



Welcome  
to  
**Universiti**  
**Putra**  
**Malaysia**

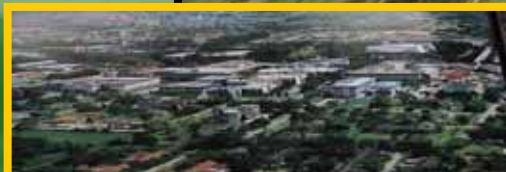
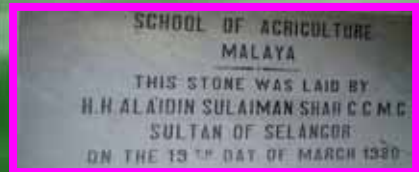


## Our Mission

*“To be a leading centre of learning and research, contributing not only towards human advancement and discovery of knowledge but also to wealth creation and nation building”.*

### The origin of Universiti Putra Malaysia

School of Agriculture (1930) —

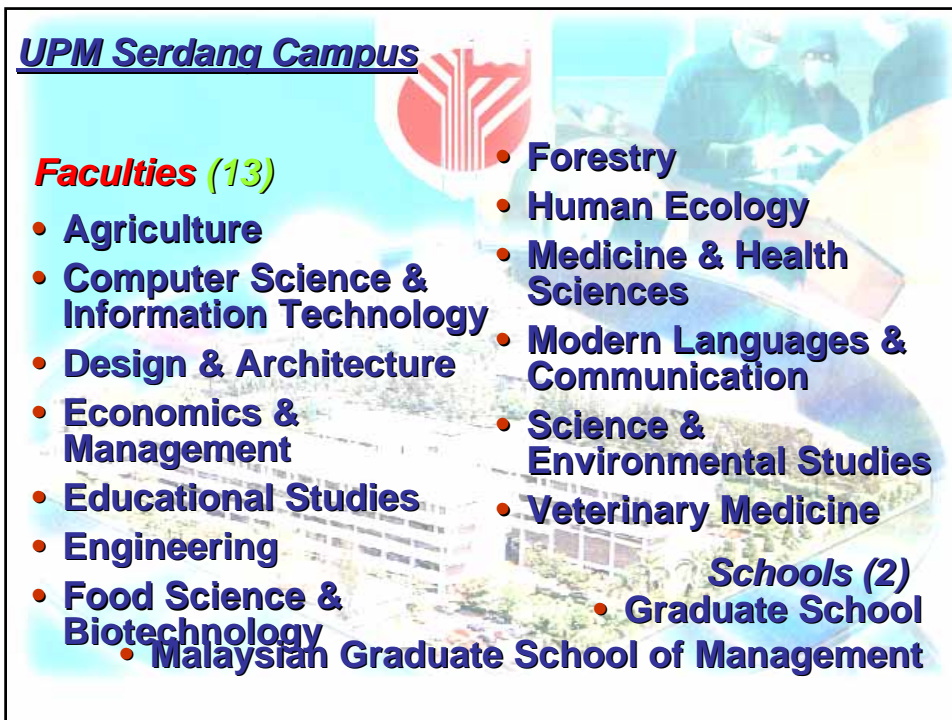




## Universiti Putra Malaysia

- *UPM started with 3 faculties — agriculture, forestry, and veterinary medicine & animal science — and a division of basic sciences.*
- *Since then, 13 faculties, 2 Schools, 6 institutes and 8 centres have transformed UPM into a Science and Technology (S&T) University.*
- *Today, UPM is one of the largest S&T universities in Malaysia with over 1,500 academic, 2,200 non-academic staff and about 34,600 undergraduates and postgraduates students in Serdang campus.*

### UPM Serdang Campus



**Faculties (13)**

- Agriculture
- Computer Science & Information Technology
- Design & Architecture
- Economics & Management
- Educational Studies
- Engineering
- Food Science & Biotechnology

- Forestry
- Human Ecology
- Medicine & Health Sciences
- Modern Languages & Communication
- Science & Environmental Studies
- Veterinary Medicine

**Schools (2)**

- Graduate School
- Malaysian Graduate School of Management



## ***Institutes: (07)***

- Institute of Bioscience (*IBS*)
- Institute of Distance Education & Learning (*IDEAL*)
- Institute of Advanced Technology (*ITMA*)
- Institute of Multimedia & Software
- INSTITUTE FOR MATHEMATICAL RESEARCH (*INSPEM*)
- Institute of Community Development and Youth Studies (*PEKA*)
- Institute of Gerontology (*IG*)



