



# Tohoku International School

## Secondary School Course Syllabus

<b>Course Title:</b> Mathematics: Applications and Interpretation, Higher Level (HL)	<b>Teacher:</b> Mr. Stephen Messano <b>Email:</b> smessano@tisweb.net
<b>Level:</b> Grade 11-12	<b>Time Frame:</b> Two years (2021-2023)
<b>Brief Course Description:</b> <p>The key concepts in the Mathematics: Applications and Interpretation course are measurement, modeling, and working with data (collecting, analyzing, and communicating conclusions). This course explores in greater depth many of the topics already encountered in earlier math courses at TIS, including algebra, functions, geometry, trigonometry, statistics and probability. It will also introduce students to some of the fundamental ideas of calculus.</p>	
<b>Course Philosophy:</b> <p>How can a town with four fire stations be divided into regions so that the nearest fire truck is dispatched to the fire location? How can we tell if the oceans are warming? How can a lawyer make sure that a jury understands evidence based on probabilities? How can meteorologists estimate the area likely to be affected by a hurricane? Answering these questions requires tools that let us measure, understand and interpret real world data so as to improve our lives and the lives of those around us.</p> <p>Students will develop their abilities to understand and solve mathematical problems, think critically, and communicate ideas clearly. As students explore the material presented in this course, they should begin to see the connections and applications between mathematics and the world around them. Students who complete this two-year course successfully should do well on the IB DP Mathematics Examination at the end of Grade 12, as well as higher math courses in college.</p>	
<b>Units of Study – Year 1 (2021-2022)</b> <ol style="list-style-type: none"> <li>1. Measuring Space: Accuracy and Geometry</li> <li>2. Representing and Describing Data: Descriptive Statistics</li> <li>3. Dividing Up Space: Coordinate Geometry, Voronoi Diagrams, Vectors, and Lines</li> <li>4. Modelling Constant Rates of Change: Linear Functions and Regressions</li> <li>5. Quantifying Uncertainty: Probability</li> <li>6. Modelling Relationships with Functions: Power and Polynomial Functions</li> <li>7. Modelling Rates of Change: Exponential and Logarithmic Functions</li> <li>8. Modelling Periodic Phenomena: Trigonometric Functions and Complex Numbers</li> <li>9. Modelling with Matrices: Storing and Analysing Data</li> </ol> <b>Units of Study – Year 2 (2022-2023)</b> <ol style="list-style-type: none"> <li>10. Analyzing Rates of Change: Differential Calculus</li> <li>11. Approximating Irregular Spaces: Integration and Differential Equations</li> <li>12. Modelling Motion and Change in Two and Three Dimensions</li> <li>13. Representing Multiple Outcomes: Random Variables and Probability Distributions</li> <li>14. Testing for Validity: Spearman's, Hypothesis Testing and <math>\chi^2</math> Test for Independence</li> <li>15. Optimizing Complex Networks: Graph Theory</li> </ol>	
<b>TIS Assessments:</b> <u>Projects – 30%</u> <p>Some units will feature projects that will require the students to apply the skills learned in the unit to a real world problem, and present their findings to the class.</p> <u>Quizzes – 20%</u> <p>Throughout each unit, students will be required to complete shorter written assessments (10-25 min).</p>	

## Mathematics: Applications and Interpretation, Higher Level (HL)

### Tests – 40%

At the end of each unit, there will be a longer written assessment (45-min).

### Learning Skills – 10%

Attendance, organization, completion of course work and the ability to take initiative and work productively in various settings all play a role in student success and are important for achieving the course expectations. Students will be observed throughout the year in order to determine an accurate assessment of these skills, according to the TIS Learning Skills Rubric.

### **IB Assessments:**

#### External Assessments

- Paper 1 (120 minutes) – Short-response questions – 30%
- Paper 2 (120 minutes) – Extended-response questions – 30%
- Paper 3 (60 minutes) – Two extended-response problem-solving questions – 20%

#### Internal Assessment

- Mathematical Exploration - 20%

### **Course Specific Materials Required**

- Graphing calculator (TI-84 Plus or equivalent)
- Pencils, erasers, etc.
- Graph paper notebook
- Homework/handout folder
- Ruler/straightedge
- Textbook: *Mathematics: Applications and Interpretation, Higher Level (HL)*, Wathall et al.

***Tohoku International School:***

***A community of learners preparing for life in an evolving global society***