MAKERERE UNIVERSITY

COLLEGE OF NATURAL SCIENCES

ANNUAL REPORT 2013

College Administration

The College is headed by a principal who is assisted by a deputy, 2 deans of schools and 6 heads of departments. We also have 2 coordinators for special subject areas of Botany and Sports Science.

Principal
Professor J.Y.T Mugisha, PhD

Deputy Principal
John M. Magero, PhD

Dean – School of Biosciences
Maud Kamatenesi-Mugisha, PhD

Dean – School of Physical Science
Juma Kasozi, PhD

Chair – Department of Mathematics
Godwin Kakuba, PhD

Chair – Department of Chemistry
Muhammed Ntale, PhD

Chair – Department of Physics
Winston Tumps Ireeta, PhD

Chair – Department of Geology and Petroleum Studies
Michael Owor, PhD

Chair – Department of Biochemistry and Sports Science
Joseph Kyambadde, PhD

Chair – Department of Biological Sciences
Anne Akol, PhD

Coordinator – Botany
Arthur K. Tugume, PhD

Coordinator – Sports Science
Deogratius Bamweyana

College Human Resource Officer
Agnes Kemigisa

College Registrar
Josephine Ataro

College Bursar
Andrew Malagala

College Librarian
Rhoda Nalubega

College Procurement Officer
Sarah Nakibuuka

College Communication Officer
Zaam N.K. Ssali
E-mail: pr@cns.mak.ac.ug

CoNAS General Contact
College of Natural Sciences
Makerere University
P.O. Box 7062
Kampala, Uganda
Tel: +256 414 532401
Website: www.cns.mak.ac.ug

Schools: School of Physical Sciences *Website*: http://sps.mak.ac.ug
School of Biosciences *Website*: http://sbis.mak.ac.ug

Table of Contents

List of Acronyms

BSCB – Bachelor of Science in Conservation Biology

BSFA – Bachelor of Science in Fisheries and Aquaculture

BSIC – Bachelor of Science in Industrial Chemistry

BSPG – Bachelor of Science in Petroleum Geosciences and Production

BSC – Bachelor of Science

BSPC – Bachelor of Science in Sports Science

CoNAS – College of Natural Sciences

BETB – Bachelor of Science in Ethnobotany

MSc. – Master of Science

BSBT – Bachelor of Science in Biotechnology

PhD – Doctor of Philosophy

NORAD – Norwegian Agency for Development Cooperation

List of Tables

Foreword by the Principal

I present to you the annual report for the College of Natural Sciences (CoNAS) for the year 2013. The year 2013 was a busy year for the College of Natural Sciences where major milestones were realized.

The College in tandem with its mission of '*of creating and imparting knowledge in basic and applied sciences*' has endeavoured to produce graduates for various sectors of scientific and economic development of Uganda. The College continued to offer services to other Colleges by teaching branches of basic science relevant to their disciplines. Capacity building for our members of staff was realized through attendance of workshops and seminars both at national and international level. Excellence in teaching and learning has continued supported by various research activities and projects undertaken by staff and students.

I am happy to report that the College will benefit from various partnerships for capacity building. One of them is a USAID Project titled, '*Capacity Building in Environmental Management for the Oil Sector (EMOS)'* that commenced in October 2013. The U.S. Agency for International Development (USAID) office in Uganda awarded a $6 million contract to TetraTech ARD and Texas A&M University in U.S.A to support strengthening of the capacity of Ugandan professionals in the public and private sector to manage the environmental impacts of the oil and gas sector. Makerere University through CoNAS will serve as the lead institution for a strategic planning process and development of a framework for educational capacity building activities.

Our staff have realized innovations arising out of their research projects and initiatives. A major innovation is the Lateral Flow Test that can accurately detect parasites in tsetse flies that cause sleeping sickness. The test will help in identifying areas of potential sleeping sickness outbreaks that can be prioritized for tsetse fly control to pre-empt an outbreak. A project coordinated by Professor John Kiboko Enyaru, Department of Biochemistry and Sports Science in collaboration with a Ugandan manufacturer Astel Diagnostics Ltd, and six other implementing agencies from Congo, the Democratic Republic of Congo, Malawi, South Sudan, Sudan and Tanzania, successfully developed the test.

However, challenges of funding, recruitment delays and retaining staff continue to affect the performance of the college. Servicing of students from other colleges worsen the problem with the student staff ratio remaining very high.

I wish to thank the University Administration and development partners for their support of our activities during the year. I also thank the College administration, staff and students for their continued support and participating in the activities

of the College. I also extend thanks to all players in the successful preparation of this report. The staff for the information provided for production of the report and the College Communication Office that compiled the report.

As We Build for the Future

Professor J.Y.T Mugisha

PRINCIPAL

Executive Summary

The College of Natural Sciences (CoNAS) is made up of two schools, the School of Biological Sciences and School of Physical Sciences. The schools are further divided into departments. The School of Physical Sciences has the departments of Mathematics, Physics, Chemistry, and Geology and Petroleum Studies. The School of Biological Sciences has the departments of Biology and department of Biochemistry and Sports Science.

In the year 2013, the CoNAS continued to deliver on its mission of creating and imparting knowledge in basic and applied sciences. The CoNAS offers programmes and courses in basic and some aspects of Applied Sciences. It should be noted that for purposes of furthering knowledge, research projects jointly handled by staff and students are conducted in all departments at graduate (Masters and PhD) level. The College endeavours to produce graduates for various sectors of a scientific nature. The College also offers services to other Colleges by teaching branches of basic science relevant to their disciplines.

The programmes offered include: Undergraduate – BSc (Majoring in Chemistry, Mathematics, Geology, Biochemistry, Botany, Zoology or Physics), BSc in Industrial Chemistry, BSc in Petroleum Geosciences and Production, BSc in Fisheries and Aquaculture, BSc in Ethnobotany, BSc in Conservation Biology, BSc in Biotechnology, BSc in Sports Science; Graduate – MSc in Physics, MSc in Chemistry, MSc in Geology, MSc in Mathematics, MSc in Mathematical Modelling, MSc Botany, MSc in Biochemistry, MSc in Zoology, MSc in Fisheries and Aquatic Sciences, PhD in Mathematics, PhD in Physics, PhD in Chemistry, PhD in Geology, PhD in Botany, PhD in Biochemistry and PhD in Zoology.