## ***Centres: (8)***

- Computer Centre
- External Programme Centre
- Islamic Centre
- Sultan Salahuddin Abdul Aziz Shah Cultural & Arts Centre
- University Business Development Centre
- Research Management Centre (*RMC*)
- Knowledge Management Centre (*PPI*)
- University Agriculture Park (*TPU*)





## **Research & Development** **Research & Development**

### **Research allocation (RM-7)**

- *A premier R&D agency in Malaysia.*
- *Received RM123.1 million supporting 646 projects for research under IRPA including RM7.5 million for 9 top down biotechnology projects in the 7th Malaysia Plan (1996-2000), RM36.5 million from Research Contracts, and RM7.81 million for Consultancy fees .*
- *In addition, RM 10 million was allocated for short- term grant supporting 1,108 projects on fundamental research.*

**(Total RM185.5 million)**

## International Grants

- *Australian Centre for International Agricultural Research (ACIAR)*
- *Asian Development Bank (ADB)*
- *Food and Agriculture Organisation (FAO)*
- *International Atomic Energy Agency (IAEA)*
- *International Foundation of Science (IFS)*
- *Japanese International Cooperation Agency (JICA)*

## Awards and Prizes at a Glance



### (2000-2001)

- International Awards (22)
- MPKSN Young Scientist Awards (7)
- Academy of Science Malaysia Memberships (7)
- Associations/Competitions Awards (9)
- National Exhibitions Awards (24)
- UPM Inventions & Research Awards (56)
- Fellowship Awards (16)
- International Postgraduate Students Awards (18)
- Postgraduate Awards (10)
- Other Awards (45)

**Total: 214**

# Multimedia Super Corridor



# Welcome to

Institute for Mathematical Research  
(INSPERM/INFORM)

<http://www.inform.upm.edu.my>



# HISTORY



## Third National Symposium of Mathematical Science in 1988

The Institute For Mathematical  
Research was established on :

**1st April 2002**

**Main objectives :-**

*To provide opportunities for  
and carry out research in  
mathematics in a focused  
and an integrated manner  
among mathematical  
scientists inside and  
outside UPM, local and  
international.*





## THE 5 OBJECTIVES OF INSPEM...

- *To seek the best ways to increase mathematical literacy.*
- *To popularise the use of mathematics among the populace.*
- *To carry out “high-end” research in mathematics, and in areas whose major component is mathematical in nature.*
- *To develop linkages with agencies, local and abroad in mathematical research.*
- *To publicize products of research to the general public especially among the end-users.*

### Research Activities in INSPEM Covers The General Areas of:-



1. Research in the field of pure, applied mathematics and statistics.
2. Applications of mathematics.
3. Mathematics education.
4. Mathematical literacy and popularizations of mathematics.

## Laboratories in INSPEM

- Theoretical Mathematics
- Statistics & Applied Mathematics
- Mathematical Sciences & Applications
- Mathematical Education and Literacy

### Fields of research

- Pure Mathematics
- Applied Mathematics
- Statistics
- Mathematics Education and Literacy

