NATIONAL MATHEMATICAL CENTRE, ABUJA
(a centre of excellence in the mathematical sciences)

A BRIEF ON NATIONAL MATHEMATICAL CENTRE, ABUJA TO 14th MEETING OF COMSATS COORDINATING COUNCIL

BY

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DIRECTOR GENERAL NMC

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ADMINISTRATIVE BUILDING

INTRODUCTION

- The National Mathematical Centre, Abuja came into being on January 1, 1988 as an Inter-University Centre for Mathematical Sciences; although the decree (Decree No 40) giving it a legal existence was not promulgated until December 12 1989. (now National Mathematical Centre Act 2004 CAP. N58).
- The Centre began operations at the University of Nigeria, Nsukka in 1988 but moved to the Federal Capital, Abuja in July 1989 and it is located at Sheda-Kwali, Kaduna – Lokoja Road, Abuja, Nigeria.

NMC AUDITORIUM

VISION

- To develop appropriate initiatives and resources of international standing for the re-awakening and sustaining of interest in the mathematical sciences and their applications
- To produce specialists and teachers in the Mathematical Sciences at all levels of our educational system.

MATHEMATICAL SCIENCES LIBRARY

MISSION

- To become a world-class Centre of excellence for Research and Training in the Mathematical Sciences capable of promoting the development and socio-economic impact of mathematical sciences in Nigeria,
- As well as using Mathematical Sciences to solve important scientific and technological problems.

OLYMPIAD BUILDING & NMC AUDITORIUM

MANDATE

The Centre was established by the Federal Government of Nigeria to, among others:

- Train and develop high-level personnel in mathematical sciences including mathematics, statistics, computer science and theoretical physics for Nigerian and African Institutions;
- Create a resource Centre to serve national and international communities as a focal point for advanced research and training in the mathematical sciences and its applications;

MANDATE …

- Enhance collaboration among mathematical scientists especially between young Nigerian scientists, and other advanced and scientists from within and outside Nigeria;
- Identify and encourage young talents in the mathematical sciences;
- Stimulate enthusiasm for the physical sciences in young Nigerian students and scholars;
- Prepare Nigeria for a leading role in the mathematical sciences;
- Attract good mathematical scientists from all over the world into the service of Nigeria;

MANDATE …

- Encourage and support activities leading to the improvement of the teaching and learning of the mathematical sciences at all levels.
- Provide facilities for scientific conferences and the publication of the proceedings arising there from;
- Tackle national set goals in the development of mathematical sciences;
- Conduct series of specialized lectures or courses for the purpose of up-grading post-graduate students in the filed of mathematical sciences to a level where they can begin to understand research papers and seminars;

MANDATE ....

- Conduct series of research lectures for advanced postgraduate as well as post-doctoral and other participants based on a set of pre-assigned research papers, with the objective of generating questions that would be collated, discussed and used to determine new research direction for participants;
- Conduct seminars, workshops and symposia in such areas as the Academic Board of the Centre may, from time to time, determine or plan;

MANDATE

- Establish and execute a visiting programme for mathematical scientists, under which mathematical scientists can visit the Centre for short periods to work on their individual research problems using the library, computing and other facilities of the Centre.
- Perform such other functions that are related to the above objectives and do such other things as are, in the opinion of the Council, necessary and expedient for carrying out the functions of the Centre.

MAJOR ACHIEVEMENTS

ACADEMIC PROGRAMMES

The Centre now operates six (6) Schools, two (2) Institutes and one (1) Department namely:

- School of Postgraduate Studies (SPS)
- School of Mathematical Studies (SMS)
- School of Mathematical Sciences Education (SMSE)
- School of Theoretical Physics (STP)
- School of Computer Science (SCS)
- School of Statistics (SS)
- Institute of Science Education (ISE)
- Institute of Olympiads (IO)
- Department of Mathematical Biology

ACADEMIC PROGRAMMES

- THE Centre regularly organizes academic programmes/scientific activities in the mathematical sciences—Foundation Postgraduate Courses, Research Oriented Courses, Workshops, Conferences, etc., in order to improve the quality of education and research in the mathematical sciences in Nigeria. **The aims of such activities include**:-
- Strengthening the postgraduate programmes of the Centre and the Nigerian University System;
- Raising the numbers and qualities of postgraduate degrees produced from our universities system;

ACADEMIC PROGRAMMES

- Creating opportunity for mathematical scientists to have regular interactions at the Centre;
- Increasing the scientific literature and providing pool of potential research supervisors for Research students;
- Maximizing the use of expertise available in the mathematical sciences for teaching and organizing courses that are otherwise not available in most of the Nigerian Universities.
- In the recent past, the number of these scientific activities had decreased for several reasons, including, inadequate funding by the Federal Government of Nigeria.

SCHOOL OF POSTGRADUATE STUDIES (JHDP)

- One of the recent expansions in the Training Programme and Capacity Building initiatives of the National Mathematical Centre (NMC), Abuja, Nigeria for lecturers in Tertiary Institutions is the introduction of the Joint Degree Programme (JDP).
- This was within the framework of the Centre's mandate to train and develop high level personnel in the mathematical sciences which includes mathematics, statistics, computer science and theoretical physics for Nigerian and African institutions.

SCHOOL OF POSTGRADUATE STUDIES (Joint Degree Prog.)

- Following a long and rigorous planning and due process of the JDP curricula by the National Universities Commission (NUC) of Nigeria and the selected collaborating universities in Nigeria, the Centre fulfilled the NUC requirements to start with the Postgraduate Diploma (PGD) and Masters of Science (MSc) Degree in Financial Mathematics collaborating with the University of Abuja, Abuja. The programme finally started on 12th March, 2007 for the 2006/2007 academic session.
- Initial Programmes proposed and their respective collaborating Universities are as follows:

S/NO	PROGRAMME	COLLABORATING UNIVERSITY	DEGREE
1.	Financial Mathematics	University of Abuja, Nigeria	PGD, MSc, PhD
2.	Mathematics in Biomedicine	University of Jos, Nigeria	PGD, MSc, PhD
3.	Communication Technology	Obafemi Awolowo University, Ile-Ife, Nigeria	MSc, PhD
4.	Mathematical Ecology	Abubakar Tafawa Balewa University, Bauchi, Nigeria	MSc. PhD
5.	Mathematical Education in Information Technology & Communication Theory	University of Ilorin, Ilorin, Nigeria	MSc, PhD
6.	Mathematical Modelling in Maritime Technology	Federal University of Technology, Owerri, Nigeria	MSc, PhD
7.	Modelling & Simulation in Engineering System	Abubakar Tafawa Balewa University, Bauchi, Nigeria	MSc, PhD