Additionally, courses in Biochemistry are taught for students from the College of Health Sciences and School of Veterinary Medicine. CoNAS also teaches students from the College of Education and External Studies, College of Computing and Information Science and School of Statistics and Applied Economics a number of courses in Chemistry, Mathematics, and Physics.

The number of students who graduated for both bachelors and graduate degrees from the College in 2013 was 243 compared to 324 for the year 2012. The registered students at undergraduate level were 1175 and 156 students for postgraduate degrees. The College had a total of 54 publications by academic staff in refereed journals arising from research undertaken.

1.0 INTRODUCTION AND BACKGROUND

1.1 Introduction

This is a presentation of the annual report of the College of Natural Sciences (CONAS) for the year 2013. The report details progress and activities implemented within the year.

1.2 Mission of the College

The mission of CONAS is to create and impart knowledge in basic and applied sciences to society through training, research and extension services for development.

The general functions of the College of Natural Sciences are to:

a) Produce graduates for various sectors of scientific and economic development of Uganda and the World at large.
b) Conduct high quality research in basic science.
c) Offer extension services to various sectors of human activities.
d) Provide services to other Colleges/Schools/Institutes by teaching branches of basic science relevant to their disciplines.
e) promote joint and interdisciplinary research

1.3 The College of Natural Sciences Structure

The College has two schools which have been further divided into departments.

1. School of Biosciences
2. School of Physical Sciences

1.3.1 Units of the Schools in CoNAS: Activities and Achievements

The College has six departments namely, Biochemistry and Sports Science, Biological Sciences, Chemistry, Geology and Petroleum Studies, Mathematics, and Physics. Each Department has a specific role/mandate in teaching and research as outlined below. Their activities and achievements for 2013 are included.

1.3.1.1 SCHOOL OF BIOSCIENCES

The Department of Biochemistry and Sports Science

The Department of Biochemistry and Sports Science is responsible for teaching biochemistry and sports science in the Colleges of Natural Sciences, College of Health Sciences and School of Veterinary Medicine. The Department plans to widen the application of biochemistry and molecular biology for sustainable development. It is planning to change its name to "*The Department of*

Biochemistry and Molecular Biology". The department will temporarily be together with Sports Science until both grow into independent departments. Sports Science is geared towards producing graduates who are equipped with adequate scientific knowledge and skills to serve in the sports industry and enhance development of both elite and mass sports, for all individuals irrespective of age, physical ability or level of skill both in and outside Uganda.

Publications for 2013

1. Echodu R, Sistrom M, Hyseni C, Enyaru J, Okedi L, Aksoy S, Caccone A.(2013). Genetically Distinct *Glossina fuscipes fuscipes* Populations in the Lake Kyoga Region of Uganda and Its Relevance for Human African Trypanosomiasis. Biomed Res Int. 614721.

2. Eyford BA, Ahmad R, Enyaru JC, Carr SA, Pearson TW. (2013). Identification of Trypanosome proteins in plasma from African sleeping sickness patients infected with *T. b. rhodesiense*. PLoS One. 8(8):e71463.

3. Malele II, Ouma JO, Enyaru JC, Matovu E, Alibu V, Auma JE, Onyoyo SG, Bateta R, Changasi RE, Mukiria PW, Ndung'u K, Gitonga PK, Mwaniki LM, Nyingilili HS, Lyaruu EA, Kapange LA, Kamau PK, Masiga DK.(2013).Comparative diagnostic and analytical performance of PCR and LAMP-based trypanosome detection methods estimated using pooled whole tsetse flies and midguts. Vet. Parasitol.:549-556.

4. Tiberti N, Lejon V, Hainard A, Courtioux B, Robin X, Turck N, Kristensson K, Matovu E, Enyaru JC, Mumba Ngoyi D, Krishna S, Bisser S, Ndung'u JM, Büscher P, Sanchez JC.(2013). Neopterin is a cerebrospinal fluid marker for treatment outcome evaluation in patients affected by *Trypanosoma brucei gambiense* sleeping sickness. PLoS Negl Trop Dis.:7(2):e2088.

5. Tiberti N, Matovu E, Hainard A, Enyaru JC, Lejon V, Robin X, Turck N, Ngoyi DM, Krishna S, Bisser S, Courtioux B, Büscher P, Kristensson K, Ndung'u JM, Sanchez JC.(2013). New biomarkers for stage determination in *Trypanosoma brucei rhodesiense* sleeping sickness patients. Clin Transl Med.:2(1):1.

6. Molecular Ecology Resources Primer Development Consortium, Aksoy S, Almeida-Val VM, Azevedo VC, Baucom R, Bazaga P, Beheregaray LB, Bennetzen JL, Brassaloti RA, Burgess TI, Caccone A, Chang SM, Ciampi AY, Ciancaleoni S, Clímaco GT, Clouet C, Coimbra MR, Coutinho LL, Dantas HL, De Vega C, Echodu R, **Enyaru J**, Figueira A, Filho MA, Foltz B, Fressigné L, Gadomski M, Gauthier N, Herrera CM, Hyseni C, Jorge EC, Kaczmarczyk D, Knott E, Kuester A, Lima AP, Lima MA, Lima MP, Longo AL, Lor G, Maggioni R,

Marques TS, Martins AR, Matoso DA, Medrano M, Mendonça MA, Mettler R, Nascimento PR, Negri V, Oliveira KK, Oliveira LO, Ovcarenko I, Paula-Silva MN, Raggi L, Sandoval-Castillo J, Santos CH, Martin Schaefer H, Segelbacher G, Seino MM, Sistrom M, Taole MM, Teske PR, Tsagkarakou A, Verdade LM, Villela PM, Vinson CC, Wingfield BD, Wingfield MJ. Permanent genetic resources added to molecular ecology resources database 1 October 2012-30 November 2012. Mol Ecol Resour. 2013 Mar;13(2):341-3.

