

Course Coordinator	Director - CN Yang Scholars Programme
Course Code	CY2001
Course Title	Research Attachment 1
Pre-requisites	NA
No of AUs	4
Contact Hours	Laboratory: 12 contact hours per week

Course Aims

After clearing CY1500 Introduction to Research and CY1400 CNYSP Undergraduate Research Experience, this course allows you to further explore similar/different fields of research and carry out independent hands-on state-of-the-art research under the supervision of NTU faculty in any field of your choice. It further strengthens your knowledge and foundation in research, thereby preparing you well for your Overseas Final Year Project.

Intended Learning Outcomes (ILO)

By the end of the course, you should be able to:

1. Apply problem-solving and critical thinking skills in the research context.
2. Critically review and appraise scientific literature such as journal papers.
3. Systematically collect and process accurate and consistent data.
4. Logically analyze, evaluate and interpret results.
5. Summarize findings and justify conclusions.
6. Write quality reports for readers to understand the significance of problems addressed.
7. Present and defend your work to reviewers.

Course Content

1. You will experience independent research work in a selected field of study under the supervision of NTU faculty.
2. General content
 - a. Literature Review
 - b. Collecting and analyzing data
 - c. Technical writing
 - d. Presentation skills
3. The specific content is dependent on the selected field of study.

Assessment (includes both continuous and summative assessment)

Component	Course LO Tested	Related Programme LO or Graduate Attributes	Weighting	Team/ Individual	Assessment rubrics
1. Report	1,2,3,4,5,6	Creativity; competence; communication; civic-mindedness; character	50%	Individual	Appendix 2
2. Presentation	1,2,3,4,5,7	Creativity; competence; communication; civic-mindedness; character	25%	Individual	Appendix 3
3. Continuous assessment	1,2,3,4,5,6,7	Creativity; competence; communication; civic-mindedness; character	25%	Individual	Appendix 1
Total			100%		

Formative feedback

You will be provided with individual formative feedback on personalized tasks during your laboratory sessions. Written or verbal feedback on your report and presentation will also be provided at the end of the course.

Learning and Teaching approach

Approach	How does this approach support students in achieving the learning outcomes?
Active Learning, Research and Inquiry-based Learning	In this course, you are seen as producer instead of simply consumer of knowledge. As you are highly engaged and responsible for your learning, you will learn to be independent, self-disciplined and self-motivated. Through this independent supervised project, you will acquire research and laboratory skills, enhance your critical and logical thinking skills, and develop fine oral and written communication skills.

Reading and References

Reading materials are dependent on the selected field of study and specific to each project. Supervising faculty will recommend reading materials, and you are expected to conduct a comprehensive literature review as well.

Course Policies and Student Responsibilities

(1) General

You are expected to complete all assigned readings and activities, attend all lab sessions/research meetings punctually and take all scheduled assignments and tests by due dates. You are expected to take responsibility to follow up with course notes, assignments and course related announcements for research sessions you have missed. You are expected to participate in all research discussions and activities.

(2) Absenteeism

Absence from lab sessions/research meetings without a valid reason will affect your overall course grade. Valid reasons include falling sick supported by a medical certificate.

Academic Integrity

Good academic work depends on honesty and ethical behaviour. The quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honour Code, a set of values shared by the whole university community. Truth, Trust and Justice are at the core of NTU's shared values.

As a student, it is important that you recognize your responsibilities in understanding and applying the principles of academic integrity in all the work you do at NTU. Not knowing what is involved in maintaining academic integrity does not excuse academic dishonesty. You need to actively equip yourself with strategies to avoid all forms of academic dishonesty, including plagiarism, academic fraud, collusion and cheating. If you are uncertain of the definitions of any of these terms, you should go to the [academic integrity website](#) for more information. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

Course Instructors

Instructor	Office Location	Phone	Email
Professor Tan Choon Hong	SPMS-CBC-04-18	63168761	CHOONHONG@NTU.EDU.SG

Planned Weekly Schedule

To be discussed and agreed on between students and their supervising faculty. This course does not have final examinations. Below is a timeline which indicates the deadline by which the assessment should be completed.