STUDENT POPULATION OF FINANCIAL MATHEMATICS

- **The Table below shows the current population of students matriculated so far by the NMC/University of Abuja JDP in Financial Mathematics**
  - **Mater of Science (MSc Degree)**

Session	Male	Female	Total	Calendar Months Duration
2006/2007	26	3	29	18*
2007/2008	27	4	30	18*
2008/2009	36	5	41	18+
* Includes 6 months of project work and thesis				

SCHOOL OF POSTGRADUATE STUDIES

- The Centre is reaching out to the industry, by way of seeking suitable industrial problems that match the experts of its affiliates and also encourage Joint Degree Programme students to undertake projects aimed at solving real-life problems in the sectors of the society .
- The Centre had graduated its first set of students with the MSc degree awarded by the University of Abuja.
- **We have proposed additional three courses under the Joint Degree Programme with the University of Abuja.** These are:

NEW (JD)PROGRAMMES

- **Mathematics in Biomedicine:** A course designed to produce high-level personnel who can proffer solutions to medical problems using mathematical apparatus and model.
- **Communication Technology and Information Theory:** A Course designed to produce highly trained personnel with broad-based computing and telecommunication knowledge for information and communication theory and practice in our Universities, Industries and Government.

NEW (JD)PROGRAMMES

- **Mathematics Education in Information and Communication Technology:** A Course to encourage the development of technology and information systems in the teaching of mathematics with application of relevant research and software designs.

MATHEMATICAL SCIENCES LIBRARY

- The NMC Mathematical Sciences library was established to combat the inability of many Nigerian Universities to provide relevant textbooks and learned journals required for adequate research. Consequently, researchers in the country come to use facilities of the Library for research.
- The library therefore, sets out to fill the vacuum create by inadequacy of relevant textbooks and learned journals required for adequate research in the mathematical sciences.

NMC MS Library

- The NMC Mathematical Sciences Library sometime ago could boast of relevant textbooks and learned journals required for adequate research in mathematical sciences which are not available in most Universities in Nigeria.
- However, the major challenge/constraint of the Library, is finance to acquire relevant and current information resources.
- The journals subscription had been suspended for a number of years, so there is a backlog of journals to be subscribed in order to fill in the gap.

NMC MS Library

- The Centre hosted the International Scientific Committee comprising Top-notch Mathematicians and physicists across the globe sometime ago.
- At that event, each of the scientists in attendance did promise to assist the NMC Library system using their contacts around the globe.
- We had received many of the promises in form of book donations and bibliographic access to journals.
- The Library would appreciate more support in the area of journal/book donations and software partnerships.

Library and future plans

- The Centre plans to procure necessary equipment for the immediate digitalization of the library;
- Providing links to remote information database sources via the electronic superhighway—the internet in 2011;
- Reviewed NMC Publications will be used as Gifts and Exchanges with similar bodies and institutions, e.g. JNMS and Abacus;
- Taking necessary steps towards strengthening the JNMS and Abacus for exchange.

Library and Future Plans

- Resumption and invigoration of Lecture Notes Series, Conference Proceedings, and Seminar Bulletin and other publications for possible acceptance for local and international gifts and exchanges.
- Continual sourcing of additional funding by the library from various donor-agencies, e.g., ETF, UNESCO, World Bank, COMSATS, TWAS, CIIT, UBEC, LDF, etc.
- Enhancing staff development through regular training and re-training workshops and seminars, refresher Courses for relevant IT and library software

COMPUTER LABORATORY

- The Centre has continued to forge ahead in its efforts aimed at creating awareness, stimulating, development and encouraging the production and uses of ICT tools and facilities in the Centre and Nigeria in general.
- The Centre has developed top class computing facilities which is serving as computer support for research projects undertaken by the Academic units of the Centre, visiting Mathematical Scientists and Course Lecturers/Participants.

COMPUTER LABORATORY

- It also has facilities for Administrative Computing Support, Software/Hardware Engineering, and Computer Consultancy for Government and Industry.
- There is also a functional local network within the Centre and is linked to the internet.
- The Laboratory is currently equipped with over 150 Desktop Computer Systems, one Proliant Server, several Laptops, projectors and scientific Software for both low and high level acacademic activities.

SCHOOL OF MATHEMATICAL STUDIES (SMS)

- **2010 National Mathematics Competition for University Students** (NAMCUS); Feb. 7th – 13th Venue: NMC; Participants: 54 Course Organizer: Prof. A. R. T. Solarin, Dean, School of Mathematics Studies, NMC
- **2010 UCMAS National Training Workshop** March 15th – April 7th , 2010 Held at the Centre: Participants : 21
- **2010 Functional Analysis – BANACH ALGEBRA,** April 4 – 17 held at the Centre;

2010 SMS ACTIVITIES

- **Course Lecturers:** Prof. H.G. Dales, Leeds University, U.K., Prof. A.R.T. Solarin, NMC, Dr. J. F. Feinstein – University of Nottingham, Dr, Andras Zsak – Peter house College, Universities of Cambridge and Lancaster; Dr. Mewomo O. T., University of Agric, Abeokuta; Dr. Oguntuase, J. A., Univ. of Agric, Abeokuta: Participants: 30
- **2010 Capacity Building Workshop in Algebra,** October 17 – 23; Venue: NMC: Course Lecturers= Prof. A. R. T. Solarin, NMC, Prof. S. A. Ilori, University of Ibadan, Prof. M. O. Ajetunmobi, Lagos State University, Dr. M. Asiru, Federal Polytechnic, Bida: Participants: 119

SCHOOL OF THEORETICAL PHYSICS (STP)

- **The School aims** to develop physics in Nigeria and in the black Africa, develop human capacity, management training and international development through Research and Education.
- It had recently organized the following Courses, Workshops, Seminars, Conferences and Symposia in the areas of physics:-
- **2010 Foundation Postgraduate Course in Iso-Mathematics and Computational Physics,** 11 – 17 July 2010, NMC:

SCHOOL OF THEORETICAL PHYSICS

Course Lecturers/Speakers: Prof. Alex Animalu, UNN (Organiser); Prof. R. M. Santill, Uninc, North Carolina ,USA; Prof. A. Kebede, Uninc, North Carolina ,USA; Assoc. Prof. B. O. Oyelami, NMC Dr.Akpojotor, Max-Planck, Germany: Participants: 57

2010 3rd International Seminar on Theoretical Physics and National Development (ISOTPAND 2010), 18 – 23 July 2010, Venue: NMC; Lecturers/Speakers: Professor Abebe Kebede, North Carolina A&T State University Greensboro, USA; Professor Anthony F. Onochie, Onosta Global Engineering Limited, USA; Shaninaz M. Yousef Cairo University, Cairo: Participants: 100

SCHOOL OF THEORETICAL PHYSICS

- **2010, ISOTPAND 2010 & Birthday of Professor J.O.C. Ezeilo,** 22nd July 2010, Venue: NMC; Lecturer/Speaker: Professor Anya O. Anya: Participants: 200
- **2010, Foundation Postgraduate Course in Astronomy and Astrophysics;** September 12 – 26, 2010, Venue: NMC: Lecturers/Speakers: Professor Chidi Akujor, Federal University of Technology, Owerri; Professor A. A. Ubachukwu, University of Nigeria, Nsukka: No. Of Participants: 26

SCHOOL OF MATHEMATICAL SCIENCES EDUCATION (SMSE)

- The Centre has the mandate of popularizing and improving the teaching and learning of mathematical sciences at all levels of the educational system in Nigeria.
- It had so far, conducted series of workshops for mathematical sciences education teachers aimed at strengthening the base for mathematical sciences and for developing initiatives for the improvement of education in the mathematical sciences in Nigeria.

