

# COURSE SYLLABUS

**Course Title: Mathematics**  
**(12<sup>th</sup> Grade, TOEFL-Intermediate)**

The Asian International School

## INSTRUCTIONAL RESOURCES

- TOEFL Intermediate Mathematics Module
- Worksheets

## LEARNING OUTCOMES

Upon successful completion of this course, the student will:

- Understand how the derivative helps us better understand and graph functions
- Understand and discuss the integral
- Be able to take integrals of common functions and some complex functions
- Understand definite integrals and their application to area under and between curves

## COURSE REQUIREMENTS

In order to take this course:

- A scientific calculator will be useful for performing calculations.
- Access to a computer with one of the following programs will be useful:
  - [GeoGebra](#) (Free)
  - [Mathematica](#) (Paid)
  - [GNU Octave](#) (Free)
  - [MATLAB](#) (Paid)

## I. COURSE SCHEDULE

MONTH/ CHAPTER	UNIT TITLE	LEARNING OUTCOMES	TIME FRAME	NOTES
<b>SEMESTER 1</b>		<b>18 WEEKS</b>		
AUG./ CHAPTER 1: Graphical Applications of the Derivative	Unit 1: Increasing and Decreasing Functions	<ul style="list-style-type: none"><li>• Identify (strictly) increasing and (strictly) decreasing functions</li><li>• Identify (strictly) monotonic functions</li><li>• Understand and use the derivative to help identify (strictly) increasing and (strictly) decreasing functions.</li></ul>	4 weeks	

SEP./ Chapter 1: Graphical Applications of Differentiation	Unit 2: Extrema of a Function  Unit 3: Assessing and Graphing Functions	<ul style="list-style-type: none"> <li>• Define local and absolute extrema</li> <li>• Identify local and absolute extrema</li> <li>• State the conditions for a function to attain extrema</li> <li>• Explain how extrema help us solve “real-world” problems.</li> <li>• Identify vertical, horizontal, and oblique asymptotes.</li> <li>• Determine when a function has vertical, horizontal, and oblique asymptotes.</li> <li>• Use limits and derivatives to help graph functions.</li> </ul>	4 weeks	
OCT./ Chapter 1: Graphical Applications of Differentiation	Chapter 1:  Unit 4: Comprehensive Project  Review for Midterm Exam	The teacher should design a comprehensive project that students will do at home and present their results in class. The comprehensive project should demonstrate the student’s understanding and master of the topics and core concepts presented in Chapter 1. Ideally, the comprehensive project will be done in small groups and require outside research from the students.	4 weeks	<b>Mid-Term Exam</b>
NOV -DEC./ Chapter 2: Integrals	Unit 1: Indefinite Integrals (Antiderivatives)  Unit 2: Techniques of Integration  Unit 3: Definite Integrals  Unit 4: Comprehensive Project  Review for Final Exam	<ul style="list-style-type: none"> <li>• At the end of this unit students should be able to explain what an integral is and how to find integrals of simple functions as well as all six trig functions.</li> <li>• Define u-substitution</li> <li>• Define integration by parts</li> <li>• Identify functions that can be integrated by u-substitution</li> <li>• Identify functions that can be integrated by parts</li> <li>• Integrate simple functions using u-substitution</li> <li>• Integrate simple functions using integration by parts</li> <li>• Define and calculate definite integrals</li> <li>• Find the area under a curve</li> </ul>	6 weeks	<b>Final Exam and Vietnamese Exam</b>

TOTAL: 2 Chapters – 12 Units	<b>18 WEEKS</b>	
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