The Department of Biological Sciences

The department offers a broad range of courses in plant and animal sciences, as well as conservation biology, biotechnology and the utilisation of plant and animal resources for the benefit and welfare of mankind. Graduates of the department become skilled at playing important roles in the study and improvement of animal production, public health and food safety conservation of biodiversity including genetic and wildlife resources, fisheries and aquaculture. The courses offered by the department of Biological Sciences fall within the fields of genetics, animal and plant breeding, evolutionary biology, animal and plant physiology, microbiology, insect, fish and plant pathology, Entomology, Parasitology, Ecology and Natural resources conservation, Fresh water biology, Taxonomy and Ethnobotany. The herbarium and botanic garden are key facilities for the teaching and research in botany and related fields while the museum and aquarium are one of several facilities that aid training in the animal sciences.

Publications for 2013

1. N. LeBlanc, Cortey, M., J. Pinero, F., Gallardo, C., Masembe, C., Okurut, A. R., Heath, L., van Heerden, J., Sánchez-Vizcaino, J. M., Ståhl, K., and Belák, S. (2013). "Development of a Suspension Microarray for the Genotyping of African Swine Fever Virus Targeting the SNPs in the C-Terminal End of the p72 Gene Region of the Genome", *Transboundary and Emerging Diseases*, vol. 60, no. 4,.

2. C. Osinde, Kamatenesi-Mugisha, M., and Oryem-Origa, H., *Nutritional and Anti-Bacterial Properties of Selected Plant Species (*2013-*Paperback)*. LAP Lambert Academic Publishing. ISBN: 13:978365918177, 10:3659178179.

3. M. Kaddumukasa, Nsubuga, D., and Muyodi, F. J. (2013). "Occurence of Culturable Vibrio cholerae from Lake Victoria, and Rift Valley Lakes Albert and George, Uganda", vol. 17, no. 4.

4. M. Kamatenesi-Mugisha, Buyungo, J. P., Ogwal, P., Kasibante, A., Deng, A. L., Ogendo, J. O., and Mihale, M. J. (2013). "Oral acute toxicity study of selected botanical pesticide plants used by subsistence farmers around the Lake Victoria Basin", *African Journal of Environmental Science and Technology*, vol. 7(3), pp. 93-101.

5. B. J. Sun, Sun, L. Y., Tugume, A. K., Adams, M. J., Yang, J., Xie, L. H., and Chen, J. P. (2013). "Selection pressure and founder effects constrain genetic variation in differentiated populations of a soil-borne bymovirus Wheat yellow mosaic virus (Potyviridae) in China", *The American Phytopathological Society*.

6. Arthur K. Tugume, Robert Amayo, Isabel Weinheimer, Settumba B. Mukasa, Patrick R. Rubaihayo, Jari P. T. Valkonen (2013). *Genetic Variability and Evolutionary Implications of RNA Silencing Suppressor Genes in RNA1 of Sweet Potato Chlorotic Stunt Virus Isolates Infecting Sweet potato and Related Wild Species*. PLOS ONE, Volume 8, Issue 11.

7. Ndukui, JG, Mugisha, K, Owiny, D, Kateregga, J, Patrick, V, Kasolo, J, Waako, P (2013) Toxicity Profile of Aqueous Leaf Extracts of Citropsis Articulata and Mystroxylon Aethiopicum in Male Albino Rats. World Journal of Pharmaceutical research. 3(1) 1273-1290.

8. Savina Asiimwe, Maud Kamatenesi-Mugisha, Agnes Namutebi, Anna-Karin Borg-Karlsson and Peace Musiimenta (2013). Ethnobotanical Study of nutri-medicinal plants used for the management of HIV/AIDS opportunistic ailments among the local communities of western Uganda. Journal of Ethnopharmacology 150:639-648.

1.3.1.2 SCHOOL OF PHYSICAL SCIENCES

The Department of Chemistry

Chemistry is the key to many other sciences and therefore orientated towards interdisciplinary teaching and research. The department is also involved in teaching applied chemistry through the programme called Industrial Chemistry. The Department also strongly supports the establishment of the planned central laboratory facility, which will serve the College as a whole. The Department will contribute equipment as well as technical staff in offering service analyses, consultancy in research and practical training for selected target groups within the College.

Publications for 2013

1. N. Zhu, Fu, J., Gao, Y., Ssebugere, P., and Wang, Y. (2013). "Hexabromocyclododecane in alpine fish from the Tibetan Plateau, China", vol. 181.

2. Byamugisha Tarsisius, Robert Byamukama and Muhammad Ntale (2013). Tests confirm suitability of Ugandan soils for commercial growing of *Artemisia annua* Linn. African Journal of Agricultural Research Vol. 8(37), pp. 4565-4572.

3. Godfrey S. Bbosa, David B. Kyegombe, William W. Anokbonggo, Muhammad Ntale, David Musoke, John Odda, Aloysius Lubega and Jasper Ogwal-Okeng (2013). Chronic alcohol use affects therapeutic steady state plasma drug concentrations of stavudine, lamivudine and niverapine in HIV-infected patients during 9 months follow up period: WHO AUDIT tool application. International Journal of Basic and Clinical Pharmacology.

4. Peter Musagala, Henry Ssekaalo, Jolocam Mbabazi and Muhammad Ntale (2013). A spectrophotometric method for quantification of sulphite ions in environmental samples. Journal of Toxicology and Environmental Health Sciences. Vol. 5(4), pp. 6-72.

5. Norah Mwebaza, Markus Jerling, Lars L. Gustafsson, Celestino Obua, Paul Waako, Margarita Mahindi, Muhammad Ntale, Olof Beck and Urban Hellgren (2013). Comparable Lumefantrine Oral Bioavailability when Co-administered With Oil-Fortified Maize Porridge or Milk in Healthy Volunteers. Basic & Clinical Pharmacology & Toxicology: Volume 112, Issue 2.