SMSE TRAINING WORKSHOPS

- Some of the training workshops organized in 2010 included:
- **19th – 23rd July, 2010 -** Workshops on the Retraining of Primary School Teachers on the New UBE Curriculum and Continuous Assessment in Schools at Enugu: No. Of Participants: 1132
- **26th – 30th July, 2010** - Workshops on the Retraining of Primary School Teachers on the New UBE Curriculum and Continuous Assessment in Schools at Nsukka; participants: 568

SMSE TRAINING WORKSHOPS

- **2nd – 6th August, 2010** - Workshops on the Retraining of Junior Secondary School Teachers on the New UBE Curriculum and Continuous Assessment in Schools at Enugu: No. Of Participants: 700
- **9th-13th Aug 2010 - Workshops on the Retraining of Junior Secondary School Teachers** on the New UBE Curriculum and Continuous Assessment in Schools at Nsukka: No. Of Participants: 291

SMSE TRAINING WORKSHOPS

- **16th- 20th Aug 2010 - Workshops on the Retraining of Junior Secondary School Teachers** on the teaching of mathematics, Sciences, English Language and Social studies in Schools at Enugu: No. Of Participants: 141
- **23rd -27th Aug 2010 - Workshops on the Retraining of Junior Secondary School Teachers** on the teaching of mathematics, Sciences, English Language and Social studies in Schools at Nsukka: No. Of Participants: 291

SMSE TRAINING WORKSHOPS

- **6th -10th Sept 2010 - Workshops on the Retraining of Primary School Teachers** on the teaching of mathematics, Sciences, English Language and Social studies in Schools at Enugu: Participants: 1132
- **13th -17th Sept 2010** - Workshops on the Retraining of Primary School Teachers on the teaching of mathematics, Sciences, English Language and Social studies in Schools at Nsukka: Participants: 568

SMSE TRAINING WORKSHOPS

- **20th-22nd Sept 2010 - Workshops on the Retraining of ECCD School Teachers** on the teaching of mathematics, Sciences, English Language and Social studies in Schools at Enugu: 700
- **27th – 29th Sept 2010 - Workshops on the Retraining of ECCD School Teachers** on the teaching of mathematics, Sciences, English Language and Social studies in Schools at Nsukka: Participants 291

SMSE TRAINING WORKSHOPS

- **16th- 20th Aug 2010 - Retraining of Junior Secondary School Teachers** on the teaching of mathematics, Sciences, English Language and Social studies in Schools at Enugu: Participants: 1,132
- **23rd -27th Aug 2010 - Retraining of Junior Secondary School Teachers** on the teaching of mathematics, Sciences, English Language and Social studies in Schools at Nsukka: No. Of Participants: 568
- **6th -10th Sept 2010 - Retraining of Teachers** on the teaching of mathematics, Sciences, English Language and Social studies in Schools at Enugu: Participants: 700

SCHOOL OF COMPUTER SCIENCE

- The School of Computer Science assists the Centre to carry out its expanded mandate in the Nigerian University system and national economy by enabling the Centre to produce high level personnel in information technology in general and computer science in particular by:-
- Helping to deliver the promise of ICT revolution to Nigeria through information technology education at all levels of education in Nigeria; exposing young and experienced professionals to new results and findings in area of IT and Computer Science;

SCHOOL OF COMPUTER SCIENCE

- facilitating and conducting new research activities in the area of IT and computer science:
- extolling the underlying theoretical mathematical principles common to mathematics, physics, statistics, and computer science, and promote interface (interdisciplinary) studies among them.

SCHOOL OF COMPUTER SCIENCE

- **The School plans:-**
- To organize some activities fully funded by the Centre and some to be funded by outside bodies based on collaborative links, within the framework of programme of scientific activities.
- To get three or more research postgraduate students under the Postgraduate School of the Centre, and with reference to programme of scientific activities, and to explore funding from national and international agencies such as Erasmus Mundus Programme of the European Union, ICTP, etc.)

SCHOOL OF COMPUTER SCIENCE

- To organize joint training programmes with Consultancy Unit and Computer Laboratory for purposes of fund raising for the Centre; to intensify software development and ICT incentive activities.
- **Production of NMC's Computer Science Teaching Module:** The modalities for producing Computer Science Teaching Module had been discussed with the Head and staff of Computer Laboratory. Activities in this direction had already commenced and will continue with more vigour in 2011 when we expect the module to be produced and launched.

SCHOOL OF COMPUTER SCIENCE
Proposed Activities

S/N	TITLE OF ACTIVITY	PARTICIPANTS
1	Research Methodology in Science, Engineering and Technology	M.Sc, PhD Students, Software Developers and Lecturers
2	Research Oriented Course on Current Issues in Object – Oriented Software Methodologies	M.Sc, PhD Students, Software Developers and Lecturers
3	Workshop on Web Technologies for Data Warehousing/Data mining	MDAS, Bank, Insurance companies, Oil & Gas CEOs, Web programmers, Software developers, HODs etc
4	Annual Nigerian Universities Computer Programming Contest And West African Regional Computer Programming Contest	Undergraduate and first year Masters Students.