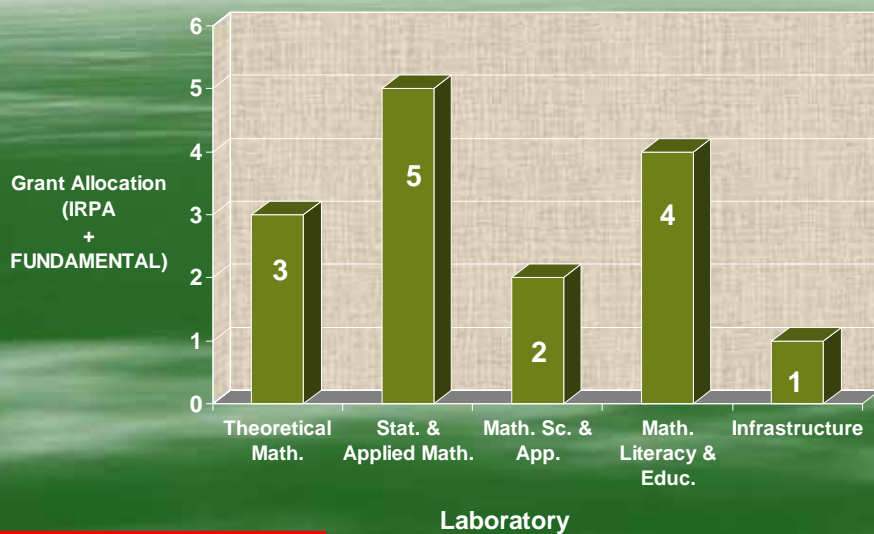


### Category of Researchers in INSPEM

- PERMANENT RESEARCHER
- ASSOCIATE RESEARCHER
- VISITING SCIENTISTS
- FELLOWS
- POST-DOCTORAL
- POSTGRADUATE



## Research Grant



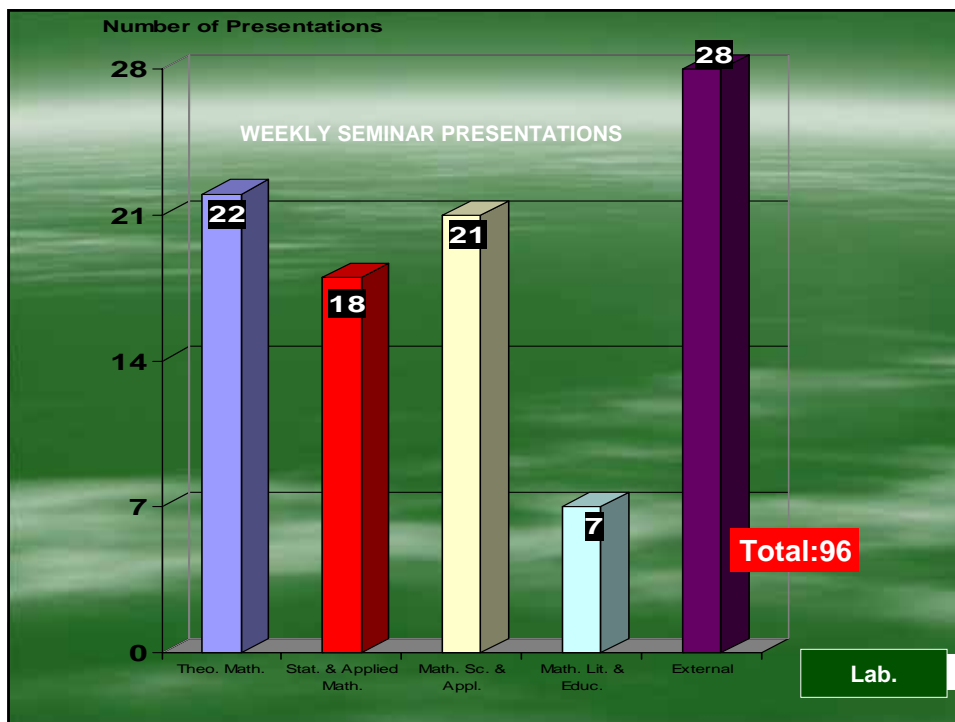
**Value: RM 1,211,460.00**

# IRPA

|       | RESEARCH TITLE  | ALLOCATION    |
|-------|---|---------------|
| 1     | <i>Interactive and Animated Mathematics for Math Education</i>  | RM 185,000.00 |
| 2     | <i>A Study of Mathematical Values Among Malaysian Mathematics Secondary School Teachers</i>                       | RM 197,160.00 |
| 3     | <i>Enhancing Mathematics Learning for Lower Secondary School Students Using Multimedia Mathematics Courseware</i> | RM 146,800.00 |
| 4     | <i>Tree-Structured Regression Model for the Subdistribution of Competing Risk</i>                                 | RM 94,500.00  |
| 5     | <i>Analysis of Survival Data for Long-Term Survivors and Recurrent Event Data</i>                                 | RM 88,000.00  |
| TOTAL |   | RM 711,460.00 |