6. Wang P, Zhang H, Fu J, Li Y, Wang T, Wang Y, Ren D, Ssebugere P, Zhang Q, Jiang G (2013). Temporal trends of PCBs, PCDD/Fs and PBDEs in soils from an E-waste dismantling area in East China. Environmental Science Process Impacts. 15(10):1897-903. doi: 10.1039/c3em00297g.

7. Ssebugere P, Kiremire BT, Henkelmann B, Bernhöft S, Wasswa J, Kasozi GN, et al. (2013). PCDD/Fs and dioxin-like PCBs in surface sediments from Lake Victoria, East Africa. Science of the Total Environvironment 454-455:528-33.

8. Ssebugere P, Kiremire TB, Henkelmann B, Bernhöft S, Kasozi GN. Wasswa J. (2013). Schramm K-W. PCDD/Fs and dioxin-like PCBs in fish species from Lake Victoria, East Africa. Chemosphere;92(3):317-21.

9. Julius Matsiko, Jolocam Mbabazi and Muhammad Ntale (2013). "Impact of Municipal effluent on the water quality of receiving rivers: A case of River Aturukuku in Tororo District, Eastern Uganda." *American Open Analytical Chemistry Journal*, Vol. 1(1), pp. 01 – 11.

10. Peter Musagala, Henry Ssekaalo, Jolocam Mbabazi and Muhammad Ntale (2013). "A spectrophotometric method for quantification of sulphite ions in environmental samples." *Journal of Toxicology and Environmental Health Sciences*, Vol. 5(4), pp. 66-72.

11. Norah Mwebaza, Markus Jerling, Lars L Gustafsson, Celestino Obua, Paul Waako, Margarita Mahindi, Muhammad Ntale, Olof Beck, Urban Hellgren (2013). Comparable Lumefantrine Oral Bioavailability when Co-administered With Oil-Fortified Maize Porridge or Milk in Healthy Volunteers. Basic & Clinical Pharmacology & Toxicology Vol.112, Issue3.

12. Ocan Moses, Vudriko Patrick, Ntale Muhammad, Ogwal-Okeng Jasper, Obua Celestino (2013). Substandard rifampicin based anti-tuberculosis drugs common in Ugandan drug market. Journal of Pharmacy and Pharmacological Research Vol. 3(1) pp. 11 – 21.

The Department of Geology and Petroleum Studies

The Department of Geology and Petroleum Studies is the only department teaching geology in the country. It also teaches geosciences and petroleum production. Its graduates are employed in ground water, mineral and petroleum exploration and mineral sectors. The department also offers extension services to various sectors that deal with geological materials. With the introduction of a new degree programme students' population has rapidly increased in the department. The Department of Geology and Petroleum Studies is very popular at the College following the exploration and discovery of oil in Uganda. It offers courses at undergraduate, masters and PhD levels. One of the recent developments is the introduction of the Bachelor of Science degree in Petroleum Geosciences and Production. The department has introduced a master's programme in Petroleum Geosciences and Production in a partnership with the University of Bergen since 2012/2013 academic year.

The Department of Mathematics

The Department of Mathematics is involved in promoting adventure and discovery in the learning and teaching of mathematics. It is involved in the teaching of mathematics in the College of Natural Sciences, Humanities and Social Sciences, Health Sciences, Education, Computer Science, and School of Statistics and Applied Economics (SSAE). It has its extension services arm: The Uganda Mathematical Society. Together, they organize an annual schools mathematics contest in mathematics at all levels with aim of popularizing the subject. The activities of the department in 2013 and their achievements are detailed below.

a) Outreach: The department continues to foster a strong outreach programme especially through Uganda Mathematical Society (UMS). Dr. Godwin Kakuba is the current president of the Society and Mr. Innocent Ndikubwayo is the contest coordinator. In collaboration with the Department of Mathematics, UMS organised national mathematics contests for primary, secondary and tertiary institutions. On the 19th of July, the society also organised a national mathematics teachers' conference at which the Principal of CoNAS was the chief guest at the opening ceremony. The colourful prize giving ceremony on the 20th of July, where the contests' winners were awarded presents, was presided over by the Assistant Commissioner, private schools, Ministry of Education and Sports

b) Research**:** A number of research concepts were submitted from Mathematics Department as part of the submission by the College to the SIDA Grants under the Makerere University application for SIDA Phase IV 2015 - 2020.

c) Partnerships:

- The Department hosted Prof. Jennifer Switkes from California Polytechnic Pomona, CA, USA. Prof. Switkes was doing collaborative research in mathematical modelling and teaching Differential Equations to the undergraduate students.

- The department still hosts the East Africa University Mathematics Programme (EAUMP). Dr. J. Kasozi is the coordinator and a new application for the period 2014 - 2017 has been successfully funded. The programme promotes research in mathematics in the East African region and a number of staff have benefited. These include Mr. Nathan Muyinda and Mr. Innocent Ndikubwayo.

- Other projects in the Department are CIMO and HEI ICI. These support student/staff exchanges with Lappenranta University of Technology in Finland. A number of staff have benefited including Dr. Nannyonga, Mr. Kurama, Mr. Kayondo and Mr. Kikabi.

- The Department is also active under SIDA. Currently the department has a project: Mathematical modelling of Eutrophication and pollution in Lake Victoria. The participating researchers are. John Mango, Richard Wait, Roger Thunivic, Juma Kasozi, Ssembatya Vincent and PhD student David Ddumba.

d) Staff Development: During 2013, new members of staff registered for PhD research, these include: Mr. Fred Mayambala, Mr. Alex B. Tumwesigye and Ms. Juliet Nakakawa, these have been provisionally admitted. Mr. Dennis Wokiyi and Mrs. Betty Kirenga are working on their synopses.

e) Curriculum Review: The Department is reviewing its graduate programme as initiated by the college. We are also in advanced stages of developing new undergraduate programmes in Finance and computational biology.