Week	Topic	Course LO	Readings/ Activities
1-13	Meeting supervisor and research group Understanding research topic Acquiring laboratory skills Collecting and analysing data Summarizing findings Writing report and preparing presentation	1,2,3,4,5,6,7	Laboratory sessions
14	<u>Presentation</u> You will give a 10-minute presentation on your research findings. There will also be question and answer session for you to defend your work. <u>Report</u> You will submit a written academic report outlining your research work. <u>Continuous assessment</u> You will be assessed continuously by supervisor on all assigned tasks. It includes the understanding and correct demonstration of the knowledge taught, as well as overall competence and behavior during the course.	1,2,3,4,5,6,7	<u>Assessment</u>

Appendix 1: Assessment Criteria for Continuous Assessment (25%)

	Below expectation (0 to 3)	Meeting expectation (4 to 6)	Exceed expectation (7 to 8)
General (8)	Not punctual Spent unsatisfactory time working on the project Developed inefficient work habits Would not be a valuable addition to a research team	Punctuality (e.g. arrives on time for meetings) Spent satisfactory time working on the project Has developed <u>some</u> attributes necessary for scientific endeavor Would be a <u>good</u> addition to a research team Worked hard and consistently Developed efficient work habits Demonstrated a clear appreciation of how their work fits into the field of research	Punctuality (e.g. arrives on time for meetings) Spent satisfactory time working on the project Has developed <u>all</u> attributes necessary for scientific endeavor Would be a <u>valuable</u> addition to a research team Worked hard and consistently Developed efficient work habits Demonstrated a clear appreciation of how their work fits into the field of research Demonstrated the <u>persistence and ability</u> to carry on under difficulty
Participation (8)	Does not actively participate in group meetings Unable to prepare and orally present data to peers Does not show understanding of other projects within the group Unable to interpret results and plan future work Some willingness to discuss work progress regularly with supervisor	Participates in group meetings (asks questions, willingness to present data) Able to prepare and orally present data to peers Contributes <u>some</u> thoughts and concepts to own project progress Has displayed an increase in active contribution to own project over time Willingness to discuss work progress regularly with supervisor	<u>Actively</u> participates in group meetings (asks questions, willingness to present data) Able to prepare and orally present data to peers Contributes <u>many</u> thoughts and concepts to own project progress Has displayed a <u>significant</u> increase in active contribution to own project over time Willingness to discuss work progress regularly with supervisor Shows <u>understanding</u> of other projects within the group Able to <u>interpret results and plan future work</u>
	Below expectation (0 to 3)	Meeting expectation (4 to 7)	Exceed expectation (8 to 9)
Technical skills (9)	Works in an un safe and careless manner Does not keep own designated workspace clean and organised Does not keep common areas & equipment clean Unable to follow instructions for conducting work Learnt some of the relevant skills	Works in a safe and careful manner Keeps own designated workspace clean and organised Keeps common areas & equipment clean Able to follow instructions for conducting work Able to work <u>quite</u> independently Interacts in professional manner with fellow team members Possesses <u>some</u> confidence to approach team members to ask for assistance Technical skills have improved during the length of the project Learnt many of the relevant skills Demonstrated <u>some</u> technical mastery of all relevant skills	Works in a safe and careful manner Keeps own designated workspace clean and organised Keeps common areas & equipment clean Able to follow instructions for conducting work Able to work independently Interacts in professional manner with fellow team members Possesses confidence to approach team members to ask for assistance Technical skills have improved <u>significantly</u> during the length of the project Learnt many of the relevant skills Demonstrated <u>considerable</u> technical mastery of all relevant skills Picked up new concepts and skills <u>rapidly</u>

Appendix 2: Assessment Criteria for Report (2 examiners, each contributing 25%)

