

Miyazaki International College  
Course Syllabus  
Fall 2022

Course Title ( Credits )	LAI104: Introduction to Mathematical Thought (2 credits)
Course Designation for TC	N/A
Content Teacher	
Instructor	Anderson Passos, Ph.D.
E-mail address	apassos@sky.miyazaki-mic.ac.jp
Office/Ext	MIC 1-315/Ext. 725
Office hours	Monday to Thursday 11:00-12:00

Course Description:										
<i>Critical thinking plays a key role in the way our students will interact with society after they graduate, but before truly effective critical thinking can be realized, learners must first be able to form logical arguments based on objective, rational analysis. This course aims to help students to improve their analytical skills, develop greater thinking speed, and sharpen their observational abilities through the study of mathematics.</i>										
Course Objectives:										
<p>In this course, participants will:</p> <ul style="list-style-type: none"> <li>- develop a solid groundwork in basic mathematical concepts;</li> <li>- develop skills in rational analysis and problem solving;</li> <li>- develop a familiarity with expressions of logic and argument formation;</li> <li>- learn the English necessary to discuss topics in mathematics and logical reasoning.</li> <li>- Learn about the history of mathematics and some important personalities</li> </ul>										
Teaching Methodology:										
Course objectives will be achieved through a variety of active learning teaching strategies, including but not limited to:										
<table border="1" style="width: 100%;"> <thead> <tr> <th style="background-color: black; color: white;">Active Learning Teaching Strategy</th> <th style="background-color: black; color: white;">Course Schedule</th> </tr> </thead> <tbody> <tr> <td>Interactive lectures with note taking</td> <td>Most classes</td> </tr> <tr> <td>Journals</td> <td>Regular homework</td> </tr> <tr> <td>Pair &amp; Group work</td> <td>Lessons 4, 8, 18, 24,30</td> </tr> <tr> <td>Presentations</td> <td>Lesson 30</td> </tr> </tbody> </table>	Active Learning Teaching Strategy	Course Schedule	Interactive lectures with note taking	Most classes	Journals	Regular homework	Pair & Group work	Lessons 4, 8, 18, 24,30	Presentations	Lesson 30
Active Learning Teaching Strategy	Course Schedule									
Interactive lectures with note taking	Most classes									
Journals	Regular homework									
Pair & Group work	Lessons 4, 8, 18, 24,30									
Presentations	Lesson 30									

Course Schedule:		
Day	Topic	Content/Activities
1	Mathematical Review	<ul style="list-style-type: none"> <li>- Why study mathematics?</li> <li>- What is it? Let's see what type of problems math can handle</li> <li>- Review of different types of numbers mathematics can handle (Whole, Natural, Zero, Negative, Integers, Rational, Irrational and Real numbers)</li> </ul>
2		<ul style="list-style-type: none"> <li>- Why can't we divide by zero?</li> <li>- Review of basic operators and precedence</li> <li>- Review of basic mathematical concepts</li> <li>- Homework: The history of Zero</li> </ul>
3	Ancient and Modern Mathematics	<ul style="list-style-type: none"> <li>- Describing set of numbers</li> <li>- Notations for expressing number sets               <ul style="list-style-type: none"> <li>o Interval notation</li> <li>o Set-builder notation</li> <li>o number line</li> </ul> </li> <li>- The concept of infinity</li> <li>- Homework: The beginning of everything</li> </ul>
4		<ul style="list-style-type: none"> <li>- Worksheet and class activities</li> <li>- Having fun with numbers</li> <li>- Reading activity 2: Early Counting 1</li> <li>- Homework: Bring to class other number systems used nowadays</li> </ul>
5		<ul style="list-style-type: none"> <li>- Pythagoras</li> <li>- Thales</li> <li>- Golden Ratio</li> <li>- Homework: bring to class your own example of the Golden ratio</li> </ul>
6		<ul style="list-style-type: none"> <li>- Puzzle Day!!!!               <ul style="list-style-type: none"> <li>o Let's have fun solving Mathematic Puzzles</li> </ul> </li> <li>- Homework: Early Counting 2</li> </ul>
7		<ul style="list-style-type: none"> <li>- Pascal's triangle and the Golden Ratio</li> <li>- Fibonacci numbers.</li> </ul>