Publications for 2013

1. M. R. Waema, Luboobi, L. S., and Odhiambo, J. W. (2013). "Mathematical Model For HIV AND CD4+ Cells Dynamics In VIVO", *International Electronic Journal of Pure and Applied Mathematics*, vol. 6, no. 4.

2. Waema R. Mbogo, Livingstone S. Luboobi and John W. Odhiambo (2013a). Mathematical Model for HIV and CD4+ Cells Dynamics *in Vivo*. *International Journal of Pure and Applied Mathematics* 6 (2), 83 – 103.

3. Waema R. Mbogo, Livingstone S. Luboobi and John W. Odhiambo (2013b). Stochastic Model for In-Host HIV Dynamics with Therapeutic Intervention *ISRN Biomathematics* vol. 2013, ID 103708, 11pages.

4. Groenewald N. J and Ssevviiri D. (2013). Generalization of nilpotency of ring elements to module elements, Comm. Algebra, 42(2), 571–577.

5. Groenewald N. J and Ssevviiri D. (2013). Kothe's upper nil radical for modules, ActaMath. Hungar., 138 (4), 295–306.

6. Groenewald N. J and Ssevviiri D. (2013).Completely prime submodules, Int. Elect. J.Algebra, 13, 1–14.

7. Groenewald N. J and Ssevviiri D. (2013). 2-primal modules, J. Algebra Appl., 12 ,1250226, DOI: 10.1142/S021949881250226X.

8. Ssevviiri D. (2013). Characterisation of noninilpotent elements of the Z-module $Z/(p_1^{k1} X . . . X p_n^{kn})Z$, International Journal of Algebra, 7(15), 699-7062.

9. Luukka P, Kurama O (2013). Similarity classifier with ordered weighed averaging operators. Expert Syst. Appl. 40(4); 995-1002 [j17].

10. Kasozi J., Mayambala F., Mahera C.W (2013). Controlling ultimate ruin probability by quota-share reinsurance arrangements. International Journal of Applied Mathematics and Statistics Volume 49, Issue 19.

11. Kitayimbwa, JM, Mugisha, J.Y.T, Saenz, RA (2013).The role of backward mutations on the within-host dynamics of HIV-1. Journal of Mathematical Biology 67(5): 1111-1139.

12. Akinyi, OC, Mugisha, J.Y.T, Manyonge, A, Ouma, C (2013). Modelling the Impact of Misdiagnosis and Treatment on the Dynamics of Malaria Concurrent and Co-infection with Pneumonia. Applied Mathematical Sciences. 7(126):6275-6296

13. H. Ddumba, J.Y.T. Mugisha, J.W. Gonsalves, G.I.H. Kerley (2013). Periodicity and limit cycle perturbation analysis of a predator-prey model with interspecific species' interference, predator additional food and dispersal. Applied Mathematics and Computation. 219: 8338 – 8357

14. Onga'la Jacob Otieno, Mugisha Joseph, Oleche Paul (2013) Mathematical Model for Pneumonia dynamics with Carriers. *International Journal of Mathematical Analysis*, 7(50):2457 - 2473.

15. Ibrahim M. ELmojtaba, J.Y.T.Mugisha and Mohsin H.A. Hashim (2013). Vaccination model for visceral leishmaniasis with infective immigrants. *Mathematical Methods in Applied Sciences*. 36:216-226.

16. Hasifa Nampala, Livingstone S. Luboobi, Joseph Y.T. Mugisha, Celestino Obua (2013). Mathematical modeling of liver enzyme elevation in HIV mono-infection. *Mathematical Biosciences* 242(1):77–85.

17. B. Nannyonga, J.Y.T. Mugisha and L.S. Luboobi (2013) Evaluating the effectiveness of DDT house spraying in persistent and re-emerging malaria. *Afrika Matematika.* 24: 209 – 221.

18. Okaka C. Akinyi, Mugisha, J.Y.T., Manyonge A., and Ouma C. (2013) Modelling the impact of misdiagnosis and treatment on the dynamics of Malaria Concurrent and Co-infection with Pneumonia. Applied Mathematical Sciences, Vol. 7, no. 126, 6275-6296.

ACCEPTED PAPERS

1. Kasozi J. and Mahera C.W. Dividend payouts in a perturbed risk process compounded by investments of the Black-Scholes type. Accepted in: Far East Journal of Applied Mathematics.

2. Mbogo, W. R., Luboobi, L. S., and Odhiambo, J. W. (2013c). Stochastical model for Langerhans and HIV dynamics in vivo. In Press: Hindawi Publishing Corporation-ISRN Applied Mathematics.

3. Groenewald N. J and Ssevviiri D. Properties of different prime radicals of monoid modules, Comm. Algebra, accepted.

4. Groenewald N. J and Ssevviiri D. On the Levitzki radical of modules, Int. Elect. J. Algebra, accepted.

CONFERENCE PROCEEDINGS:

1. Kasozi J. SAMSA 2013 conference from 25th November 2013 to 30th November 2013 at Stellenbosch University, Cape Town, South Africa. Paper entitled: Dividend maximisation under a ruin constraint in a surplus process compounded with a constant force of interest.

2. Kasozi J. Second Kenyatta University International Mathematics conference held at Kenyatta University, Nairobi, Kenya from 17th - 21st June, 2013. Paper presented: MARM contributions to scholarship and research in Uganda.

The Department of Physics

The Department of Physics has been a leader in training physicists in this country for a long time. Its activities range from servicing education and research in solar energy, materials Sciences, radiation physics and many other practical related programmes. It boasts of newly refurbished laboratories under the Millennium

Sciences Initiative programme. The departmental have engaged in international partnerships and projects as highlighted below.

Schools, Workshops and Trainings

- Dr. Ireeta attended the Active Learning In Optics And Photonics (Alop) School, Held From 17th To 23rd November 2013 At University Of Addis Ababa, Addis Ababa, Ethiopia.

