Abstract

The purpose of this theoretical study is to define the application of mathematics in various fields. In this aspect, it is used to solve a lot of everyday problems in various fields of studying across the globe. Various of these aspects use mathematical formulas directly while some use mathematical concepts to solve the issues concerning their field. In context, fields including Climate, Social science, Finance and Economics, Computer science, Insurance, Medical research, Consumer marketing, Aviation among many others. These are fields currently in operation for a very long time, and the use of mathematics in their daily operations has proved to be of great significance to the well being in terms of growth and development of these industries. Within these industries it has been proven beyond reasonable doubt that mathematics is and will continue being used in their daily operations to enhance their operations in effect of progress. In this paper we will look at the applications of mathematics in these organizations

APPLICATION OF MATHEMATICS IN VARIOUS FIELDS

Mathematics is the science that deals with the logic of shape, quantity and arrangement. ([www.livescience.com](http://www.livescience.com)). This science in itself is backed up by formulas and functions to be applied in order to solve problems. These formulas and functions can be specific to certain problems or universal to all problems, depending on the nature of the problem to be solved and the nature of the answer required from the problem. This way of operation has led it to become the most widely used tool of operation in the whole world. This makes mathematics by it self a very wide subject hence the presence of various branches within it.

The main branches of mathematics are algebra, geometry, and arithmetic’s, based on these many other branches have been discovered. (byjus.com. 2023). These Branches include; Algebra, Differential Equations and Fourier Analysis, Differential and Computational Geometry, Probability and Statistics, Numerical Analysis, Operations Research and Optimization. (UNBC, 2023). These Branches of Mathematics play a crucial role various industry in the world hence worth investigating. The industries are found in various fields and their application of mathematical formulas in the progress cannot go unnoticed.

These fields include (Stat Analytica, 2012-2023):

* **Medicine**
* **Environment and climate**
* **Social science**
* **Finance and economics**
* **Computer science**
* **Engineering**
* **Insurance**
* **Aviation**
* **Maritime**

**Medicine**

In the field of medicine Mathematical models and formulas are being used throughout its departments.

**Biological research**

The application of mathematics in statistics is useful for modeling and analyzing data. This data can range from small individual organisms to large biosystems. These have been crucial in determining the viability of drugs in treating patients and the viability of vaccines in preventing certain infections

**Genetics Research**

Mathematical concepts and models are used to acquire information about the DNA and other data. This is conducted by studying models or DNA in presence or absence of certain factors and results shown when accurate are crucial in the advancements of genetic modification and the enhancements of plants and animals. This is crucial to cloning of animals or creation of Genetically Modified Organisms (GMO) plants and food stuffs in a bid to generate more resistant plants for better yields.

**Computer science**

**Programming**

Mathematical concepts like algebra and modeling are used in programming languages to create scheduling task on processors in a heterogeneous multiprocessor computing network

**Speech recognition**

This is a computer module setup to identify a user based on their speech patterns. To create a speech recognition system, you need to understand the logic and calculations behind it. According to Sebastian Kirsch Linear vector calculus, and probability and statistics are very important (Quora, Inc. 2023) concepts to grasp during setup of any speech recognition system

**Signal processing**

A real discrete- time signal is defined as any time-ordered sequence of real numbers (CCRMA-Stanford University, 2023). To be able perform signal processing designing some knowledge of trigonometry functions, complex analysis, linear algebra and statistical methods is required according to (cds.cern.ch, 2023). A background in Matrix, Algebra esp. Eigenvalues Elgin vectors, Matrix Vector operations, Block matrix properties (Quora Inc. 2023) is also a must have in the operations of a signal processing software.