INSTITUTE OF SCIENCE EDUCATION (formerly MIP)

- An Institute set up to:
- Revamp mathematics learning and teaching in Nigeria because the performances of students nationwide in Secondary Schools Certificate Examination (WASSCE) in Mathematics,
- **E**xpand Mathematics Improvement Programme (MIP) to all States and LGAS in Nigeria
- Intensify research, and book publication activities including production of the second volume of *Basic Concepts on difficult areas in mathematics and solutions to WASSCE and NECO – SSCE questions from 2006 – 2010.*

INSTITUTE OF SCIENCE EDUCATION (formerly MIP)

- MIP presents a clearly structured teaching methodology characterized by active teacher participation and monitoring of students' activities using NMC instructional materials (*MIP textbooks e.g. Basic Mathematics Concepts, Teaching Modules, Students' Workbook, Models, Games) and Mathematics kits*
- **MIP ACTIVITIES**
- **8th- 20th Feb, 2010;** MIP clinical Training of Students & Monitoring; Venue: 6 Pilot Schools in Ondo State; Resource Persons: 4; Teachers: 3; Participants: 1060

2010 ACTIVITIES OF ISE

- **19th-23rd April, 2010**: MIP clinical Training Students and Teachers; Venue: Air-Force Girls' Com. Schl. Jos; No. Of Resource Persons: 1; No. Of Teachers: 2; Participants: 50
- **27th June—3rd July, 2010**: MIP clinical Training of Students & Teachers; Venue: 10 Pilot Schl. In Ekiti State; No. Of Resource Persons: 6; Teachers: 3; Participants: 1600
- **4th-10th July, 2010:** MIP clinical Training of Students & Teachers; Venue: 6 Pilot School in Kogi State; No. Of Resource Persons: 4; Teachers: 3; Participants: 1200

- **18th-24th July 2010:** MIP clinical Training of Students & Teachers; Venue:6 Pilot School Gombe State; Resource Persons: 4; Teachers: 1; Participants: 5600

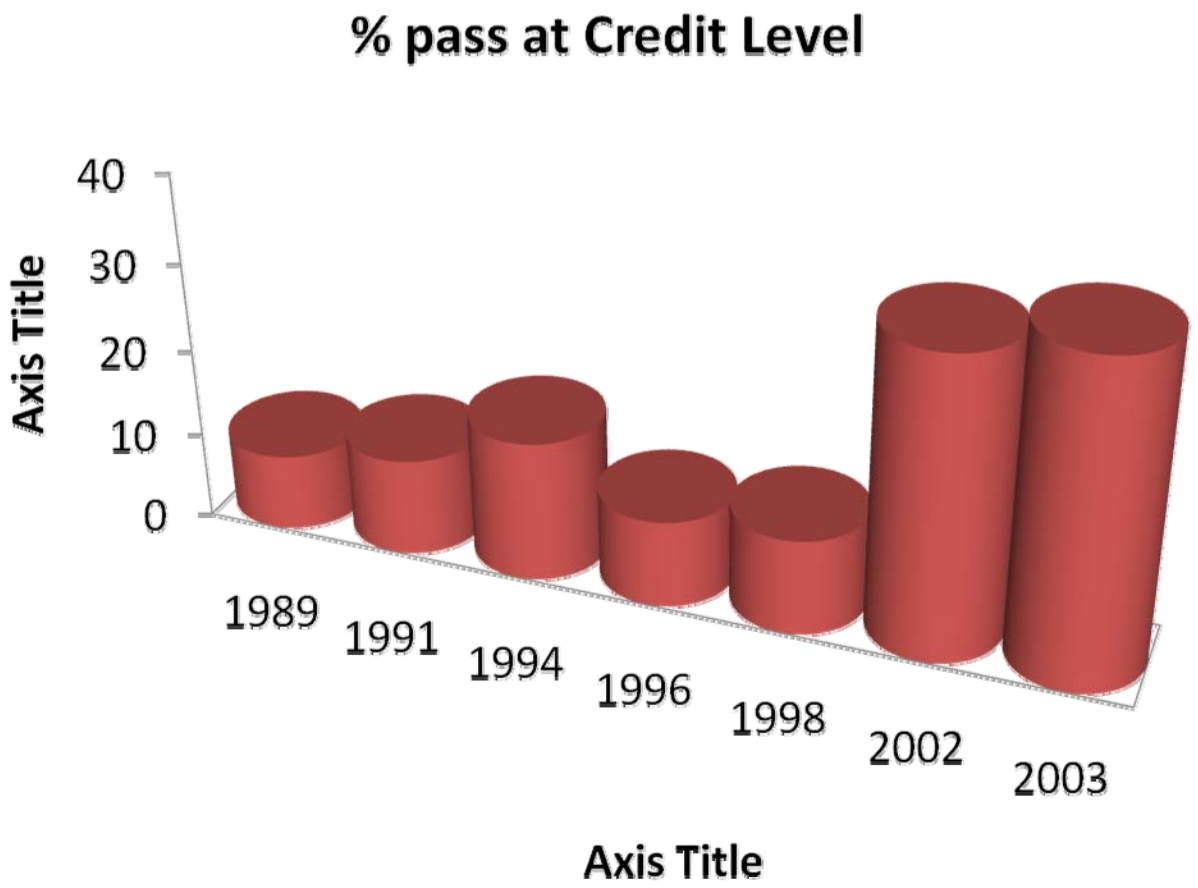
STATISTICS ON MIP PILOT SCHOOLS

S.No.	Requirements	Katsina	Zamfara	Ondo
(i)	No of MIP schools	7	4	6
(ii)	No of students in MIP schools	5380	5010	2481
(iii)	Total No of teachers in MIP schools	34	33	17
(iv)	Total No of qualified MIP teachers	9	4	10
(v)	Students/Qualified teacher ratio	598:1	1253:1	248:1
(vi)	Average No of students/ class	86	104	40
(vii)	% performance mathematics WASSCE results*	47	76	77