- Florence M. D'ujanga. International Space Weather Initiative and the Scientific Committee on Solar Terrestrial Physics (ISWI/SCOSTEP) in Nairobi, Kenya. **As a Resource Person** on "The Ionosphere and GNSS". Held from the 19-21 Nov. 2013.

- Florence M. D'ujanga. 2013 Regional Conference of the International Network of Women Engineers and Scientists (INWES) in Nairobi, Kenya. **Presented a paper:** "Effects of Space Weather Storms on Trans-Ionospheric Communication Systems". Held from the 24 Oct – 1st Nov. 2013.

- Florence M. D'ujanga. Intergovernmental Panel on Climate Change (IPCC) Regional Outreach meeting in Pretoria, South Africa. Held from the 20-22 Oct 2013

- Florence M. D'ujanga. Workshop on GNSS data application to low latitude ionospheric research, Trieste, Italy. Held from the 6-17 May 2013.

- Florence M. D'ujanga. African Array Workshop and Training on seismic station operation, Johannesburg, South Africa. Held from the 15-16 January 2013.

Projects

- Dr. Ireeta is working as a Co-Investigator on a project titled, Modelling and experimental investigation of advanced PMD, nonlinear effects and modulation format on the performance of next generation optical fibre networks of R225,600 from 2012 to 2013. This was a collaboration of the following institutions, Nelson Mandela Metropolitan University, South Africa, Engineering School of Communications of Tunis (Sup'Com), Tunisia, Chepkoilel University College, Kenya and Makerere University, Uganda.

- Dr. Ireeta is a Co-Investigator, Modelling and experimental investigation of advanced PMD, nonlinear effects and modulation format on the performance of next generation optical fibre networks of R170,000 from 2014 to 2015 from African Laser Center. This is a collaboration of the following institutions, Nelson Mandela Metropolitan University, South Africa, Engineering School of Communications of Tunis (Sup'Com), Tunisia, University of Eldoret, Kenya and Makerere University, Uganda.

Publications for 2013

1. W. T. Ireeta, Musara, V., Wu, L., and Leitch, A. W. R. (, 2013). "Essence of Re - Calibrating Optical Instruments: Analysis of the Digital Delay Line", *Advances in Applied P hysic s*, vol. 1, no. 3.
2. S. Oron, D'ujanga, F. M., and Ssenyonga, T. J. (2013). "Ionospheric TEC variations during the ascending solar activity phase at an equatorial station, Uganda", *Indian Journal of Radio & Space Physics,* vol. 42.
3. F. M. D'ujanga, Baki, P., Olwendo, J. O., and Twinamasiko, B. F.(2013) "Total electron content of the ionosphere at two stations in East Africa during the 24–25 October 2011 geomagnetic storm", *Advances in Space Research*, vol. 51, no. 5.
4. F. M. D'ujanga, Baki, P., Olwendo, J. O., and Twinamasiko, B. F. (2013). "Total electron content of the ionosphere at two stations in East Africa during the 24–25 October 2011 geomagnetic storm", *Advances in Space Research*, vol. 51, no. 5.
5. Winston T. Ireeta, Vitalis Musara, Lorinda Wu, and Andrew W. R. Leitch (2013). "Essence of Re-Calibrating Optical Instruments: Analysis of the Digital Delay Line," Advances in Applied Physics, vol. 1, no. 3, pp. 117-125.

6. Vitalis Musara, Winston T. Ireeta*, L. Wu and A.W.R. Leitch (2013). "Polarization Dependent Loss Complications on Polarization Mode Dispersion Emulation," Optik: International Journal of Light and Electron Optics, vol. 124, issue 8, pp. 3774-3776.

7. Winston T. Ireeta, Vitalis Musara, Lorinda Wu, and Andrew W. R. Leitch (2013). "Insight into PMD Regimes: An Analysis on Buried Optical Fibres," International Journal of Optics, doi:10.1155/2013/367967.

8. Total electron content of the ionosphere at two stations in East Africa during the 24-25 October 2011 geomagnetic storm. D'ujanga F.M., Baki P., Olwendo J.O. and Twinamasiko, B.F 9(2013). *Advances in Space Research*. . 51, 712-721.

9. Ionospheric TEC variations during the ascending solar activity phase at an equatorial station, Uganda. Oron S., D'ujanga F.M. and Ssenyonga T.J. (2013). *Indian Journal of Radio & Space Physics* 42, 7-17.

10. A study of intense ionospheric scintillaton observed during a quiet day in the East African low-latitude region(2013). Ngwira C.M., Klenzing J., Olwendo J., D'ujanga F.M., Stoneback K. and Baki P. *Radio Sci*, 48, 396-405.

2.0 TEACHING AND LEARNING

The College of Natural Sciences offers courses in basic and some aspects of Applied Sciences. Additionally, we have courses in Biochemistry for students from the College of Health Sciences and School of Veterinary Medicine. We also teach students from the College of Education and External Studies, College of Computing and Information Science and School of Statistics and Applied Economics a number of courses in Chemistry, Mathematics, and Physics.

In addition to the theoretical classes by our students, courses offered at the College are supplemented by laboratory based learning for practicals and e-learning. The department of biology also conducts field-based teaching to supplement the work in laboratories. This offers the students an appreciation of the work handled in class. Field attachments to ensure hands-on experience for the students has been introduced.

The College has a herbarium and museum that staff and students use for curation (preserving and preparing of materials).Work in the herbarium is conducted physically and electronically, since the facility was recently digitized. A botanical garden is also maintained for practical work. In addition, an aquarium with live fish is available for practical classes for the zoology and aquaculture students.

It should be noted that for purposes of furthering knowledge, research projects jointly handled by staff and students are conducted in all departments at graduate (Masters and PhD) level.

