NANYANG TECHNOLOGICAL UNIVERSITY

Teaching, Learning and Pedagogy Division

Reg. No. 200604393R

PROPOSED COURSE OUTLINE TEMPLATE FOR STUDENTS AT NTU

Academic Year	AY1718	**Semester**	2
Course Coordinator	Ku Cheng Yeaw		
Course Code	MH1101		
Course Title	Calculus II		
Pre-requisites	MH1100 Calculus I		
No of AUs	4		
Contact Hours	4 hours per week (3 hours of lecture, 1 hour of tutorial)		
Proposal Date	17 October 2017		

Course Aims

This course aims to develop fundamental mathematical concepts such as definite integrals and their applications to find areas and volumes, Fundamental Theorem of Calculus, integration techniques, tests for convergence and divergence of sequences and series, interval and radius of convergence of power series, differentiation and integration of power series, and Taylor series. Techniques learned in this course will prepare students for more advanced quantitative courses in mathematics, science and engineering.

Intended Learning Outcomes (ILO)

By the end of this course, you (as a student) would be able to:

Integration:

1. describe definite integrals in terms of Riemann sums and area, and the Fundamental Theorem of Calculus
2. classify and evaluate improper integrals
3. apply integration to real-world problems such as finding the area between curves, and the volume of a solid of revolution
4. evaluate integrals using the Substitution rule, integration-by-parts, Trigonometric substitution, and partial fractions
5. estimate definite integrals using numerical methods

Power series:

6. evaluate the limit of a sequence using formal definition.
7. give examples of convergent and divergent sequences and series
8. determine the convergence of a sequence and perform appropriate convergence tests for series
9. describe how a function can be expressed as a power series, determine radius and interval of convergence of a power series
10. represent certain functions by manipulating geometric series or by differentiating or integrating known series
11. find Taylor series of a given function using definition or by manipulating known series, and verify convergence of series using the Error Bound

Course Content

Antiderivatives and definite integral, Fundamental Theorem of Calculus, improper integrals, substitution rule, area between curves, volume using the disk/washer method, volume using the cylindrical shell method, integration by parts, trigonometric substitution, integration using partial fractions, limit of sequences, integral test, comparison test, absolute/conditional convergence, the ratio test, the root test, power series, radius and interval of convergence, Taylor and Maclaurin series, the binomial series.

Assessment (includes both continuous and summative assessment)

Component	Course LO Tested	Related Programme LO or Graduate Attributes	Weighting	Team/Individual	Assessment rubrics
1. Final Examination	2,5,6,7,8,9,10,11	A1, A2, A3, B1,B2,B4 C1	55%	Individual	Point-based marking (not rubrics based)
2. CA1: Homework 1	1,2,3	A1, A2, A3, B1,B2,C1, C2, E	10%	Individual	Point-based marking (not rubrics based)
3. CA2: Homework 2	6,7,8	A1, A2, A3, B1,B2,C1, C2, E	10%	Individual	Point-based marking (not rubrics based)
4. CA3: Midterm Test	1,2,3,4,5	A1, A2, A3, B1,B2,B4 C1	25%	Individual	Point-based marking (not rubrics based)
5. Total	100%				

Formative feedback

Component 2 and 3: formative feedback is written in the students' homework solution, which are returned to the students.

Component 4: Feedback on common mistakes and students' midterm test scripts will be provided.

Students will also receive formative feedback for all learning outcomes (including LO 9-11 tested in the final exam) during weekly tutorial classes from Week 2-Week 13.

Learning and Teaching approach

Approach	How does this approach support students in achieving the learning outcomes?
Derivation and demonstration (Lecture & Tutorial)	Explain the motivation behind mathematical notions and ideas. Presents systematic ways to solve problems related to the concepts developed. Derive important formulas that are fundamental in the study of Calculus.
Problem solving (Lecture & Tutorial)	Develops competence in solving a variety of problems related to integral calculus, sequences and series.
Peer Instruction (Tutorial)	Develops communication and presentation skills and deepen understanding. Students have the opportunity to work with peers and present their solution to the class.

Reading and References

James Stewart*, Calculus (8th edition)*

Course Policies and Student Responsibilities

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 original Medical Certificate* to an administrator.

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

In this case, a makeup assessment will be arranged. If a make-up test cannot be arranged due to unavailability of venue or other circumstances, the weightage of the test will be transferred to the final exam.

Collaboration Policy

Collaboration is encouraged for your homework because peer-to-peer learning helps you understand the subject better and working in a team trains you to better communicate with others in your profession. As part of academic integrity, crediting others for their contribution to your work promotes ethical practice.

You **must write up your solutions by yourself and understand anything that you hand in.**

If you do collaborate, **you must write on your solution sheet the names of the students you worked with. If you did not collaborate with anyone, please explicitly write, "No collaborators."** Failure to do so constitutes plagiarism.

Use of materials outside the course is strongly discouraged. If you use outside source, you must reference it in your solution.

Course Instructors

Instructor	Office Location	Phone	Email
Ku Cheng Yeaw	MAS-05-11	6513 8652	cyku@ntu.edu.sg

Planned Weekly Schedule

Week	Topic	Course LO	Readings/ Activities
1	Antiderivatives, definite integrals, Fundamental Theorem of Calculus	1	
2	Substitution rule & improper integrals, Area between curves	2,3	
3	Volumes, Integration-by-parts	3,4	CA1: Homework 1
4	Trigonometric integrals, Trigonometric substitution, partial fractions	4	
5	Numerical integration, Limit of sequences	5,6	
6	Finding limit of sequences	7	CA3: Midterm Test
7	Monotonic sequence, Series	7,8	
8	Integral test & the comparison test.	8	
9	Absolute & conditional convergence, the Ratio & Root test,	8	
10	Power series, radius and interval of convergence	9	CA2: Homework 2
11	Manipulate geometric series, term-by-term differentiation and integration, Taylor & Maclaurin series	10	
12	verify convergence of series using the Error Bound, Binomial series, finding limits using power series	11	
13	Summary		