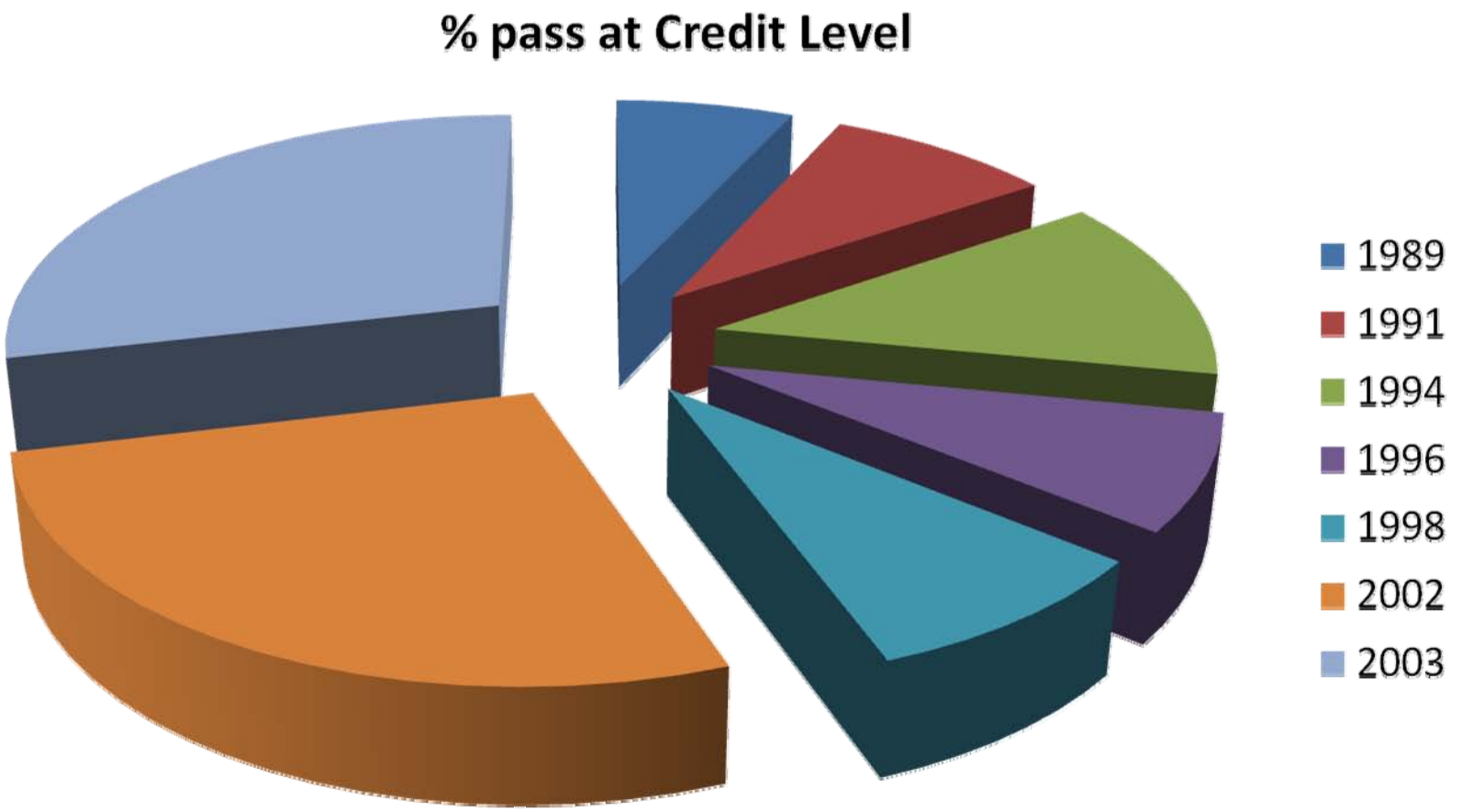
National Mathematics Performance at West African School Certificate Examinations

Year 1989	1991	1994	1996	1998	2002	2003	2004	2005
% pass at 8.78 Credit level	11.13	16.12	10.01	10.98	34.41	36.83	34.51	38.23

National Mathematics Performance at West African School Certificate Examinations



National Mathematics Performance at West African School Certificate Examinations



MATHEMATICS KITS DEVELOPMENT

- To inculcate numeracy culture in every Nigerian pupil and student, the Centre has designed innovative mathematics kits and built a modern prototype mathematics laboratory at the Centre.
- The Centre had distributed several innovative Mathematics Kits including manipulative devices (models, kits, plain and solid shapes, tools and equipment as well as textbooks (workbooks and games) to selected pilot schools.

MATHS KITS.....

- The Centre had trained several primary school and secondary school mathematics teachers on the use of the Mathematics kits:
- For improved skills and competence in the effective teaching of the subject and
- To foster mathematics consciousness in both students and teachers.

BIO-MATHEMATICS DEPARTMENT (ACADEMIC ACTIVITIES)

- **L**ong term plan to organize talent hunt workshops in preparation for future IBO
- To organize a Biostatistics & Biomathematics Curriculum Development Workshop;
- To organize a National Biomathematics Book writing workshop
- To organize Biology practical skills development (in-youths) workshop and Ecological practical design and conservation skills.

BIOMATHS ……

- **To mount Biology** entrepreneurship for youths in:
  - Laboratory specimens' techniques
  - Entomological specimens' preparation
  - Parasitological specimen preparation
  - Histological specimens (slide preparation)
- Science Improvement Project (SIP) Biological and Biomathematics Project. **Design and production of :**
- Teaching modules for teachers and students in States and FCT of Nigeria as well as the Training syllabi for NBO and IBO competitions

BIOMATHS .....

- Building Biological/Biomathematics Department into a School and Curriculum Development of the School.
- Pure biology – curriculum as in secondary and university (including postgraduate) to include: Biomathematics curriculum; Mathematical ideas in Biology; Mathematical Ecology; Biomathematics of sport; Biomathematics in Health; Mathematical models as tools for control of infectious diseases.

OLYMPIADS INSTITUTE

- The Olympiad Institute has objectives towards:
- Ensuring Nigeria's participation in the yearly international events; Identifying and encouraging young talents in mathematics and mathematical sciences and
- Helping students acquire critical thinking skills as well as introducing them to the role of mathematics and science in day to day human endeavour.
- Under this mandate, the Centre **annually organizes the National Mathematics Olympiads all over Nigeria to select participants for international competitions.**

OLYMPIADs .....

- Through the efforts of the Centre, Nigeria participated in all the Mathematics and Science Olympiads in 2010 as follows:-
  - International Physics Olympiads (IPHO) held in Croatia from 17th-25th July 2010 Nigeria got Honourable mention.
  - International Biology Olympiads (IBO) in Korea from 11th-18th July 2010
- International Olympiads in Informatics (IOI) held from 14-21 August 2010 in Canada

OLYMPIADS .....

- International Chemistry Olympiads (ICHO) held in Japan 19th-28th July 2010
- International Mathematics Olympiads (IMO) Kazakhstan between 6th and 12th July 2010 Nigeria, for the first time, won a bronze medal.
- IPHO was held in Croatia between 17th – 25th July, 2010. Nigeria got Honourable mention
- IBO was held in South Korea between 11th – 18th July, 2010.
- IOI was held in Canada between 14th – 24th August, 2010.

NMC CONSULT UNIT

- The NMC-Consult is an outfit designed to generate funds to augment statutory funding for the Centre. The CONSULT's operation is limited by several challenges.
- To solve some of the problems, the Centre wants to:-
- Merge its marketing unit and the Consultancy Unit into a viable consultancy unit, under the leadership of an active Professor. Its objectives will include:-
- To establish ICT centres in six geo-political zones of Nigeria where e-learning would be the focal point.

NMC Consult ……

- To organize work-shops/conferences in various disciplines.
- To start a secondary school towards the popularization of mathematical sciences.
- To float other ventures such as Bakery, Petrol station and Business Centres to support the activities of the Centre.

ACTIVITIES OF NMC COMSAT SUB-NETWORK

- **NMC/ RMRDC Mathematical Modeling Research Grant**
- One of the oversight functions of the NMC is to supervise the grant on Mathematical Modeling for Processing of Raw Materials Equipment institutionalized by the National Mathematical Centre (NMC) and the Raw Materials Research and Development Council (RMRDC).
- The RMRDC identified the non–application of appropriate engineering Mathematics in the design and production of raw materials processing equipment in Nigeria as one of the main reasons for poor performance and failure of many of the equipment.

