Course Title	:	Mathematical Literacy in Today's World
Course Code	:	CLD9004/GED112/CDS112
No. of Credits/Semester	:	3
Mode of Tuition	:	Sectional Approach
Class Contact Hours	:	3 hours per week
Category in Major Prog.	:	Science, Technology and Society Cluster Course/General Education Category D/Free Elective

Brief Course Description

Hermann Weyl (1885-1955) said: "Mathematics sets the standard of objective truth for all intellectual endeavours, science and technology bear witness to its practical usefulness. Besides language and music, it is one of the primary manifestations of the free creative power of the human mind, and it is the universal organ for world-understanding through theoretical construction. Mathematics must therefore remain an essential element of the knowledge and abilities which we have to teach, of the culture we have to transmit, to the next generation."

This course stresses the prevalence, relevance, and practicality of mathematics in modern society. Real world examples, such as traveling plans for a postman and a salesman, voting methods and strategies, social choice, elections and the time value of money, will expose the non specialist to contemporary mathematical thinking. The mathematical techniques involved are taught via hands-on applications. This subject is specifically designed for non-math majors.

Aims

This course is aimed to introduce students in a non-technical fashion, some of the major mathematical techniques currently available to various daily life problems. Topics include: (1) Planning and Scheduling, (2) Voting and Social Choice, (3) Fairness and Game Theory (4) Saving and borrowing models.

This course is also aimed to enhance students' problem solving ability through mathematical reasoning, case study and class room exercises.

Learning Outcomes

On completion of this course, students will be able to:

1. demonstrate a comprehension of the value of contemporary mathematical thinking in daily life, such as how loans are discharged, how to choose a "fair" apportion method and how to effectively schedule a job or traveling plan.
2. apply mathematics to real world issues, such as how the different systems of voting may affect the outcome of an election.

Measurement of Learning Outcomes

1. Students undertake in-class exercises and take home problems that require an understanding of relevant mathematical concept, principles and techniques.
2. Students are required to analyze some cases to demonstrate their ability to apply the knowledge acquired in this course to a real world situation.
3. The final examination and short quizzes will focus both on the comprehension and application of mathematical reasoning applied to a real world setting.

Indicative Content

- Finding Your Way through Graphs
  The Chinese postman problem (Euler circuits), the traveling salesman problem (Hamiltonian circuits), the Pictaphone service (Minimum cost spanning trees)
- Imperfect Democracy
  Voting methods and strategic voting, weighted voting and the voting power index, apportionment methods, the Alabama paradox and population paradox
- Elementary principles of Game theory
  Zero-sum games, non-zero-sum games, Prisoner's dilemma
- Time Value of Money
- Saving models and borrowing models, future value and compounding, present value and discounting, annuities and perpetuities, the economics of resources

Teaching Method

Basic concepts are discussed during lectures with theories explained in the context of practical real-life examples. Laboratory sessions may be used to introduce the application of Microsoft Excel or other mathematical tools to the solving of real life problems.

Assessment

Examination   60%
Continuous Assessment (5 - 6 Quizzes)   40%

- Students are assessed throughout the term on their attendance, class participation, assignments, quizzes etc.
- Students are required to use the computer software and electronic calculator to solve exercises.

Required/Essential Readings

COMAP (The Consortium for Mathematics and its Applications), *For All Practical Purposes – Mathematical Literacy in Today's World*, 7th Ed., Freeman, 2007.