**Social Science**

**Analysis of statistical data taken by a census**

A great knowledge of Probability and statistics is crucial in analysis of census data. Even in conduction of the same data. Sample formulas required in order for the taking and analysis of census data involve Mean, Median, Mode, Variance and Standard deviation. (BJU’S, 2023) Mean is derived by the formula

Variance being calculated with the formula

**Engineering**

**Electromagnetics**

**Large scale shock wave physics code development**

**Material constitutive modeling and equation of state**

**Insurance**

**Probability and Statistics**

For the insurance companies offering

**Calculation of insurance risks and price of insurance**

**Aviation**

**Modeling of airflow over airplane bodies**

Airflow modelling is crucial during the design stage of any aircraft. This is helpful in determining the efficiency of a certain part of an aircraft without having to use the entire aircraft by itself in life size form. This modelling is conducted by using the Bernoulli ‘s principle which relates the speed of a fluid in relation to pressure generated by the flowing fluid. In design and testing of an airfoil. ‘The air across the top of a convectional airfoil experiences constricted flow lines and increased air speed relative to the wing. This causes a decrease in pressure on the top and provides a lift force. Aerodynamics use the Bernoulli model to corelate with the measurements in wind tunnels and assert that when pressure measurements are made at multiple locations around the airfoil and summed, they do agree with the observed lift. (R nave, Glen research center NASA)

**Aircraft landing field length**

Also known as the aircraft landing distance, is the horizontal distance travelled by the Aeroplan from a point of approach path at a selected height above the landing surface to the point on the landing surface at which the Airplane comes to a complete stop *(Source: ICAO Annex \* Part IIIA paragraph 2.2.3.3. and Part IIIB Sub Part B Paragraph B2.7 e)* Based on the factors considered including weight, and physical condition of the aircraft, calculations made determine the Landing distance required if the flight is at its Peak weight over the landing distance available, then this data is translated into the weight of the aircraft at the time of landing and condition of the landing area and a landing distance is determined. This is useful in design of airfields, or airports.

**Aircraft survivability and effectiveness**

Aircraft survivability is the ability of the aircraft to withstand weather conditions. Aircraft effectiveness is the ability of an aircraft to maintain maximum efficiency during flight. The efficiency of an aircraft is calculated by taking period of scheduled flight by the period taken by the aircraft in actual flight. Comparing the two will help determine the efficiency of the aircraft. Based on the condition of the aircraft, comparing the functionality of new aircraft parts to the actual condition of the aircraft parts an engineer can be able to estimate the lifetime of a certain aircraft or an aircraft part and schedule it for maintenance or replacement and /or maintenance. (Wikipedia.org)

**Space technology**

**Reentry simulations for the Space Shuttle**

Reentry of a space shuttle is a complex procedure if not conducted to exact precision might lead to the space shuttle being deflected by the earth’s atmosphere into space. According to the Glen Research center (NASA May 07 2021), as an aircraft moves through the air, the air molecules near it are disturbed and move around the aircraft. Exactly how the air reacts around the aircraft depends upon the ratio of the speed of the aircraft to the speed of sound through the air --------, this speed ratio has been termed by aerodynamicists with a special parameter called the Mach number. During reentry speeds of the shuttle reach up to astonishing 17500mph and the Mach number is nearly 25. hence necessary calculations are made to account for the heat generated by friction during reentry and proper heat shields are built into the space shuttle.

**Flight schedules for the space crew**

During space expeditions the crew require maintenance. This includes food, water, entertainment alongside their actual flight job while in flight. Calculations are required to cater for the provisions required by the crew for survival. For food and water, each crew member is assigned a unit of food and water per day, this is calculated by the amount of food and water required for the entire expedition and by the number of crew available to get the total provisions required by the crew for the entire expedition.

**Conclusion**

For modern day lives Mathematical concepts data are required for the development of fields operational in the entire world. This is proven by these industries applying concepts and formulas to get rid of problems and get solutions to the chaos in their fields. Mathematical models are being used in the computer worlds to come up with more enhanced programs. Space technology requires models and algorithms in calculations to enable a proper planning and advancement of their schedules. These are a few but examples of real-life application of mathematics to the real-world industries. It is advisable that learning institutions take more measures to promote learning of mathematics amongst its students to facilitate a more enhanced society in the future.

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