NANYANG TECHNOLOGICAL UNIVERSITY

Teaching, Learning and Pedagogy Division

Reg. No. 200604393R

PROPOSED COURSE OUTLINE TEMPLATE FOR STUDENTS AT NTU

Academic Year	2021/22	**Semester**	1
Course Coordinator	KOH TECK SENG		
Course Code	CY1500		
Course Title	INTRODUCTION TO RESEARCH		
Pre-requisites	NIL		
No of AUs	2		
Contact Hours	2 hr x 13 weeks = 26 hr		
Proposal Date	Jan 2021		

Course Aims

This first year core course in the CN Yang programme aims to develop students' understanding of basic scientific research and the engineering process through (1) the big picture of research from the perspectives of philosophy of science as well as those from practitioners of science, and (2) detailed readings of scientific and engineering literature.

Intended Learning Outcomes (ILO)

By the end of this course, students should be able to:

a. Explain how research works
b. Understand ethics of research
c. Read research literature critically
d. Identify and explain links between related research literature
e. Explain and communicate research findings effectively

Course Content

1. Philosophy of science
2. Ethics
3. Critical readings of research literature
4. Presentation of research findings

Assessment

Component	Course LO Tested	Related Programme LO or Graduate Attributes	Weighting	Team/Individual	Assessment rubrics
1. Participation	All	Communication,	10%	Individual	Rubrics (Appendix 3)

2. Essays (two) - general - technical	All	Communication, Competence, Creativity,	60%	Individual	Rubrics (Appendix 1)
4. Presentation	All	Communication, Competence, Creativity	40%	Group	Rubrics (Appendix 2)
Total			100%		

* EAB SLO stands for the Engineering Accreditation Board Student Learning Outcomes. For the full list of student learning outcomes, please take a look at page 14 of this document.

Note:

i. *Programme LOs are the learning outcomes for the undergraduate degree programme. The course learning outcomes should be mapped to the programme learning outcomes.*

ii. *If the programme which your course belong to already has a set of programme learning outcomes, such as the EAB student learning outcomes, please indicate them in column 3. Otherwise, please indicate the graduate attributes the course learning outcome is related to. Graduate attributes refer to the 5 Cs of NTU. You can find them here.*

iii. *The guideline is to have not more than 60% weight for the final exam. Please highlight and provide justifications for deviation.*

iv. *Attendance in class shall not be a component of CA.*

v. *Class participation as a CA component should be accorded a reasonable weight and be justified.*

For more resources on programme LO, visit TLPD's programme design page
For more resources on assessment tasks, visit TLPD's course design page, section 4.3

Formative feedback

Formative feedback is given through discussion in class as well, as well as after each homework. For homework of greater difficulty, formative tasks in class will guide students' understanding.

Learning and Teaching approach

Description of the learning approach for example lecture, tutorial, Team-Based Learning, project, etc.
For some ideas on learning approach, please visit the TLPD course design page (section 4.4)

Approach	**How does this approach support students in achieving the learning outcomes?**
Blended learning	Because the course is 2 a.u., the contact hours are limited. Content for information and background

	reading will be put online as video lectures and readings. Face-to-face time in class will provide more in-depth discussion for deeper understanding.

Reading and References

- Oreskes, Naomi. Why Trust Science? (The University Center for Human Values Series). Princeton University Press.
- Novella, Steven. The Skeptics' Guide to the Universe . Grand Central Publishing.
- Carey, Stephen S.. A Beginner's Guide to Scientific Method. Cengage Textbook
- Zimring, James C.. What Science Is and How It Really Works. Cambridge University Press.
- Firestein, Stuart. Ignorance. Oxford University Press.

Course Policies and Student Responsibilities

Suggested fields for this portions include ***general policies with regards to students' assignment, punctuality absenteeism****, etc.*

Absence Due to Medical or Other Reasons

If you are sick and unable to attend your class, you have to:

1. Send an email to the instructor regarding the absence and request for a replacement class.
2. Submit the original Medical Certificate***** to administrator.
3. Attend the assigned replacement class (*subject to availability*).

***** The medical certificate mentioned above should be issued in Singapore by a medical practitioner registered with the Singapore Medical Association.

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.

Note: This is a standard recommended text for academic integrity in the course. If you wish to amend, please make sure that it is in accordance with the official policy by visiting the link provided above.

Course Instructors

Instructor	Office Location	Phone	Email
KOH Teck Seng	SPMS-PAP-03-08	6514 1066	kohteckseng@ntu.edu.sg

Planned Weekly Schedule

Week	Topic	Course LO	Readings/ Activities
1	Introductions	-	
2	What is scientific research?	1	Selected readings will be given; Blended learning.
3	Why trust science?	1	
4	Ethics	2	
5	Reading a scientific paper	3	
6	Research seminar 1	3,4	
7	Reading a scientific paper	3	F2F Discussions on curated literature
8	Literature review discussion	3	
9	Literature review discussion	3	
10	Presentation preparations	4	F2F Discussion and practice on presentation skills
11	Presentation preparations	4	
12	Research seminar 2	3,4	
13	Group presentation	4	

Appendix 1: PAPER GRADING RUBRIC

The following rubric demonstrates how various aspects of your writing contribute to your grade. This should help make explicit what kind of work you must complete to perform well. Think of each category as a spectrum, with every move to the left an improvement. I'll place an 'X' indicating where you fall on this range.