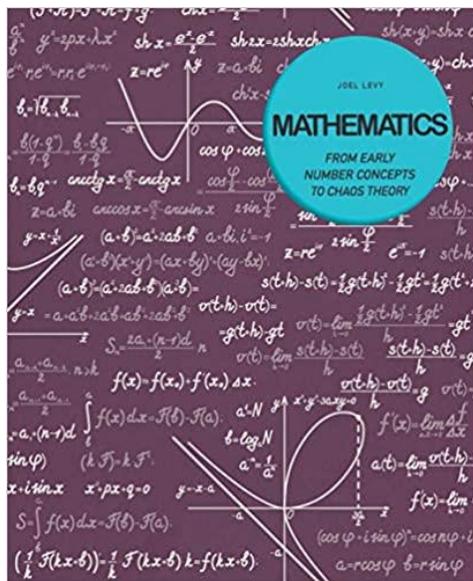
8		<ul style="list-style-type: none"> <li>- Plotting and function extraction from graphics.</li> <li>- Finding the domain of a function and expressing it using the set-builder notation learned in lesson 3</li> </ul>
9	Logic	<ul style="list-style-type: none"> <li>- Introduction to logic problems</li> <li>- Syllogisms</li> <li>- Truth tables</li> <li>- Reading Activity 4: Mathematical Proofs 1</li> </ul>
10		<ul style="list-style-type: none"> <li>- Translating syllogisms logical notation</li> <li>- Syllogism types</li> <li>- Reading Activity 5: Mathematical Proofs 2</li> <li>- Introduction to Boolean logic</li> <li>- Homework: Make your own card sets</li> </ul>
11		<ul style="list-style-type: none"> <li>- Homework check</li> <li>- Group work: exchange their own stories</li> </ul>
12		Personal Finance
13	Probability	<ul style="list-style-type: none"> <li>- Independent Probability</li> <li>- Calculating changes of an event</li> </ul>
14	Review	<ul style="list-style-type: none"> <li>- Review for the finals <ul style="list-style-type: none"> <li>o Basic math</li> <li>o Math nowadays</li> <li>o Logic</li> <li>o Finance</li> <li>o Probability</li> </ul> </li> </ul>
15		<ul style="list-style-type: none"> <li>- Poster presentations</li> </ul>
	Final Examination	

## Required Materials:

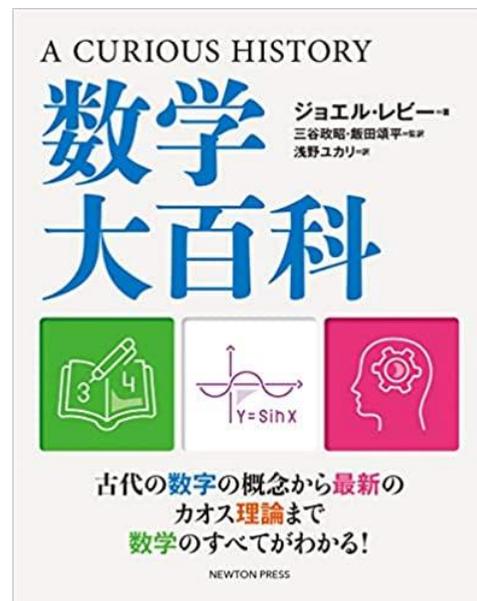
### Course Materials

- Graphic paper (will be distributed when needed)
- Pencil, eraser
- Notepad (for creating solutions, equations, etc.)
- Clear File Folder (handouts & notes)
- Notebook for the "Math Journal"

The following books might help you understanding the content of this course:



Mathematics - A Curious History: From Early  
Number Concepts to Chaos Theory  
ISBN: 978-0233005447



A CURIOUS HISTORY 数学大百科  
ISBN: 978-4315522280

## Course Policies (Attendance, etc.)

### Student Responsibilities

As a class member, you are responsible for attending all classes and arriving on time, for participating as a member of a group, and for completing and handing in all assigned work.

### Attendance and Lateness

- You can be absent a maximum of 4 times
- If you are more than 20 minutes late, you will be given an absence
- Two lateness are equal to one absence

If you sum up more than 4 absences (e.g. 3 absences and 3 lateness), you will be asked to withdraw from the course. Failing to do so will result in an automatic "F" grade.