The student enrolment for the year 2013 was as follows:

Table 1: Registered Undergraduate Students in 2013

Programme	Year I	Year II	Year III	Year IV	Grand Total
BSCI.	155	121	109	-	385
BSIC	49	80	92	-	221
BSFA	25	18	16	-	59
BETB	19	13	14	-	46
BSPC	30	27	47	-	104
BSCB	7	7	13	-	27

Programme	Year I	Year II	Year III	Year IV	Grand Total
BBPG	37	59	64	41	201
BSBT	59	48	25	-	132
Total	381	373	380	41	1175

Table 2: Registered Postgraduate Students in 2013

Department	M.Sc.	PhD	Total
Biochemistry and Sports Science	16	0	16
Biological Sciences	29	21	50
Chemistry	25	9	32
Geology and Petroleum Studies	27	1	13
Mathematics	32	6	34
Physics	16	4	11
Total	145	41	156

Table 3: Total number of graduates in 2013 compared with 2012

Programme	Bachelors		Masters		Doctorates		Total		Graduates 2012	Graduates 2011
	F	M	F	M	F	M	F	M		
BSCI	36	139	3	13	1	6	40	158	198	195
BSIC	19	39	-	-	-	-	19	39	58	81
BSFA	6	9	-	-	-	-	6	9	15	32
BETB	4	5	-	-	-	-	4	5	9	8
BSPC	7	21	-	-	-	-	7	21	28	33

BSCB	5	11	-	-	-	-	5	11	16	16
Total	**77**	**224**	**3**	**13**	**1**	**6**	**81**	**243**	**324**	**365**

Table 4: Qualifications of Academic Staff at CONAS in 2013

Department	**PhD**	**Masters**	**Bachelors**	**Total**
Biochemistry and Sports Science	11	15	2	28
Biological Sciences	31	5	3	39
Physics	12	6	3	21
Mathematics	10	13	3	26
Chemistry	10	12	3	25
Geology and Petroleum Studies	9	5	0	14
Total	83	56	14	153

Table 5: Academic Staff numbers on ground in 2013

Department		**P**	**AP**	**SL**	**L**	**AL**	**Curators**	**TA**	**Total**
Biochemistry and Sports Science	Biochemistry	1	0	2	7	9	-	0	19
	Sports Science	0	0	0	2	1	-	6	9
Biological Sciences	Zoology	2	3	5	6	2	1	1	20
	Botany	1	5	2	4	2	2	3	19
Physics		3	1	3	7	4	0	3	21
Mathematics		2	0	2	9	9	-	4	26
Chemistry		2	3	2	6	8	-	4	25
Geology and Petroleum Studies		0	2	3	5	4	-	0	14
	Total	11	14	19	45	37	3	21	153

Key: P = Professor; AP = Associate Professor; SL = Senior Lecturer;

L = Lecturer; AL = Assistant Lecturer; TA = Teaching Assistant

Table 6: Publications in refereed Journals in 2013

Specialty	Publications in ref. Journals
Biochemistry and Sports Science	6
Biological Sciences	8
Chemistry	12
Geology and Petroleum Studies	0
Mathematics	18
Physics	10
Total	**54**

Curriculum Review of Programmes

The National Council for Higher Education (NCHE) regulations require that Higher Education Institutions in Uganda conduct a curriculum review every three years. The College of Natural Sciences has therefore embarked on the process to review her curriculum for all graduate programmes (MSc. and PhD) offered. This exercise began with a workshop held from the 1st to 3rd November 2013. Review of curriculum allows for inclusion of new areas of study that may have been discovered during the period of review and for improvement of our teaching and learning services. The Curriculum review is supported by the Swedish International Development Agency (SIDA) through the Quality Assurance Directorate of Makerere University.

3.0 RESEARCH, INNOVATIONS AND AWARDS

In the year 2013, various departments in the College continued to undertake research intended to enhance their work, knowledge and partnerships. The College continued to initiate new research and some of the projects ended while others that began earlier are still on-going. The College for purposes of furthering knowledge undertakes research in various areas under the individual departments. The projects are mainly funded by development partners or as collaborations with universities and research institutions in other countries. The research is jointly handled by staff and students at graduate (Masters and PhD) level. The research undertaken by staff resulted into a number of published papers in international peer reviewed journals. Staff were also recognised and awarded for their work.

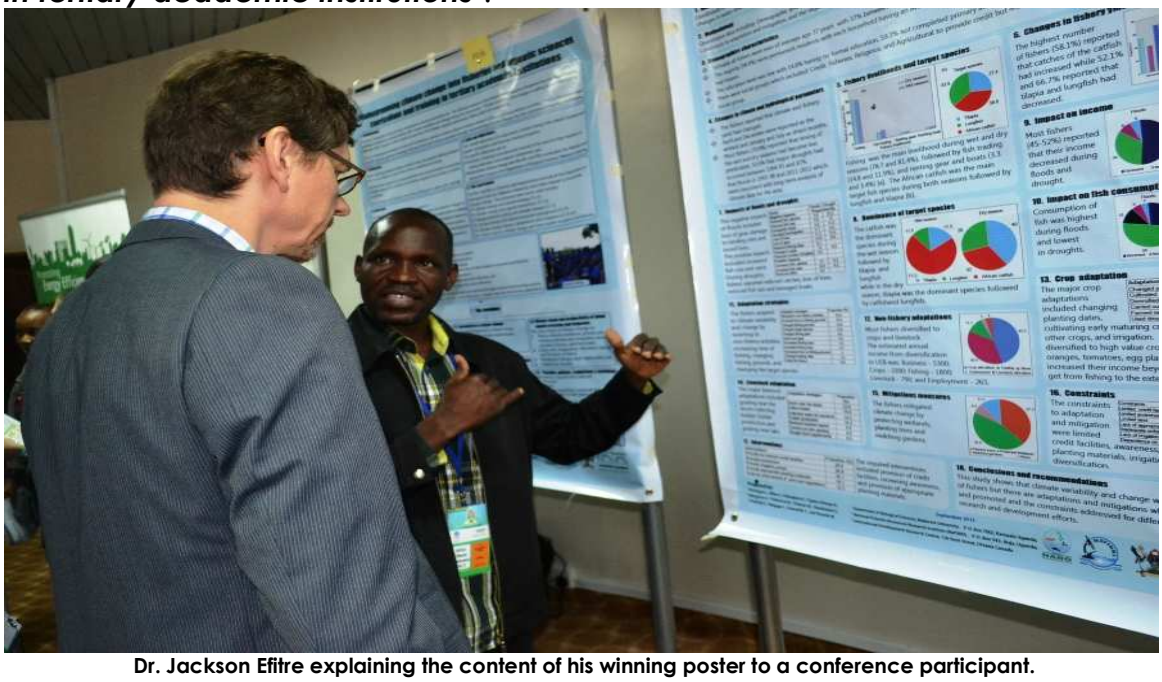
a) In line with accolades received, a project coordinated by Professor John Kiboko Enyaru, Department of Biochemistry and Sports Science in collaboration with a Ugandan manufacturer Astel Diagnostics Ltd, and six other implementing agencies from Congo, the Democratic Republic of Congo, Malawi, South Sudan, Sudan and Tanzania, successfully developed a new test that can accurately detect parasites in tsetse flies that cause sleeping sickness. The project was funded through a five-year research grant from the Bill & Melinda Gates Foundation. "The new Lateral Flow Test helps to identify areas of potential sleeping sickness outbreaks that can be prioritized for tsetse fly control to pre-empt an outbreak," Prof. Enyaru commented. Sleeping sickness is a tropical disease that is transmitted to humans by the bite of an infected tsetse fly (*Glossina genus*). The disease invades the central nervous system and can be fatal if not treated. In domestic animals, the disease is also known as nagana (a Zulu word meaning "to be depressed") and causes wasting and loss of productivity.

