

# Lesson Plan

**Lesson:** Function and its application in bio math

**Timeframe:** 2 hours of preparation before the class, 2 hours of in-class activities plus another 2 hours for solving more challenging application problems after the in-class activities. (6 hours total)

**Materials needed:**

1. Computer and access to internet
2. Grid paper, Colored pencils, Eraser, Small ruler
3. Graphing Calculator

**Objectives:**

*Basic:*

1. *Introducing the concept of relations and functions*
2. *Learning the terms used for linear and nonlinear functions*
3. *Recognizing a Linear function from Nonlinear Function*

*Advanced:*

1. *Differentiating between Relation and Function*
2. *Identifying different representation of a Linear Function*
3. *Evaluating functions from equations, graphs or tables*
4. *Identifying the Domain and the Range of a Function*

**Background:**

Students are supposed to be able to perform integer and fractional arithmetic. They also need to be able to work with simple functions having one operation. They need to know how to use a browser and work with graphing calculators.

**Introduction to Lesson:**

**Function is one of the most important concepts in mathematics. However, the application and use of this concept goes beyond mathematics and applies to our everyday life. In general, Function is a relationship between two sets of data.**

**This lesson is designed to introduce students to the idea of functions. Linear and Non-Linear function as well their graphs will be covered. Domain and Range of a function will be discussed.**

Procedure [Time needed, include additional steps if needed]:

**Pre-Class Individual Space Activities and Resources:**

<b>Steps</b>	<b>Purpose</b>	<b>Estimated Time</b>	<b>Learning Objective</b>
<p><b>Step 1:</b> Read the attached document for "Introduction to Functions" <a href="http://www.mathcentre.ac.uk/resources/uploaded/mc-ty-introfns-2009-1.pdf">http://www.mathcentre.ac.uk/resources/uploaded/mc-ty-introfns-2009-1.pdf</a></p>	<p>Introducing the concept of Function to students who do not have proper background and Refreshing the memory for those who already are familiar with this concept.</p>	1 hours	Learning about the valid function and how to graph a simple function.
<p><b>Step 2:</b> Watching a short video about the Function  <a href="https://www.youtube.com/watch?v=kvGslo1TmsM">https://www.youtube.com/watch?v=kvGslo1TmsM</a></p>	<p>Helping students who prefer to use videos for learning the topic. This video mainly reinforces what they have seen in step 1.</p>	15 minutes	Learning the general idea of the function and the difference between input and output in a function and what is not a function.
<p><b>Step 3:</b> Going over power point slides which covers more advance concepts related to the specific topic in bio math.</p>	<p>PowerPoint slides provides visual aids and could serve as students note from the lecture. PowerPoint slides help students to organize the steps for learning the topic.</p>	30 minutes	learning the specific topics related to bio math and applying the concepts into solving simple application problems.
<p><b>Step 4:</b> Take a short online quiz.</p>	<p>Measuring the students understanding of the topic.</p>	20 minutes	By completing this step students will know how much they have learned through the last 3 steps.

***In-Class Group Space Activities and Resources:***

<b>Steps</b>	<b>Purpose</b>	<b>Estimated Time</b>	<b>Learning Objective</b>
<p><b>Step 1:</b></p> <p>Recap of the topic and the material which was assigned to students as pre-class activity</p>	<p>Summarizing what the students were supposed to learn before coming to the class</p>	<p>15 min</p>	<p>Connecting the different parts of students learning outcomes together</p>
<p><b>Step 2:</b></p> <p>Answering the student's questions if they don't have any questions, then there are questions that they need to answer to measure their understanding from the topic.</p>	<p>Clarifying the concept for the students</p>	<p>25 minutes</p>	<p>Stimulate the cognitive processes and critical thinking for problem solving</p>
<p><b>Step 3:</b></p> <p>Dividing the students in to groups of 4 and sub group of 2. Students start working on the worksheet in group of two and then checking the answers in group of four.</p>	<p>Helping them to become an active learner and apply the concepts that they have recently learned in solving problems in a group helping by each other and discussing the confusions that they may had.</p>	<p>40 minutes</p>	<p>To build team- work skill and taking advantage of group thinking for problems solving.</p>
<p><b>Step 4:</b></p> <p>Helping them to come up with answer to their questions. As an instructor of the course I try to guide them to come up with answer to their questions instead of giving them the answer.</p>	<p>Building self-confidence and helping them to believe in their abilities.</p>	<p>20 minutes</p>	<p>Critical thinking, Connecting the material that they already know to new material.</p>

<b>Step 5:</b> Summarizing the key point from the lesson	Final review to help student fully comprehend the lesson.	20 minutes	Connecting all the key point for more in-depth understanding the lesson and their application in problem solving.

### Closure/Evaluation:

#### ❖ *Analysis:*

Through this lesson plan, students initially read an introduction to function which includes the definition of the function and how they can differentiate a function from a relation. Through this paper, they will be introduced to the vocabulary of the Function in mathematics. They will learn the basic principle of graphing a function. Then the Domain and Range of the function will be defined and then they could see some simple examples. This step is followed by watching a short video and PowerPoint slides which shows the application of the function in the context of biology problems. The pre-class activity will end with a short quiz. The in-class activity will follow the learning objectives of the pre-class activity but more in-depth. Through a recap and answering student's questions, their critical thinking will be stimulated. After these steps, students need to apply what they have learned in solving word problems. This is the step that information will be transferred to knowledge which could be used for future lessons. By guiding them to come up with answers to their questions and not simply giving them the answers, students will build self-confidence which ultimately make learning a fun activity and not a task that they must do. By summarizing the key points at the end of the in-class activity, students could make a connection between all the steps that they have taken to learn this topic.

#### ❖ *Post-Class Individual-Space Activities:*

*This lesson will be followed by more advance application problems from the textbook for the course. Online help is available for students who may need extra help.*

❖ ***Connections to Future Lesson Plan(s):***

Understanding linear function is the basis for all other functions. Future lessons which includes quadratic, polynomial, rational, exponential, power, logarithmic, and sinusoidal functions, all requires deep understanding of the linear function.