### **Homework**

The homework should be handed in at the beginning of every class. All homework submitted after that will **not** be considered.

### **Excused Absences**

Excused Absence forms should be brought to instructors as soon as possible. If you know you will be missing classes talk to us beforehand so we can arrange make-up work.

### **Late Assignments**

It is your responsibility to look for the instructor and check what assignments are due. Also, if you miss a class, it is your responsibility to contact the instructors to get handouts and explanations (missing a class is no excuse for not handing in homework).

## **Class Preparation and Review**

Students are expected to spend at least one hour preparing for every hour of lesson, and one hour reviewing and doing homework. Make sure you review your notes after each class and make sure you understand the topics covered. Instructors are available outside the classroom in case students need additional assistance (please check office hours on the first page of this syllabus).

Very often, you will have homework assignments. Make sure you review those before coming to the next class. Also, check the class Content/Activities so you can be prepared for the class.

## **Grades and Grading Standards**

You will be graded on quizzes, assignments and projects, class attendance and participation, and individual effort. The weights given to these will be approximately as follows:

- |                              |     |
|------------------------------|-----|
| • Homework & Journal Writing | 20% |
| • Tests                      | 30% |
| • Final tests                | 30% |
| • Participation              | 20% |

You will receive a mid-semester evaluation to let you know how you have been doing up to that point.

#### Methods of Feedback:

Homework assignments will be graded and returned within a week of submission. Additional comments and feedback will be given verbally in class, but students are encouraged to come to instructor's office during office hours in case extra explanations are needed.

Tests are usually graded using a rubric which will be made available and explained during the test period. Students are encouraged to ask additional clarification before the test starts.

Participation is required not only answering questions, but also asking questions.

#### Diploma Policy Objectives:

Work completed in this course helps students achieve the following Diploma Policy objective(s):

- 1: Advanced thinking skills (comparison, analysis, synthesis, and evaluation) based on critical thinking (critical and analytic thought)
- 3: The ability to identify and solve problems
- 4: Advanced communicative proficiency in both Japanese and English

#### Notes:



Many students studying liberal arts have different levels of understanding of mathematics. This course works towards equity of knowledge in the basic areas of the discipline at the same time that students are pushed to connect the contents of the course with real-life experiences.

<p>文部科学省から採択された 大学教育再生加速プログラム</p> 		Advanced	Proficient	Developing	Emerging	No Attempt
Critical Thinking	Ability to Identify & Solve Problems	<p>Insightful comments in class discussions</p> <p>Student shows proven ability to analyze data, gather and assess resources, and disseminate opinions in a scholarly manner.</p>	<p>Able to contribute to class discussions, and to perform a basic analysis of data, gather and assess resources, and express opinions in an adequate manner.</p>	<p>Beginning to visualize the ways in which information can be combined and applied to solving a given problem, but struggles with complex and relationships</p>	<p>Student shows motivation but must learn the concepts and mechanisms that apply to critical thinking, such as information gathering, assessment and synthesis</p>	
	Information Gathering					
	Assessment of Credibility					
	Social Skills					
	Professional Skills					
Global Perspectives	Cultural Relevancy	<p>Fully engaged in current events and shows and understanding of social inequalities and cultural differences.</p>	<p>Student is aware of current events and world cultures, but is unable to apply macro-level situations to her/his own life.</p>	<p>Exhibits interest and intrigue in current events and world culture, but has difficulty understanding relevancy.</p>	<p>Student expresses one-sided ideals from an ethnocentric point of view. Completely lacks awareness of world issues or events.</p>	<p>Insufficient effort or evidence of achievement</p>
	Awareness of Current Events & Global Issues					
English Language Ability	Reading	<p>Exhibits fluency/near fluency in speaking and writing. Grammar and reading ability similar to native English speaker. Able to use context clues when faced with unfamiliar vocabulary.</p>	<p>Proficient English ability; relies mainly on familiar vocabulary. Should be encouraged to advance beyond comfort zone.</p>	<p>Adequate English ability; must reference dictionary often</p>	<p>Student has some English ability, but lacks confidence in using and understanding. Very limited vocabulary knowledge, struggles with grammar and pronunciation Unable to form questions</p>	
	Writing					
	Oral Communication					
	Writing					
	Oral Communication					