Annexe A: New/Revised Course Content in OBTL+ Format

Course Overview

The sections shown on this interface are based on the templates UG OBTL+ or PG OBTL+
If you are revising/duplicating an existing course and do not see the pre-filled contents you expect in the subsequent sections e.g. Course Aims, Intended Learning Outcomes etc. please refer to Data Transformation Status for more information.

Expected Implementation in Academic Year	AY2023-2024
Semester/Trimester/Others (specify approx. Start/End date)	Special Term
Course Author * Faculty proposing/revising the course	Ng Keng Meng
Course Author Email	kmng@ntu.edu.sg
Course Title	Introduction to Undergraduate Research Experience
Course Code	PS5000
Academic Units	3
Contact Hours	25
Research Experience Components	Research Defined Course (at least 50% of deliverables involve practical research activities: problem identification, hypothesis forming, data collection/analysis/interpretation, result communication)

Course Requisites (if applicable)

Pre-requisites	Approval by division
Co-requisites	
Pre-requisite to	
Mutually exclusive to	
Replacement course to	
Remarks (if any)	

Course Aims

This course is designed for first-year undergraduate students and aims to cultivate your passion for research from the outset of your academic journey. It offers you the chance to collaborate with a supervisor on a focused topic within either mathematics or physics, introducing you to the world of scientific research early on in your undergraduate studies. Through this course, you will enhance your scientific maturity and refine your analytical skills. Additionally, it serves as a platform for developing research competencies, potentially leading to further research work and prepares you for the final year project. These practical research skills will be invaluable as you progress through your academic career and into your future professional endeavors.

Course's Intended Learning Outcomes (ILOs)

Upon the successful completion of this course, you (student) would be able to:

ILO 1	Perform literature review in a selected research topic; summarize and link together different research findings.
ILO 2	Apply knowledge from the findings to solve problems in a research setting, and develop creative and novel approaches.
ILO 3	Identify and determine the requirements and demands of scientific research.
ILO 4	Develop methodologies and plans to achieve research objectives and outcomes.
ILO 5	Work independently to solve research problems.
ILO 6	Use the appropriate physical and digital tools to analyse and solve problems

Course Content

In this research module, you (as a student) will experience independent supervised research work in a selected field of study. You will be supervised by a faculty from either the Division of Mathematical Sciences or the Division of Physics and Applied Physics to achieve the intended learning outcomes listed above. The specific content is dependent on the selected field of study.

Reading and References (if applicable)

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

Planned Schedule

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
1	Weeks 1 - 9: Student will experience independent supervised research work in a selected field of study. Student will be supervised by the faculty from either the Division of Mathematical Sciences or the Division of Physics and Applied Physics to achieve the intended learning outcomes listed above. The specific content is dependent on the selection field of study.	1, 2, 3, 4, 5, 6		In-person	Assigned by the supervisor

Learning and Teaching Approach

Approach	How does this approach support you in achieving the learning outcomes?
Project work	This course is an opportunity for you to experience first-hand mathematics or physics research done in a professional setting. You are expected to be independent, disciplined and motivated. You will have to acquire the necessary background by conducting a literature review and undertaking reading of relevant materials. You will also be trained in developing problem-solving skills and creative methods to solve the problems given to you. The MAS or PAP Faculty Supervisor will be the key person working with and interacting with you on a regular basis. You are expected to take the initiative to approach your supervisor for discussions and resolve issues when you encounter difficulties.

Assessment Structure

Assessment Components (includes both continuous and summative assessment)

No.	Component	ILO	Related PLO or Accreditation	Weightage	Team/Individual	Rubrics	Level of Understanding
1	Continuous Assessment (CA): Others(Progress Report)	1,2,3,4,5,6	Not Applicable	50	Individual	Holistic	Extended Abstract
2	Continuous Assessment (CA): Presentation(Final Presentation)	1,2,3,4,5,6	Not Applicable	50	Individual	Analytic	Relational

Description of Assessment Components (if applicable)

This course is Pass/Fail graded.

Formative Feedback

The supervisor will provide continuous feedback to the student on their progress. The supervisor will ensure that the student picks up all of the background knowledge required. The supervisor will guide the student on the skills required for research.

NTU Graduate Attributes/Competency Mapping

This course intends to develop the following graduate attributes and competencies (maximum 5 most relevant)

Attributes/Competency	Level
Communication	Intermediate
Creative Thinking	Intermediate
Curiosity	Intermediate
Problem Solving	Intermediate
Sense Making	Intermediate

Course Policy

Policy (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. On the use of technological tools (such as Generative AI tools), different courses / assignments have different intended learning outcomes. Students should refer to the specific assignment instructions on their use and requirements and/or consult your instructors on how you can use these tools to help your learning. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

Policy (General)

You are expected to complete all assigned readings, activities, attend all research meetings punctually and complete all scheduled tasks by the due dates. You are expected to take responsibility to follow up with research activities . You are expected to participate in all project critiques, research group discussions and other research related activities.