A few points to keep in mind:

- Grading is in many ways *subjective*, but it is not *arbitrary*.
- "Thought/Thesis/Argument" is obviously the most important, and this is reflected in its being weighted at 50%.
- The four criteria are not unrelated – e.g., if your paper is poorly organized it's unlikely to demonstrate compelling argumentation in support of an insightful thesis.

	Strong Work (A)	Needs Development (B)	Unsatisfactory (C)
Thought/ Thesis/ Argument 50%	Explicit insightful thesis; careful original argumentation; compelling reasoning with solid evidence.	Thesis somewhat unclear or uninteresting; excessive summary; some logical missteps.	Obscure or no thesis; little to no argument; lots of unsupported opinion; no original insight.
Clarity & Organization 20%	Logical ordering of ideas; easy to follow train of thought; transparent reasoning; each paragraph expresses a single idea clearly.	Ideas presented in somewhat confusing order; logic of paper as a whole not obvious; somewhat bloated paragraphs.	Little or no logical ordering of ideas; stream of consciousness; no purpose evident in paragraphs; not readily understandable.
Sources & Citation 15%	Refers to relevant sources appropriately; thorough textual support; cites in every instance; quotations are used economically and fully interpreted.	Usually refers to sources when appropriate, adequate textual support; cites in every instance; some unnecessary direct quotations, some lacking interpretation.	Inadequate reference to sources, sources not cited; little or no textual support; gratuitous direct quotation; sources not well incorporated into paper.
Mechanics/ Diction/ Language 15%	Almost flawless grammar, spelling and word choice; great fluency; natural transitions; meaning is transparent; precise language.	Grammar, spelling, word choice need attention; sentences lacking clarity; somewhat wordy; some syntax errors. These problems begin to impede understanding.	Many grammar, spelling, word choice problems; many sentences unclear or unintelligible; wordy; numerous syntax errors. Problems prevent understanding.

Appendix 2: Presentation Grading Sheet

Content

Introduction of topic - Clear introduction of oneself and team members - Reasons for choosing the topic and how the topic is relevant to your audience (the audience may be not in the same study field) - Clear ***background*** - Clear outline of topic with a moving agenda - Smooth transitions between key points	**/15**
Body - Concise summary of the papers and identification of their motivations - Clearly show the ***link*** between the papers - Demonstrate their thought process of how they chose papers A(s) and C(s) - Able to analyse the hypothesis, the results and claims of paper B - Smooth use of transitions between key points	**/25**
Conclusion - Clear reiteration of how the papers are connected and their significance to the scientific community - Shows clearly how the chosen papers and topic relate to the ***bigger picture/roadmap***	**/20**

Delivery (Group)

Use of visuals - Supportive not distractive visuals - Attractive; well-constructed	**/5**
Q&A - Clear and/or clever answers to questions - Clever ways to handle a silent audience (if appropriate)	**/10**

Delivery (Individual)

	Presenter #1	*Presenter #2*	*Presenter #3*
Body language and attitude - Appropriate facial expressions - Natural body movements including hand gestures - Consistent eye contact, not looking at the screen/notes - Confident, enthusiastic and sincere	**/5**	**/5**	**/5**
Voice - Clear voice projection - Appropriate pace; effective variation of tone - Good articulation; fluent	**/5**	**/5**	**/5**
Audience rapport - Able to hold attention, influence, captivate audience	**/5**	**/5**	**/5**
Time Limit - Completed within time limit (minus 5 marks for every 20s delay)	**/10**	**/10**	**/10**

Total Marks		
Presenter #1	*Presenter #2*	*Presenter #3*
/100	**/100**	**/100**

Appendix 3: Class Participation Grading Rubrics

Each student will submit one question for each reading assignment per week to an online discussion forum in class. The student will then be assigned at least one question from the forum and present a tentative answer to the class.

Criteria for Class Participation

(adapted from
https://www.ntu.edu.sg/tlpd/tlr/AssessingYourStudents/Pages/AssessmentCriteria-COHASS.aspx)

	Exemplary (8-10)	Satisfactory (5-7)	Unsatisfactory (2-4)	Inadequate (0-1)
Quality of Participation	Comments and questions are deep and reflect considerable engagement with the course material.	Comments and questions demonstrate adequate engagement with course material.	Comments and questions are superficial and do not reflect adequate engagement with course material.	Comments and questions reflect little or no engagement with course material.
Relevance of Contributions	Contributions are relevant and promote deeper analysis of the topic.	Contributions are relevant but do not promote deeper analysis.	Contributions are sometimes misguided or distracting.	Contributions are either off-topic or non-existent.