# FUNDAMENTAL

|       | TITLE  | ALLOCATION    |
|-------|--|---------------|
| 1     | <i>On the RSA-type Cryptosystem</i>  | RM 50,000.00  |
| 2     | <i>Decomposition of Continuity and Generalized Lindelof Spaces</i>   | RM 50,000.00  |
| 3     | <i>Confidence Bands for Survivor Function of Air Pollutant (Carbon Monoxide) using Exponential Distribution under Double Type II Censoring with Bootstrap Percentile</i> | RM 47,000.00  |
| 4     | <i>Modelling Spatial Phenomena and Time Series Data of Selected Variables</i>  | RM 10,600.00  |
| 5     | <i>Embedded Diagonally Implicit Runge-Kutta Methods for Solving Initial Value Problem in Parallel</i>  | RM 42,500.00  |
| 6     | <i>A Study of Wave Propagation Characteristics due to WLAN transmitter</i>   | RM 95,000.00  |
| 7     | <i>Comparative Study of Tertiary Mathematics Education in Malaysia and United States</i>   | RM 52,500.00  |
| 8     | <i>Design and Development of Learning and Research Math Lab</i>  | RM 52,400.00  |
| 9     | Infrastruktur Penyelidikan   | RM 100,000.00 |
| TOTAL |  | RM 500,000.00 |



## Visiting Scientists

|    | NAME                                    | INSTITUTE   | DATE                | CATEGORY           | LABORATORY                           | RESEARCH TITLE  |
|----|---|---|---------------------|--------------------|--------------------------------------|---|
| 1. | Prof. Dr. Howard A. Peelle              | University of Massachusetts, USA                                  | 15/2/03 – 14/6/03   | Fulbright Scholar  | Math. Literacy & Education           | Mathematics & Computer Sciences Education                     |
| 2. | Prof. Madya Dr. Thomas Bier             | Universiti Malaya, Malaysia                                       | 3/3/03 - 9/4/03     | Visiting Scientist | Theoretical Mathematics              | Linear Algebra, Cryptography                                  |
| 3. | Prof. Dr. Ashurov Ravshan Radjabovich   | Tashkent Region State of Pedagogy Institute, Tashkent, Uzbekistan | 10/12/03 – 24/12/03 | Visiting Scientist | Theoretical Mathematical             | Differential Equation   |
| 4. | Dr. Mohammad Alinor Abdul Kadir         | Universiti Kebangsaan Malaysia, Malaysia                          | 1/3/04 – 31/5/04    | Visiting Scientist | Math. Literay & Education            | Phenomenology in Mathematics                                  |
| 5. | Prof. Madya Dr. Mohd. Salmi Md. Noorani | Universiti Kebangsaan Malaysia, Malaysia                          | 1/6/04 – 31/8/04    | Sabatical          | Mathamatical Sciences & Applications | Fluid Dinamic   |
| 6. | Dr. Dalabaev Umuridin                   | University of World Economy and Diplomacy, Tashkent, Uzbekistan   | 17/8/04 – 31/1/05   | Visiting Scientist | Mathematical Sciences & Applications | Difference Schemes for The Equation of One and Two-Phase Flow |

# VISITORS

| COUNTRY        | TOTAL |
|----------------|-------|
| MALAYSIA       | 19    |
| JEPUN          | 4     |
| UZBEKISTAN     | 3     |
| USA            | 3     |
| UNITED KINGDOM | 2     |
| RUSIA          | 2     |
| VIETNAM        | 1     |
| AUSTRIA        | 1     |
| OMAN           | 1     |
| ROMANIA        | 1     |
| POLAND         | 1     |
| NETHERLANDS    | 1     |
| AUSTRALIA      | 1     |
| TOTAL          | 40    |



## Research Programme

### Lab. of Theoretical Mathematics

- Functional Analysis
- Mathematical Cryptography
- Graph Theory
- Differential Algebra
- Topology
- Number Theory

### Lab. of Statistics and Applied Mathematics

- Numerical Analysis
- Survival Analysis
- Mathematical Modelling
- Optimization
- Time Series and Spatial Modeling
- Statistical Modelling and Inferences

### Lab. of Mathematical Sciences and Applications

- Mathematical Virtual Environment
- Cryptographical Design
- Physical Mathematics
- Engineering Mathematics
- Economics Mathematics
- Computer Aided Instructions
- Industrial Mathematics
- Biological Mathematics
- High Performance Computing

### Lab. of Mathematics Education and Literacy

- Mathematical Pedagogy
- Ethnomathematics
- Mathematical Literacy
- Evaluation in the Teaching and Learning Mathematics
- Development and Evaluation of Medium of Instructions

The above research program are available for postgraduate research



### For Further Information

Director  
Institute for Mathematical Research  
Universiti Putra Malaysia  
<http://www.inform.upm.edu.my>