Policy (Absenteeism)

As this is a research course, you are expected to participate in all research meetings and activities as required by your supervisor. Absence without a valid reason or without informing your supervisor will affect your grade.

Policy (Others, if applicable)

Diversity and inclusion policy

Integrating a diverse set of experiences is important for a more comprehensive understanding of science.

It is our goal to create an inclusive and collaborative learning environment that supports a diversity of perspectives and learning experiences, and that honours your identities; including ethnicity, gender, socioeconomic status, sexual orientation, religion or ability.

To help accomplish this:

If you are neuroatypical or neurodiverse, have dyslexia or ADHD (for example), or have a social anxiety disorder or social phobia;
If you feel like your performance in the class is being impacted by your experiences outside of class;
If something was said in class (by anyone, including the instructor) that made you feel uncomfortable;
Please speak to your teaching team, our school pastoral officer [ENTER NAME OF SCHOOL PASTORAL OFFICER HERE] or a peer or senior (either in-person or via email) about how we can help facilitate your learning experience.

As a participant in course discussions, you should also strive to honour the diversity of your classmates. You can do this by: using preferred pronouns and names; being respectful of others opinions and actively making sure all voices are being heard; and refraining from the use of derogatory or demeaning speech or actions.

All members of the class are expected to adhere to the NTU anti-harassment policy. if you witness something that goes against this or have any other concerns, please speak to your instructors or a faculty member.

Rubric for Progress Report (50%)

Criteria	High Standard Grade	Pass Standard Grade	Fail Standard Grade
Content	The progress report demonstrates a strong understanding of the research project, with clear articulation of objectives, methodology, and progress made during the reporting period. It provides insightful analysis supported by relevant data.	The progress report demonstrates a satisfactory understanding of the research project, including clear articulation of objectives, methodology, and progress made during the reporting period. It provides analysis supported by relevant data.	The progress report demonstrates an insufficient understanding of the research project, with unclear articulation of objectives, methodology, and progress made during the reporting period. It lacks analysis and relevant data.
Organization	The progress report is well-organized with clear headings and subheadings guiding the reader. Ideas are presented logically with seamless transitions between sections.	The progress report is adequately organized with clear headings and subheadings guiding the reader. Ideas are presented coherently with mostly smooth transitions between sections.	The progress report is poorly organized with unclear or missing headings and subheadings. Ideas are presented in a disjointed manner with little coherence or transitions between sections.
Clarity & Style	The progress report is written in clear, concise language with appropriate terminology. Sentences are well-constructed, and the writing style is engaging and easy to follow.	The progress report is written in clear, concise language with appropriate terminology. Most sentences are well-constructed, and the writing style is generally easy to follow.	The progress report is written in language that is unclear or overly verbose, with frequent misuse of terminology. Many sentences are awkwardly constructed, making the writing difficult to follow.
Depth of Analysis	The progress report demonstrates a high level of analysis with insightful interpretations of data and findings. Strong connections are made between the research project and relevant literature or theoretical frameworks.	The progress report demonstrates a sufficient level of analysis with interpretations of data and findings. Some connections are made between the research project and relevant literature or theoretical frameworks.	The progress report demonstrates an insufficient level of analysis with limited interpretations of data and findings. Few connections are made between the research project and relevant literature or theoretical frameworks.
Use of Resources	The progress report effectively utilizes a wide range of credible sources to support arguments and findings. Sources are properly cited and integrated into the text.	The progress report utilizes credible sources to support arguments and findings. Sources are properly cited and integrated into the text.	The progress report lacks sufficient use of credible sources to support arguments and findings. Sources are not properly cited or integrated into the text.

Rubric for Final Oral Presentation (50%)

Grading Criteria	Exceptional (46-50)	Effective (34-45)	Acceptable (21-33)	Developing (0-20)
Accuracy	The interpretation is highly accurate, concise, and precise.	The interpretation is mostly accurate. Some parts can be better explained or more succinct.	The interpretation is somewhat accurate. However, it contains some inaccuracies, missing points or ideas that are not related to the interpretation.	The interpretation is mostly inaccurate.
Visual and Oral delivery	Slides are informative, good clear voice and constant eye contact	Slides are adequate, oral delivery is satisfactory and frequent eye contact	Slides are bare and somewhat disorganized; voice is sometimes inaudible and little eye contact	Slides are disorganized, voice it too soft, and no eye contact
Presentation	Very clear and organized. It is easy to follow your train of thought	Mostly clear and organized. Some parts can have better transitions.	Somewhat clear. It requires some careful reading to understand what you are writing.	Mostly unclear and messy. It is difficult to understand what you are writing as there is no clear flow of ideas.
Question and Answer (for each individual student)	Very clear and precise answers to all problems. Explain the problems from various perspectives logically.	Correct answers to most of the problems. Explain the problems in an organized way.	Partially correct answers to most of the problems. Explain the some of the problems.	Unclear and messy answers. Difficult to understand.