SOME RESEARCH ACTIVITIES

- In order to salvage the situation by maintaining the best engineering practice the production of high standard equipment are really necessary. Hence, NMC and RMRDC were prompt to institute the grant with funds provided by RMRDC.
- This grant started in 2006 and the two persons benefited. These were: (a) Associate Professor Ogbeide Samuel Enorogbue with Project Title – Mathematical Modeling of Essential Oil Distillation Units for Lemon Grass and Ginger Roots and

SOME RESEARCH ACTIVITIES

- (b) Dr. Abdulganiyu Raji, with Project Title – Mathematical Modeling of Oil Expression from Palm Kernel (Elaeis guineensis) Using Screw Press. The project had been completed and the results obtained from the research had been forwarded to the Committee in the Raw Materials Research Development Council working on the development of Simulation Package for processing raw materials.

SOME RESEARCH ACTIVITIES

- We had constituted two committees for 2010/2011 Award Selection and Interviewing Committees. The Selection Committee recommended three names to the Interview Committee.
- Three winners were interviewed in order for us to channel them in the direction of making suitable mathematical models properly targeted at Raw Materials processing equipment.

SOME RESEARCH ACTIVITIES

- **The 2009/2010 Research Grant** was awarded to:
- Dr. (Mrs) Taiwo Ademiluyi of Rivers State University of Science and Technology, Port-Harcourt, Project Title "Mathematical Modelling for Design and Fabrication of Cassava Drying Rotary Dryer".
- Dr. Nwakwojioke N. Bethrand of Michael Okpara University, Umudike with project titled "Modelling of Palm Nut Pulp Separator surface analysis, and,
- Dr. Olufemi A. Koya of Obafemi Awolowo University, Ile-Ife with project title—Mathematical Modelling of Commutation by Hammer Mill.

SOME RESEARCH ACTIVITIES

- The winners received one million naira (₦1 M) each as grant. The winners will give progress report, project seminars quarterly and the project is for one calendar year.
- The outcome of the Research in the project would be forwarded to the Committee on Computer Aided Design of RMRDC to develop appropriate software for engineers.

Mathematical Modeling Research for NMC-COMSATS Sub-Network

- The NMC organized an International Conference on Mathematical Modeling of some Global Challenging Problems in the 21st Century (26 – 30th November 2008).
- The Proceedings had already been published under Open Source on www.nmcabuja.org/nmc-proceeding.html.
- The papers published were indexed in Google scholar, MATHSCINET, and Open library and already sent for math review.

Global Initiative to solve Human Problems using modeling/Simulation (GISHPMS)

- At the last NMC-COMSATS International Conference on Mathematical Modeling held at NMC, we gave an exposition on areas where mathematical modeling can be used to solve human problems in the 21st Century.
- As you are aware, COMSATS Secretariat in Pakistan had also charged the Centre to form a coalition on Researchers and Centres to work on Mathematical modeling.
- In view of this, we intend to introduce the global initiative to solve human problems using models/simulation (GISHPMS).

Solving Human Problems using modeling/Simulation (GISHPMS)

- Although the Centre has some on-going research works in Modeling/Simulation and many proposals had also been developed in that direction, GISHPMS was born out of other modeling projects and would involve coalition of some research groups together.
- **Philosophy:** Global Initiative to Solve Human Problems using Modeling/Simulation (GISHPMS) is about development of new capacity for the world to fight some of the global challenging problems facing human beings including those in medicine, agriculture, energy, finance and human capital development and so on.

Solving Human Problems using modeling/Simulation (GISHPMS)

- The idea of GISHPMS is to raise awareness (advocacy) on how to solve the human problems using the instrument of mathematics modeling/simulation.
- The use of mathematical models/simulation will offer us information about problems and how to predict the state of the events of the underlying process governing the problem and how to forecast the best possible strategic way to control or solve the problem.

Solving Human Problems using modeling/Simulation (GISHPMS)

- GISHPMS has several advantages such as:
- Creating awareness about several problems that are facing humans, e.g. new emerging diseases and disasters such as tornadoes, earthquakes, sunamis, etc.
- Equipping people with the skills in modeling and simulation to bring them into mainstream of scientific decision making.
- Reduction of unemployment and underemployment and empowerment of persons to earn good wages, that is, a source of wealth creation.

Solving Human Problems using modeling/Simulation (GISHPMS)

- Ability of professionals to be produced to analyze, predict and control human problems.
- Training for all classes of individuals from school certificate holders to PhD holders on how to use model/simulate facilities to analysis data and to interpret the results.
- Participants would be trained on how to develop simulation packages from models that are useful in solving several human problems and how to increase the sources of income of the participants.

Some Models for the GISMPHS:

- Population models and application in epidemiology;
- Medical bioinformatics model: studying the genes of human beings how to use such information to predict/diagnose diseases, and the underlying models for medical imagery equipment;
- Study the dynamics of the atmosphere, the ocean, the solid earth and the biosphere and other forms of living things;
- Study universal climatic changes and problems like cyclone or hurricane.

Some Models for the GISMPHS:

- Bio-economic models for sustainable exploitation and biological resources e.g. Fishery and Forestry;
- Foreign exchange, financial and market strategies;
- Application of high level stochastic calculus to develop models for quantitative analysis of financial problems on mortgaging, insurance and hedging;
- Nano-science and application;
- Energy alternatives, renewable and non-renewable energy researchers;
- Traffic controls in telecommunication and information technology. Quality of Service (QOS) strategies for implementing GISHPMS;

Expected Results:

- **RESULTS:** The production of software; provision of Education/Training and basic skills for students to be employable in global world of information technology.
- Building human capital for financial industry to provide quantitative analysis of market situation, portfolio optimization and immunization.
- Forecasting/analysis of diseases, energy crisis and energy alternative issue, environment and impact assessment.
- Studying the state of the economy and strategic ways to increase Gross Domestic Product (GDP) of the Nation.
-

Implementing the GISHPMS:

- Training: To involve training of persons in developing models, design and implement simulation experiments to solve real life problems using information from real life data, interpret and predict occurrence of some real life phenomena using modeling and simulation techniques.
- To train high/medium level personnel on the use the existing simulation facility to solve societal problems and to take critical decisions using modeling and simulation techniques.

Implementing the GISHPMS:

- Research: To use the modeling and simulation to solve problems and contribute to knowledge on solutions to Human problems using GISHPMS techniques.
- Communication: The process of communicating the outcome of modeling and simulation to end users.
- In summary, the GISHPMS is a capacity building project intertwined with capacity utilization of scientists, engineers and educationalists being pooled together to achieve some set target goals.