	Below expectation (0 to 1)	Meeting expectation (2 to 3)	Exceed expectation (4 to 5)
Introduction (5)	Poor introduction to the topic Demonstrated a poor knowledge of the background literature Inadequate citations in text Aims not expressed clearly	<u>Good</u> introduction to the topic Demonstrated a <u>good</u> knowledge of the background literature Adequate citations in text Clearly expressed aims	<u>Excellent interesting</u> introduction to the topic Demonstrated a <u>thorough</u> knowledge of the background literature Adequate citations in text Clearly expressed aims
Materials and Methods (5)	Some relevant methods included Methods are not clear or repeatable Does not show clearly how independent variables are controlled and how dependent variables can be measured. Does not show how data can be collected and analysed properly. Does not demonstrate understanding of purpose.	All relevant methods included Methods are clear and repeatable <u>to a large extent</u> . Shows clearly how independent variables are controlled and how dependent variables can be measured. Shows how data can be collected and analysed properly.	All relevant methods included Methods are clear and repeatable Shows clearly how independent variables are controlled and how dependent variables can be measured. Shows how data can be collected and analysed properly. Demonstrates <u>understanding of purpose</u> , i.e. not a direct copy but a concise description
Results (5)	Poor use of figures, legends and tables Tables and figures (including legends) are not clear and self-explanatory Maintains some coherence by creating a logical pattern of development Does not demonstrate the ability to interpret and analyze based on actual results	<u>Good</u> use of figures, legends and tables Tables and figures (including legends) are clear and self-explanatory Maintains coherence by creating a logical pattern of development <u>Somewhat</u> demonstrates the ability to interpret and analyze based on actual results	<u>Excellent</u> use of figures, legends and tables Tables and figures (including legends) are clear and self-explanatory Maintains coherence by creating a logical pattern of development Demonstrates the ability to interpret and analyze based on actual results
Discussion and conclusions (5)	Some valid conclusions are drawn from results, significance of results is unclear Discussion points are not clearly defined and discussed in logical sequence Conclusion summarizes the project Has outlined future directions that are not quite feasible	Valid conclusions are drawn from results, significance of results is clear Discussion points are clearly defined and discussed in logical sequence Conclusion summarizes the project Has outlined future directions that are feasible	Valid conclusions are drawn from results, significance of results is clear Discussion points are clearly defined and discussed in logical sequence Has <u>critically analysed</u> the relevant literature rather than merely summarised it Has outlined future directions that are feasible Conclusion not only <u>summarizes</u> the project but also <u>shares a final insight</u> <u>Put forward their own useful and valid ideas</u> relating to the project
Language, formatting and Presentation (5)	Some incorrect spelling (general and scientific), grammar and use of English Many typographical errors Incorrectly formatted (refer to thesis guidelines i.e. margins, spacing, font, etc.) Not all required sections are included and in order	Correct spelling (general and scientific), grammar and use of English <u>Several</u> typographical errors Correctly formatted (refer to thesis guidelines i.e. margins, spacing, font, etc.) All required sections are included and are in order	Correct spelling (general and scientific), grammar and use of English <u>Few, if any</u> , typographical errors Correctly formatted (refer to thesis guidelines i.e. margins, spacing, font, etc.) All required sections are included and are in order

Appendix 3: Assessment Criteria for Presentation (25%)

	Below expectation (0 to 3)	Meeting expectation (4 to 7)	Exceed expectation (8 to 9)
Content (9)	Background information was insufficient/ excessive with little or no relevance; motivation was unclear. Objectives were too broad/narrow and does not seem achievable. There was no link between key points. Little to no evidence of claims provided. Insufficient supporting literature. The hypothesis was poorly crafted. The testing parameters were ill-defined and/or insufficient/excessive. Methodology was poorly elaborated and confusing. Little to no indicators were used to determine success. Results were poorly discussed, without justifiable conclusions. Significance of findings and future work not presented.	Background information was slightly insufficient/excessive with <u>some</u> relevance; motivation was unambiguous. Objectives were not too broad/narrow and seem achievable. Key points had <u>some link</u>. Some evidence of claims provided, with some supporting literature. The hypothesis was <u>decently crafted</u>. The testing parameters were <u>sufficiently defined</u> and not insufficient/excessive. Methodology was decently elaborated with <u>some confusion</u>. Appropriate indicators were used to determine success. Results were <u>well-discussed</u>, with justifiable conclusions. Significance of findings and future work were presented <u>sufficiently</u>.	Background information was sufficient and not excessive with <u>great</u> relevance; motivation was clear. Objectives were well-defined and were definitely achievable. Key points flowed in a <u>coherent</u> manner. Evidence of claims provided, with supporting literature. The hypothesis was <u>well-crafted</u>. The testing parameters were <u>well-defined</u> without ambiguity. Methodology was clearly elaborated with <u>almost no confusion</u>. Clear indicators were used to determine success. Results were <u>critically discussed</u>, with justifiable conclusions. Significance of findings and future work were presented <u>well</u>.
	Below expectation (0 to 3)	Meeting expectation (4 to 6)	Exceed expectation (7 to 8)
Delivery (8)	Presentation was unattractive with too much information or no information. Poor choice of colours. Speaker seemed expressionless and body was too rigid. Almost no eye contact with the audience at all. Total lack of confidence. Almost inaudible. Pace was too fast/slow. Wrong attire	<u>Certain aspects</u> of presentation were attention-grabbing. <u>Some balance</u> of pictures and words. <u>Decent</u> choice of colours. Speaker exhibited some expression, body was slightly rigid. <u>Some eye contact</u> was maintained with the audience. Voice was at normal conversational level. Pace was <u>decent</u>. No striking issues with articulation. Decent attire with some violations	The <u>entire</u> presentation was attention-grabbing and very informative. There was a <u>great balance</u> of picture and words without information overload. <u>Excellent</u> choice of colours. Speaker seemed enthusiastic with natural body posture. <u>Constant eye contact</u> with the audience was maintained at all times. Voice was well projected. Pace was <u>just right</u>. Excellent articulation. Appropriate attire
Q&A (8)	Could not answer most of the questions.	Could answer some of the question, with some <u>good</u> answers.	Could answer most of the questions with some <u>excellent and knowledgeable</u> answers.