2.5 cm margin for all boundaries – top, bottom, left and right.
- **Figures and Tables:** Captions for figures and schematics should be below the object; while table captions should be above the table. All figures and tables should be labelled and numbered properly. [Instructions to constructing scientific figures and writing figure legends are here](#). Important: Any figures not generated by you must be included with the owner's permission in your report. Pictures from the webpage must be cited accordingly.
- **Cover Page:** The title in the cover page should be boldface and font size 14, while author names should be font size 12. Remember that proper affiliation and the title of your staff mentors should be addressed accordingly.
- **A Table of Content** for your report is required.

## Oral Viva (20%, individual)

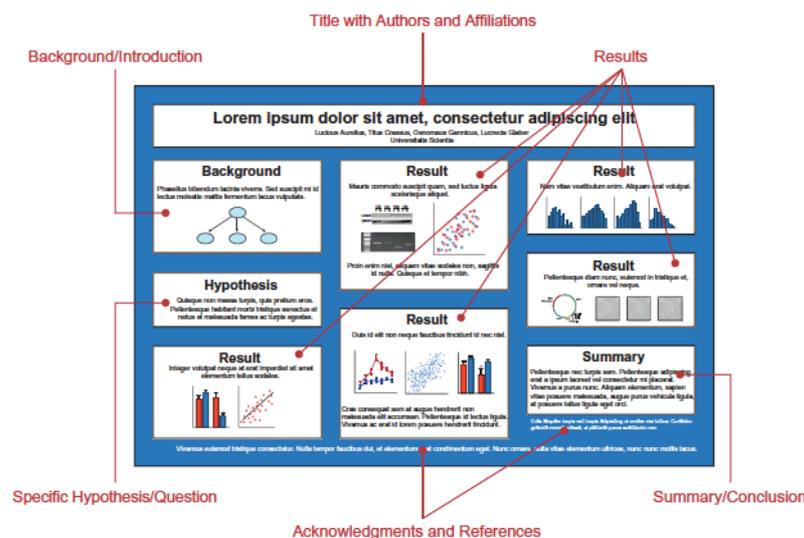
The oral viva session will be arranged to be conducted during the period between written report submission (4th November 2019) and the final presentation (15th Nov 2019). Students are to take the initiative to arrange for a suitable time-slot with all your assessors (staff and student mentors). It should be conducted after your assessors have had the chance to read your reports.

During the viva, you will be required to answer questions regarding various aspects of your project. You will be graded on the clarity of explanations and your understanding on your project. Each student will be assessed individually for the Viva.

1. **Assessors:** Each group will be assigned four assessors who have read your written report for the viva. These assessors panel for your viva includes the principal investigator of your host lab, an SPS staff, an external SPS mentor and your group internal grading mentor.
2. **Materials Allowed into Viva:** Students are allowed to bring in your own written report, research logbook and any raw / processed data / samples related to your research into the viva venue. You can have annotations on your written report if you desire. One group member is allowed to bring a laptop or tablet to reference soft-copy versions of papers and/or reports.
3. **Duration:** The duration of the viva session varies for groups, typically lasting one to three hours.

## Poster presentation (10%, group)

Each group would have to make a scientific poster for presentation during SP3172 congress. The purpose of a scientific poster is to visually present a summary of your research that complements your interactions with other SPS students or examiner during a poster session. Like slides in a slide presentation, a poster is a visual aid that supports your oral communication of information. A good poster should be intelligible on its own. The sections of a scientific poster (see below) are similar to the main sections of your written report, except that ideally they will only contain a handful of sentences of text.



A guide to poster presentation can also be access from [here](#). All SP3172 student should adhere to this set of guide lines.

## Poster presentation detail

The printed poster (A1 size, Portrait Orientation) will have to be put up in SPS room **15 minutes before the start of SP3172 congress on 16th Nov 2019**. The poster should be left until the end of the congress. Students should be around at their posters to present to anybody who is interested. Your poster will be graded by your host laboratory supervisor, the congress grader and Only a group grade will be awarded for the poster presentation. *A soft copy of your poster is required to be uploaded into LumiNUS folder by 2359hr, 15th Nov 2019.*

## Oral presentation (20%, group)

The final group presentation will be delivered on the SP3172 Congress, held on 16th Nov 2019, 9:00 am to 4:30 pm, in SPS room. Each group will be allocated a **25-minute time slot, comprising of 15 minutes of presentation, 7 minutes of Q&A and 3 minutes of buffer time** to set up the slides and to pack up after the entire presentation. Grading will be done individually.

- Uploading of Presentation: All **presentation materials are to be uploaded into LumiNUS folder by 2359hr, 15th Nov 2019**. Any submission beyond the deadline will be subjected to a grade penalty as illustrated below. This is to be fair to students who are presenting earlier and also to smoothen the transition from one group to another.
- **File Format:** Students may use PowerPoint or any reasonable form of presentation software. If students require the use of specialised visualisation software to display their research data, please check if the appropriate software has been installed on the seminar room computer. If not, please contact the SPS system administrator for assistance at least one week before the congress.
- **All students should arrived punctually and stay throughout the whole of SP3172 congress. Marks will be deducted from your overall SP3172 score.**

## Continual assessment (10%, individual)

The Continual Assessment is a form of evaluation of the student's contribution to the project work in the host PI lab and this is graded by the host laboratory PI. The CA grading includes general work attitudes (attendance, initiative and self-motivation), problem solving ability and presentation/communication of ideas, data analysis during the duration of the project. Students are recommended to be consistently and actively involved in their project, and maintain favourable group dynamics with other members of the group.

## Learning reflections: (10%, group)

Each group should reflect at regular interval on their learning, progress and any difficulties faced during the duration of the semester. Learning reflections will be assess and graded by your internal mentor only. There is no page limit or word limit. This can be done on a google word document as assigned by the module coordinator

Some things that you can discuss in your learning reflection.....

1. Your perceptions of the research work and the content.
2. Any problem that you encounter in your research work and how you decide to resolve it?
3. Any questions you might have.

4. Experiences, ideas and observations you have had, and how they relate to the course or topic.
5. What you found confusing, inspiring, difficult, interesting and why.
6. Possibilities, speculations, hypotheses or solutions.
7. Alternative interpretations or different perspectives on what you have read or done in your course.
8. How new ideas challenge what you already know.
9. What you need to explore next in terms of thoughts and actions.

## Reimbursement for Poster Printing for SP3172

Every group is allowed to use part of their allocated \$400 budget for SP3172 to print their final poster only. With that, original receipt has to be kept and submitted, together with the claim form which will be given to every group upon the submission of your written report.

Original receipt has to be pasted on an A4 white blank paper without any tape on the printing and written marks on the receipt itself. Receipt has to be intact and all information printed clearly. Then fill in the [RFP form](#) (see below), detailing your name, student ID and bank account number.

You are advised to take a photo or scan the receipts before the receipt fades for record purposes. In the event that the receipt has faded, claims cannot be made from that receipt. **Claim form has to be submitted latest by 16th Nov 2019 to either Dr Robert or Headmentors.**