Other Research Collaborations/Activities

- Electronic Classroom mechanism: Software Development
- The Centre had developed software for training students using cartoons and simulation technique.
- The National Mathematical Centre (NMC) and Nigerian Electricity Regulatory Commission (NERC) had concluded arrangement to sign a Memorandum of Understanding (MOU). The Centre is to develop a new Electricity Tariff Model to help to compute appropriate pricing structure for Nigeria Power Sector. The Research Group on Financial Model is developing a scholastic based model for pricing the fair price for electricity for the Nation.

Research Collaborations …

- The Centre is collaborating with the Nigerian National Petroleum Cooperation (NNPC) to develop an optimization model to improve the flow of crude in the flow station. Operational Research Models have been proposed by Mathematical Modeling Research Group.
- The Centre is also collaborating with some Universities on the use of mathematical Modelling and Mathematical Software. Recently, it supported: The first National training course on MATLAB/SCILAB for data Analysis and visualization held at the University of Nigerian Nsukka (UNN).

Research Collaborations ....

- The Centre had supported the use of Python programming language in the Foundation Postgraduate Course of Isomathematics and Computational Physics.
- This Course was jointly organized by NMC and the International Centre for Basic Science Abuja held at NMC (11 -17 July 2010) under Public Private Partnership (PPP) agreement.

Research Collaborations ....

- lecture note will be published by the African Journal of Physics, a publication of African Physics Society Network registered in USA.
- Foundation Postgraduate Course in Isomathematics and Genomathematics will run on 10-15 July 2011.
- The Python and V-Python Programming will be used to Simulate some physical problems some of which will be genetically based.
-

VISITING SCIENTISTS

- The Centre in its efforts to expand the number of experts available and also to avail experts its research facilities, it offered short-term research Visitors scheme under which Researchers visit the Centre for a brief period for their academic endeavours.
- Several Scientists visit the Centre to assist in the work of the Centre in an effort to place Nigeria in the world map in the mathematical sciences.
- Some postdoctoral fellowships had been advertised in the area of Pure and Applied Mathematics.

VISITING SCIENTISTS……

- Some Visiting Professors were appointed to give the desired quality leadership in Research and Training as well as to oversee the fellowship programmes in these directions.
- Other programmes include the Post Doctoral Fellowship in K-Theory and Applications
- Under this scheme, an international Professor of Mathematics, Professor Aderemi Kuku, visited the Centre in 2010 and coordinated the Centre's Weekly Seminars and implementation of the recommendations of the International Scientific Committee.

ACADEMIC LINKAGES

- Special Academic linkages had been established with International Agencies/Research Institutes such as TWAS, ICTP, IMPA, COMSATS, IMO for the purpose of accessing funds for research;
- The Centre signed an MoU with the Institute for Applied Mathematics, Brazil in knowledge, manpower and students exchange for the technological development;
- Academic relationship with ICTP, Trieste had provided an opportunity for over 50 junior researchers to learn, at the Centre, basic methods of Computational Condensed Matter Physics recently.

INTERNATIONAL COOPERATION

- The Centre is a member of COMSATS Coordinating Council. The COMSATS Meeting is an annual event and has special significance as it helps strengthen the Network of the International Science and Technology Centres of Excellence for Sustainable Development in the South.
- The meeting paves way for creating avenues for international cooperation and to devise science and technology based solutions for the pressing developmental problems of the third-world.

INTERNATIONAL SCIENTIFIC COMMITTEE

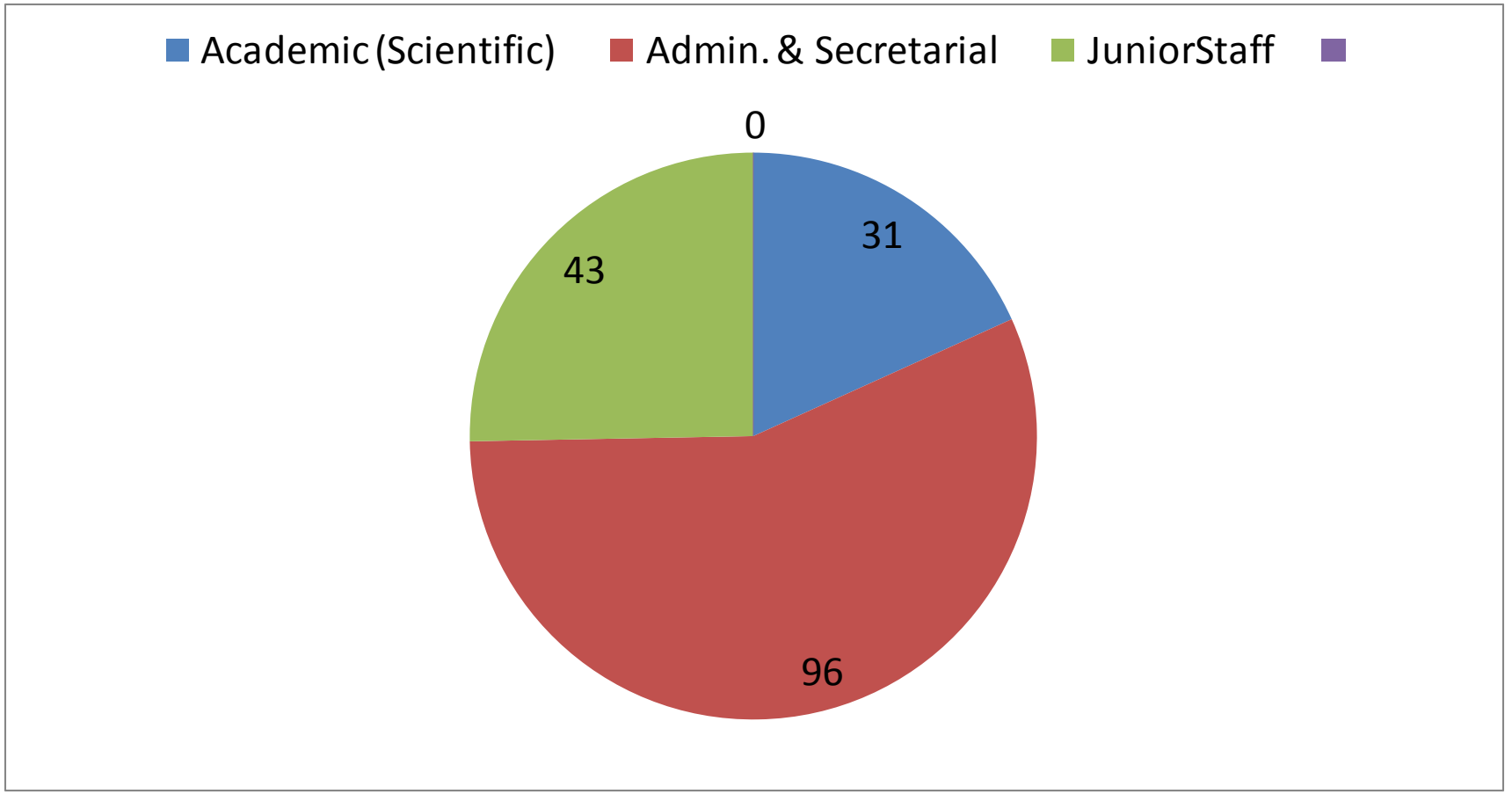
- The Centre constituted a high powered International Scientific Committee (ISC) sometime ago to monitor and advise the Academic Board and the Council on the formulation and evaluation of the academic programmes/activities of the Centre.
- The ISC is headed by Professor Phillip Griffiths, former Director, Institute of Advanced Study, Princeton, NJ, USA and Prof. Sam. O. Ale as the Deputy Chairman.

