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

Course Overview

Expected Implementation in Academic Year	AY2023-2024
Semester/Trimester/Others (specify approx. Start/End date)	Semester 2
Course Author * Faculty proposing/revising the course	Song Yongcun
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Course Title	Advanced Investigations in Calculus II
Course Code	MH5101
Academic Units	1
Contact Hours	24
Research Experience Components	Not Applicable

Course Requisites (if applicable)

Pre-requisites	MH1101 OR Approval by the Division of Mathematical Sciences
Co-requisites	MH1101
Pre-requisite to	
Mutually exclusive to	
Replacement course to	
Remarks (if any)	

Course Aims

This course is a supplement to MH1101 students who want to be challenged. You will develop problem solving skills for complex and challenging problems in Calculus related to integrals, sequences and series.

Course's Intended Learning Outcomes (ILOs)

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

ILO 1	Develop deeper understanding of mathematical concepts by solving complex problems.
ILO 2	Explain the processes used to arrive at solutions rather than remembering or applying a set of procedures.
ILO 3	Investigate complex problems by trying a variety of approaches and strategies.
ILO 4	Appreciate the relevance and usefulness of the concepts and tools in Calculus beyond standard text.
ILO 5	Present (in writing and speaking) mathematical ideas logically and coherently at the appropriate level for the intended audience.

Course Content

Fundamental Theorem of Calculus, Applications of Integrations

Techniques of integrations

Numerical Integrations

Sequences and Series, Convergence Tests

Power Series, Taylor Series, Maclaurin Series

Fourier Series

Fourier Transforms

Reading and References (if applicable)

James Stewart, Calculus (8th edition)
ISBN-13: 978-1285740621
ISBN-10: 1285740629

Planned Schedule

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
1	Differentiation and integration	1, 2, 3, 4, 5			In-class discussion
2	Differentiation and integration	1, 2, 3, 4, 5			In-class discussion
3	Differentiation and integration	1, 2, 3, 4, 5			In-class discussion
4	Differentiation and integration	1, 2, 3, 4, 5			In-class discussion, Test 1
5	Differentiation and integration	1, 2, 3, 4, 5			In-class discussion
6	Differentiation and integration	1, 2, 3, 4, 5			In-class discussion
7	Sequences and series	1, 2, 3, 4, 5			In-class discussion, Test 2
8	Sequences and series	1, 2, 3, 4, 5			In-class discussion
9	Sequences and series	1, 2, 3, 4, 5			In-class discussion
10	Sequences and series	1, 2, 3, 4, 5			In-class discussion, Test 3
11	Sequences and series	1, 2, 3, 4, 5			In-class discussion

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
12	Sequences and series	1, 2, 3, 4, 5			In-class discussion
13	Sequences and series	1, 2, 3, 4, 5			In-class discussion, Test 4

Learning and Teaching Approach

Approach	How does this approach support you in achieving the learning outcomes?
Tutorials	Students will be asked to work on problems before and during class and to present their work. The course instructor will facilitate the discussions, and comments on common mistakes, important ideas and tools involved, and connection with related concepts and level of difficulty.

Assessment Structure

Assessment Components (includes both continuous and summative assessment)

No.	Component	ILO	Related PLO or Accreditation	Weightage	Description of Assessment Component	Team/Individual	Rubrics	Level of Understanding
1	Continuous Assessment (CA): Test/Quiz(Test 1)	All	SPMS-MAS Graduate Attributes: Communication (I), Creative Thinking (A), Decision Making (A), Problem Solving (A), Sense Making (A)	25		Individual	Holistic	Relational
2	Continuous Assessment (CA): Test/Quiz(Test 2)	All	SPMS-MAS Graduate Attributes: Communication (I), Creative Thinking (A), Decision Making (A), Problem Solving (A), Sense Making (A)	25		Individual	Holistic	Relational
3	Continuous Assessment (CA): Test/Quiz(Test 3)	All	SPMS-MAS Graduate Attributes: Communication (I), Creative Thinking (A), Decision Making (A), Problem Solving (A), Sense Making (A)	25		Individual	Holistic	Relational
4	Continuous Assessment (CA): Test/Quiz(Test 4)	All	SPMS-MAS Graduate Attributes: Communication (I), Creative Thinking (A), Decision Making (A), Problem Solving (A), Sense Making (A)	25		Individual	Holistic	Relational

Description of Assessment Components (if applicable)

Formative Feedback

In-class problems: Students will receive feedback on their performance on (ungraded) problems they are solving in class. Tests: Students will receive feedback on test performance.

NTU Graduate Attributes/Competency Mapping

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

Attributes/Competency	Level
Problem Solving	Advanced

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)

Policy (Absenteeism)

Absence due to medical or other reasons

If you are sick and unable to attend a midterm test or missed the deadlines for your assignments, you must:

1. Send an email to the instructor regarding the absence.
2. Submit the Medical Certificate* to your Home school.

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

In this case, the weightage of the test will be transferred to the other tests.

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 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.

Assessment

Component	Course ILOs tested	SPMS-MAS Graduate Attributes tested	Weighting	Team / Individual	Assessment Rubrics
Continuous Assessment					
Tutorials					
Test 1	All	Communication (I), Creative Thinking (A), Decision Making (A), Problem Solving (A), Sense Making (A)	25%	Individual	Point-based
Test 2	All	Communication (I), Creative Thinking (A), Decision Making (A), Problem Solving (A), Sense Making (A)	25%	Individual	Point-based
Test 3	All	Communication (I), Creative Thinking (A), Decision Making (A), Problem Solving (A), Sense Making (A)	25%	Individual	Point-based
Test 4	All	Communication (I), Creative Thinking (A), Decision Making (A), Problem Solving (A), Sense Making (A)	25%	Individual	Point-based
		Total	**100%**		