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# MATHEMATICS EDUCATION IN MALAYSIA

ASSOC. PROF. DR ROHANI AHMAD TARMIZI  
ASSOC. PROF. DR. WAN ZAH WAN ALI  
UNIVERSITY PUTRA MALAYSIA  
SERDANG SELANGOR  
MALAYSIA

## *Introduction*

- Some historical perspective.....
- The Way Forward – VISION 2020.....  
Malaysia as a developing nation is striving and aiming to be a fully developed and industrialized country by year 2020.
- It was also emphasized that Malaysia should not be developed only in the economic sense but aimed at fully developed along all the dimensions namely:

- National unity – *harmony and fair partnership*
- Values – *strong in religion and spiritual values*
- Psychologically – *faith, confidence, and quality life*
- Society – *tolerant, profess customs and religious beliefs yet with national pride and confidence*
- Progressive society – *contributor to scientific and progressive society*
- Economically – *fair and equitable distribution of the nation's wealth*

## Globalization perspective...

- In this era of globalization and the borderless globe, being conversant in English is of paramount importance if one wants to be a global player
- This has led the Malaysian government to make a decision of policy transformation –
  - to put emphasis on information technology starting from the primary school level
  - to change the medium of instruction in the teaching of science and mathematics from the national language (Bahasa Melayu) to English beginning from 2003 for Year I, Form I and Lower Six classes



- Hence change in teaching instruction is in lieu and thereby students achievement will be improved in line with the national VISION.
- Recently (middle of year 2002) teaching and learning takes on a new platform with the introduction of the new policy... English for the Teaching of Mathematics and Science (ETeMS)
- While this issue had and is still been highly debated, the policy was implemented beginning academic year 2003.

## Provisions Given to Schools

- Notebooks
- LCD projector
- screen
- text resources
- multimedia interactive softwares
- RM 10,000.00 for supplementary materials
- every teacher provided with scripts containing guide questions

## NATIONAL PHILOSOPHY OF EDUCATION

Education in Malaysia is an ongoing effort towards developing the potential of individuals in a holistic and integrated manner, so as to produce individuals who are intellectually, spiritually, emotionally and physically balanced and harmonious based on a firm belief in and devotion to God. Such an effort is designed to produce Malaysian citizens who are knowledgeable and competent, who possess high moral standards and who are responsible and capable of achieving a high level of personal well being as well as being able to contribute to the harmony and betterment of the family, society and the nation at large.

### Based on the National Philosophy and Recent Developments

- Several divisions and centers in the Ministry of Education were involved in developments, standardizing and quality assurance of the country's education program.
- Firstly: The Curriculum and Development Center under the Ministry of Education has set the required curriculum for the school levels both at the Primary Education and Secondary Education

## Based on the National Philosophy and Recent Developments

- Secondly: The School Division also under the Ministry of Education set forth the Teacher Education curriculum and is used in Teachers' Training Colleges in the country. Teacher trainees undergo a three year program and were posted at primary schools.

## Based on the National Philosophy and Recent Developments

- The Higher Education Division undertook the task of monitoring, standardizing and quality assuring of Mathematics Teacher Education Program. This program is conducted in the universities. A four year integrated program (mathematical and pedagogical content) was conducted with approximately three months of teaching practices at the end of the program. The teacher graduates are posted in the secondary schools.

## **AIM OF PRIMARY SCHOOL MATHEMATICS**

The Primary School Mathematics Curriculum aims to build pupil's understanding of number concepts and their basic skills in computation that they can apply in their daily routines effectively and responsibly in keeping with the aspirations of a developed society and nation, and at the same time to use this knowledge to further their studies

## **PRIMARY SCHOOL MATHEMATICS**

- The content of the primary mathematics curriculum, may it be before the 1960s, in the 1970s up till the year 2004 had not differed much.
- Young children are taught about types of numbers, operations on these numbers, learning about measurement of length, weight, and time which include conversion from one unit to another unit, and learning about space and dimensions.
- Problem solving remains as the ultimate goal in mathematics learning.