ISC ……

- Other international members are Professor M. H. A. Hassan, former Executive Director, TWAS; Professor Dr. Michiel Hazenwiken, Editor, Encyclopeadia of Mathematics, Amsterdam; Professor Saliou Toure, President, African Mathematical Union; Professor K. R. Screeniversan, Institute for Mathematical Sciences

STAFFING

- The total number of staff members of the Centre is 170 as follows:-
- Academic (Scientific) Staff = 31
- Admin and Secretarial staff = 96
- Junior staff = 43
- **Total** **= 170**


Academic (Scientific)
Admin. & Secretarial
JuniorStaff
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PRODUCTS OR PUBLICATIONS

- National Mathematical Centre, Abuja Lecture Notes Series 1 - 35
- Lecture Notes on Cumulative Algebra
- Lecture Notes on Cumulative Algebraic K-Theory
- Proceedings of the National Mathematical Centre on Ordinary Differential Equation
- National Mathematical Sciences Summit and Annual Lecture Report
- Lecture Notes on A Foundation Postgraduate Course in Algebra

PRODUCTS OR PUBLICATIONS

- Lecture Notes on A Research Oriented Course in the Arithmetic of Elliptic Curves Groups and Loops
- Lecture Notes on A Research Oriented Course in Topological Vector Spaces Non-locally Convex, Non-Archimedean
- Lecture Notes on A Foundation Postgraduate Course in Object-Oriented Software Design Introduction to C++ Programming
- Lecture Notes on A Research Oriented Course in Semi Group Theory

PRODUCTS OR PUBLICATIONS

- NMC Proceedings Workshop on Mathematical Modelling of Environmental Problem
- NMC proceedings on Conference on Mathematics of Computation and Application
- NMC: A Day Seminar on Numerical Methods for Ordinary Differential Equations,
- Proceedings on the NMC/COMSATS International Conference on Mathematical Modelling of some Global challenges

PRODUCTS OR PUBLICATIONS

- NMC Proceedings Workshop on Mathematical Modelling of Environmental Problem, 2005—available on **www.nmcabuja.com/proceedings**
- NMC proceedings on conference on Mathematics of Computation and Application, 2005—available on **www.nmcabuja.com/proceedings**
- NMC: A Day Seminar on Numerical Methods for Ordinary Differential Equations, 2006—available on **www.nmcabuja.com/proceedings** --these proceedings were mirrored in site in Sweden: emath.golonka.se/nmcproceedings

PRODUCTS OR PUBLICATIONS

- The Proceedings of the First International Conference on Mathematical Modelling of Some Global Chalenging Problems in the 21st Century organised by NMC-Comsat, 26 - 30 November, 2008. Editors: Samson Olatunji Ale, ET. AL.
- The Centre had produced two new Academic Journals for the Mathematical Sciences and the Mathematical Sciences Education:
  - **NMC Journal of Mathematical Sciences(NMC-JOMS)** – for publication of articles in core Mathematics and Science **and**

PRODUCTS OR PUBLICATIONS

- **NMC Journal of Mathematical Sciences Education (NMC-JOMSE)** – for publication of articles in Mathematics and Sciences Education.
- Teaching Modules for Teachers—Primary 1,2,3,4,5,6;
- Teaching Modules for Teachers—JSS1,2,3; SS1,2,3;
- Workbooks for pupils—Primary 1,2,3,4,5,6;
- Workbooks for students—JSS123; SS1,2,3;
- Mathematical Games for Primary & Secondary Schools;
- Basic Concepts on Difficult Areas in Secondary School Mathematics;

PRODUCTS OR PUBLICATIONS

- Basic Concepts on Difficult Areas in Secondary School Mathematics and Solutions to WASSCE and NECO SSCE Questions from 2000-2009;
- Mathematics for Primary Schools—Primary 1,2,3,4,5,6;
- Mathematics for Secondary Schools—JSS 1,2,3; SSS 1,2,3.
- The Whiz-Teacher (a device designed for ICT based teaching method)
- Primary and Secondary Mathematics Kits (P/SMK)

CHALLENGES

- **Running Courses, Workshops, Conferences, Lectures and** the maintenance of the mathematical sciences Library and the Computer Laboratory at appropriate levels for research are the main avenues by which the Centre seeks to fulfil its mandate.
- For now, locally based mathematical scientists are pooled together to give viable Foundation Postgraduate and Research Oriented Courses at the Centre.
- The Centre is soliciting for funds for Sponsorship of the Resource Persons at Scientific courses, Conferences and Workshops; Endowment of Professorial chairs.

CHALLENGES

- **COMSATS** is requested to come to our aid to run and invite Keynote speakers to our forthcoming activities:
- Workshop on Mathematical Modeling and Simulation (16 – 21 October 2011).
- International Conference on Mathematical Modeling and Simulation (23 – 26 October 2011).
- **COMSATS INVITED TO:**
- **ASSIST THE CENTRE TO SOURCE FINANCIAL SUPPORT FROM WORLD DONORS AND WORLD BANK**

CHALLENGES

- (including other organizations such as the African Development Bank, UNESCO, African Mathematics Millennium Science Initiative, the Gates Foundation, National Science Foundation, USA as well as attract industrial funds.
- **COMSATS TO:**
- **Support and promote special academic relationships, partnership and collaboration between the National Mathematical Centre and identified Research Centres, Universities and other relevant bodies and institutions;**

CHALLENGES

- COMSATS to assist the Centre attract the best mathematical scientists in the world to visit, collaborate and train students in Nigeria.
- **COMSATS to assist the Centre in bringing together renowned mathematicians to participate in its Special Joint Degree Programme to achieve its central objective of making Nigeria a truly international Centre for Research and Training in the mathematical sciences.**

CONTACT INFO

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Thank You