

**COURSE SYLLABUS**  
**MATH 1(MST)**  
**Quantitative Reasoning**

**Course Description** : Logical, quantitative and postulational thinking

**Course Credit** : 3 units

**Course Objectives:** At the end of the course, the student should be able to:

- a) arrive at a comprehensive, integrated, though synoptic understanding of mathematics as a system of knowledge, and as a way of knowing; and
- b) demonstrate the ability to think critically and logically, and reason quantitatively on issues that are relevant to himself and to society.

**Course Outline/Topics to be Covered:**

Part I. Thinking Logically

- 1. Literacy for the Modern World (2 hrs.)
  - 1.1 Interdisciplinary Thinking
  - 1.2 What is Quantitative Literacy?
  - 1.3 Challenging Misconceptions about Mathematics
  - 1.4 What is Mathematics?
  - 1.5 The Road to Quantitative Literacy
- 2. Principles of Reasoning (4 hrs.)
  - 2.1 Logic: The Study of Reasoning
  - 2.2 The Value of Logical Argument
  - 2.3 Propositions - Building Blocks of Arguments
  - 2.4 Deductive Arguments
  - 2.5 Inductive Arguments
  - 2.6 Arguments in the Real World
- 3. Reasoning with Care (2 hrs.)
  - 3.1 The Forces of Persuasion
  - 3.2 Fallacies of Relevance
  - 3.3 Fallacies of Numbers and Statistics
  - 3.4 Causal Connections
  - 3.5 Fallacies Involving Percentages
- 4. Problem-Solving Strategies (3 hrs.)
  - 4.1 The Art of Problem Solving
  - 4.2 Problem Solving Throughout Unit Analysis
  - 4.3 The Process of Problem Solving
  - 4.4 Strategic hints for Problem Solving
- 5. The Search for Knowledge (3 hrs.)
  - 5.1 The Search for Truth
  - 5.2 Logic and Science
  - 5.3 Paradoxes
  - 5.4 The Limitations of Logic

First Exam – 04 May 2007 (Friday)

## Part II. Thinking Quantitatively

6. Concepts of Number (4 hrs.)
  - 6.1 The Language of Nature
  - 6.2 A Brief History of Numbers
  - 6.3 Building the Modern Number System
  - 6.4 Systems of Standardized Units
  - 6.5 Exact and Approximate Numbers: Rounding
  - 6.6 Prime Numbers: Mysteries and Applications
  - 6.7 Infinity
7. Numbers Large and Small (2 hrs.)
  - 7.1 Putting Numbers in Perspective
  - 7.2 Writing Large and Small Numbers
  - 7.3 Estimation
  - 7.4 Scaling and Scaling Laws
8. Numbers in the Real World (3 hrs.)
  - 8.1 Numbers - Not Always What They Seem
  - 8.2 Sources of Uncertainty
  - 8.3 Expressing Uncertainty
  - 8.4 Case Studies in Uncertainty

## Part 3. Thinking Mathematically

9. The Language of Mathematics (5 hrs.)
  - 9.1 Models for a Changing World
  - 9.2 Mathematical Structures and Applications
  - 9.3 Ethno-mathematics
10. The Language of Size and Shape (5 hrs.)
  - 10.1 A Brief History of Geometry
  - 10.2 Fundamental Concepts of Geometry
  - 10.3 Non-Euclidean Geometry
  - 10.4 Fractal Geometry
11. The Language of Change (5 hrs.)
  - 11.1 Rates of Change
  - 11.2 Limits and Continuity
  - 11.3 The Derivative as a Rate of Change
  - 11.4 The Antiderivative
  - 11.5 Applications
12. Postulational Thinking (2 hrs.)
  - 12.1 Material Axiomatic Systems
  - 12.2 Formal Axiomatic Systems
  - 12.3 Metamathematics
13. Conclusion: Architecture and Foundation of Mathematics (1 hr)

Second Exam – 18 May 2007 (Friday)

### Course Requirements:

The following evaluation scheme will be used:

2 written departmental exams	40%
2 Group Discussion Reports	40%
1 Individual Report	20%

### Grading Scale:

96 – 100	1.0
91 – 95	1.25
86 – 90	1.5
81 – 85	1.75
76 – 80	2.0
72 – 75	2.25
68 – 71	2.5
64 – 67	2.75
60 – 63	3.0
55 – 59	4.0
below 55	5.0

### House Rules:

1. On Attendance. The university policy on student attendance shall be strictly observed. A student is allowed to be absent from the class for at most 20% of the total allotted time. In our case, this will just be a maximum of 5 absences. In case a student exceeds this maximum number of absences, he/she shall be dropped from the rolls and will be given a grade of DRP (Excessive Excused Absences) if most of the absences are excused; otherwise, he/she shall be given a grade of 5.0 (Excessive Unexcused Absences), if most of the absences are unexcused.
2. Seating Arrangement. You will have a permanent seating arrangement. Your attendance shall be based on this seating arrangement. Hence, be sure that you are seated in your designated seat.
3. Name Tag. In order to facilitate discussion and interaction inside the classroom, you are required to wear a name tag while inside the classroom.
4. Student participation inside the classroom is encouraged. Feel free to give comments, answer questions, etc. This will be greatly appreciated.
5. Missed Mid-term Exam. No make-up exam shall be given. In case you miss the mid-term exam, you have to present a valid excuse slip immediately upon your return. Your score in the pre-final exam shall be your score for the mid-term exam. However, if your absence is unexcused, you shall be given a grade of zero (0) for the midterm exam.
6. Missed Pre-Final Exam. A make-up exam shall be given on the day for the final exam if your absence is excused (as certified by a valid excuse slip).
7. Deadlines. Deadlines for the submission of the individual or group reports must be strictly observed. Late submission will be penalized as follows:

1 day late	20% penalty
2 days late	50% penalty
3 days late	Will not be accepted

## **Other Activities**

1. Group Activities. Some of the activities in class will be done by groups. A group report should be submitted immediately after each group activity. This may include group discussions, brainstorming sessions, exercises and games.
2. Film Showing. From time to time, I will be showing some films (in part or as a whole film) in class. After each film showing, I will be giving some discussion questions. Your group will discuss these questions and a report shall be submitted immediately after our session.

## **Other Information:**

Powerpoint slides printed on A4 paper are available at the photocopy center at MB 200 at affordable prices. You are encouraged to get a copy of the lecture slides as this will serve as your notes.

Also, students are encouraged to give comments about the course, the teacher and other things related to the course. You may email/write your professor in this email address: [geneimsp@yahoo.com](mailto:geneimsp@yahoo.com). Always write as the subject *MATH 1 Comment/Question*.

## **Course Website:**

I created a website for some of the courses that I am teaching. You may visit <http://www.geocities.com/geneimsp/>. You can download all course materials in MATH 1(MST) from this site. Just follow the links. Note that the site is still being constructed – I am uploading the pdf files one by one.

## **Your Professor:**

I am Prof. Genaro A. Cuaresma (you may call me Sir Gene or Gene). My offices are at MB 210 at the Math Building and IMSP Director's Office, 2<sup>nd</sup> floor, Wing C, Physical Sciences Building. You can consult me anytime in the afternoons.