## CONTENT ORGANIZATION OF PRIMARY MATHEMATICS

- Encompasses four main areas – Numbers, Measures, Shape and Space & Statistics.

| Number                   | Measures         |
|--------------------------|------------------|
| Whole Number             | Time             |
| Fractions                | Length           |
| Decimals                 | Mass             |
| Money                    | Volume of Liquid |
| Percentage               |                  |
| Shape and Space          | Statistics       |
| Two-dimensional Shapes   | Average Data     |
| Three-dimensional Shapes | Representation   |

## AIM OF SECONDARY SCHOOL MATHEMATICS

The aim of the Secondary School Mathematics Curriculum is to develop individuals who can think mathematically, competent in applying mathematical knowledge effectively and responsibly, in solving problems and making decisions in facing challenges in daily pursuits, in time with the development of science and technology.

## **SECONDARY SCHOOL MATHEMATICS**

- The mathematics for the secondary school students in Japan and Korea almost cover all the mathematics content in the first year of universities in most countries.
- In Malaysia, the secondary school Mathematics curriculum provides a basis for any university education.
- However, students who intend to further their studies in areas that require higher level of mathematics knowledge have to undergo the Additional Mathematics curriculum.

## **CONTENT ORGANIZATION OF SECONDARY MATHEMATICS**

Based on three major areas in mathematics

- i) Numbers
- ii) Shapes and Space
- iii) Relationship

Learning about Numbers

Develops students' ability in doing computations, estimation, analysis and problem solving.

## CONTENT ORGANIZATION OF SECONDARY MATHEMATICS

### Learning About Shapes and Space

Enables students in solving geometry-related problems effectively, develop their thinking on visual and appreciation of aesthetic values abound in shapes and space around us.

### Learning About Relationship

Knowledge on relationship between entities in mathematics, such as laws, rules and theorems are basic to any mathematics curriculum. It aids problem solving and communications in mathematics

## Additional Mathematics Curriculum

- Content of the Additional Mathematics curriculum is offered in two packages - Core Package and Elective Package.
- The Core Package is compulsory for all students who opt for this subject. It consists of five components:
  - Geometry – coordinate geometry, vector
  - Algebra – function, quadratic function, index and logarithm,
  - Calculus – differentiation, integration
  - Trigonometry – trigonometric function
  - Statistics – statistics, permutation, combination
- The Elective Package consists of two packages:
  - Application for Science and Technology Package; and
  - Application for Social Science Package.

## Additional Mathematics Curriculum

- Content of the Additional Mathematics curriculum is offered in two packages - Core Package and Elective Package.
- The Core Package is compulsory for all students who opt for this subject. It consists of five components:
  - Geometry component;
  - Algebra component;
  - Calculus component;
  - Trigonometry component and
  - Statistics component.

## EMPHASIS IN TEACHING AND LEARNING

### Problem Solving in Mathematics

Problem solving is the main focus in the teaching and learning of mathematics. Understanding mathematical procedure and solving problems are two skills that emerge naturally when relational understanding is focused upon. The skills involved are:

- Interpreting problems
- Planning the strategy
- Carrying out the strategy
- Looking back at the solutions



## EMPHASIS IN TEACHING AND LEARNING

### Communications in Mathematics

- sharing of ideas
- clarify understanding of mathematics
- reflecting, discussing and modifying mathematical ideas
- able to explain concepts

## EMPHASIS IN TEACHING AND LEARNING

### Mathematical Reasoning

Logical reasoning of thinking is the basis for understanding and solving mathematical problems. Pupils are encouraged to predict and guess work in the process of seeking solutions. Pupils at all levels have to be trained to investigate their predictions or guesses by using concrete materials, calculators, computers, mathematical representation and others. Logical reasoning has to be infused in the teaching of mathematics so that pupils can recognize, construct and evaluate predictions and mathematical arguments.

## **EMPHASIS IN TEACHING AND LEARNING**

### **Mathematical Connections**

In the mathematical curriculum, opportunities for making connections must be created so that pupils can link conceptual to procedural knowledge and relate topics in mathematics with other learning areas in general

## **EMPHASIS IN TEACHING AND LEARNING**

### **Application of Technology**

The application of technology helps pupils to understand mathematical concepts in depth, meaningfully and precisely, thus enabling them to explore mathematical concepts. The use of calculators, computers, educational software, internet and available learning packages can help to upgrade the pedagogical skills in the teaching and learning of mathematics

## **APPROACHES IN TEACHING AND LEARNING**

- Pupil centered learning
- Use of relevant, suitable and effective teaching materials
- Cooperative learning
- Contextual learning
- Constructivist learning
- Mastery learning
- Inquiry-discovery
- Formative evaluation
- Summative evaluation

**Thank You**