b) Prof. Livingstone S. Luboobi, a former Vice Chancellor and Professor of Biomathematics in the Department of Mathematics is an elder who has served Makerere and this nation for a period of over 40 years. In recognition of his long and outstanding service to higher education in Uganda, Prof. Luboobi was awarded the independence medal at the 51st National Independence Day celebrations held in Rukungiri District.

c) Our Students of the Petroleum Geosciences and Production programme were also recognised and awarded certificates for their poster presented at

the East African Petroleum Conference and Exhibition (EAPCE '13). The three students; Ms. Nibyagaba Rachael, Mr. Ojok Tonny and Mr. Lwanga Edrine participated in the conference that featured 82 technical and 20 poster presentations with 52 Exhibitors. The conference was held in Arusha, Tanzania early in 2013. The East African Community (EAC) has been holding the EAPCE biennially since 2003 to promote exploration, development and production of oil and gas. The Conference offers a wide range of technical presentations reflecting developments in the oil and gas industry in East Africa and around the world. The 2013 conference was held under the theme, "EAST AFRICAN REGION - The Emerging Destination for Investment and Future Supply of Oil and Gas for Sustainable Development"",

d) CoNAS is mindful of aligning her research projects to ensure environmental sustainability as stipulated by the Millennium Development Goals (MDGs). In line with this, Dr. Jackson Efitre, a Senior Lecturer in the Department of Biological Sciences received an award and prize from the World Climate Change Research Programme (WCRP) for the best poster presentation during the Africa Climate Change Conference. The conference was held in Arusha, Tanzania in October 2013. The poster was titled "***Mainstreaming climate change into fisheries and aquatic sciences curriculum and training in tertiary academic institutions***".



Dr. Jackson Efitre explaining the content of his winning poster to a conference participant.

e) **Hosting the 15th Congress of the International Society of Ethnobiology in 2016:** The Department of Biological Sciences was elected to host the congress in collaboration with the Uganda National Council for Science and Technology

and the Buganda Kingdom. This arrangement was designed to bring out the biological and cultural aspects of the congress. A number of other players will be involved from other relevant colleges in Makerere, e.g. Social Sciences, Art and Design, other Universities, Government institutions, NGOs, and cultural institutions. The main theme of the congress is '*Ethnobiological knowledge for improved human wellbeing and development*'.

f) A research scholarship in African Swine Fever in Uganda tenable at Makerere University under the guidance of Dr. Charles Masembe (senior lecturer in Department of Biological Sciences) was announced recently. Applicants should have completed year 1 of their MSc. programme. The theme of research is, '**The role of wild pigs in the dynamics and spread of African Swine Fever in Uganda'**. This is one of the capacity building initiatives of the College of Natural Sciences. The research scholarship is under the auspices of ASF-UGANDA. ASF-UGANDA is a collaborative research consortium targeting the complexity of African swine fever, and how effective ASF control strategies can be designed. Therefore the results obtained are likely to significantly contribute to disease control, animal conservation, and improvement of livelihoods through economic growth. The consortium will use a molecular ecological approach to understand the role of the bush pigs in the epidemiology of ASFV at the wildlife-livestock interface; it will determine the prevalence of ASF and monitor the movements of bush pigs at the interface; and assess genetic relationships among target species.

g) During celebrations to mark the 50years anniversary of the University of East Africa this year, Prof. Luboobi was awarded a ***Lifetime Achievement Award*** as an alumni of the University of East Africa and his many accomplishments in academia and leadership.

Prof. Luboobi receiving his lifetime achievement award from Dr. Martin Aliker at the 50years celebration for the University of East Africa.

h) Prof. Luboobi has also been appointed to serve on the Management Board of a project titled, 'Mathematics ***Education and Working Relevance in East***

Africa'. The project is a joint programme between the University of Technology in Finland and institutions in Eastern Africa. It is supported by the Higher Education Institutions Institutional Cooperation Instrument (***HEI ICI***) of Finland. HEI-ICI supports collaboration projects between higher education institutions in Finland and developing countries. The programme seeks to enhance higher education capacity in the developing world.

i) The Department of Biochemistry and Sports Science introduced an independent project geared towards motivating staff to live a more active lifestyle, no matter how active, or inactive -- you may already be! This program is predominantly meant for football lovers - from those who ever played it to those who would like an opportunity to represent the university staff in the corporate football league. The department believes that through this kind of forum; they'll kill several birds with a single stone including physical exercise and socializing through which joint research and professional projects can emerge.

3.1 Partnerships and Networking

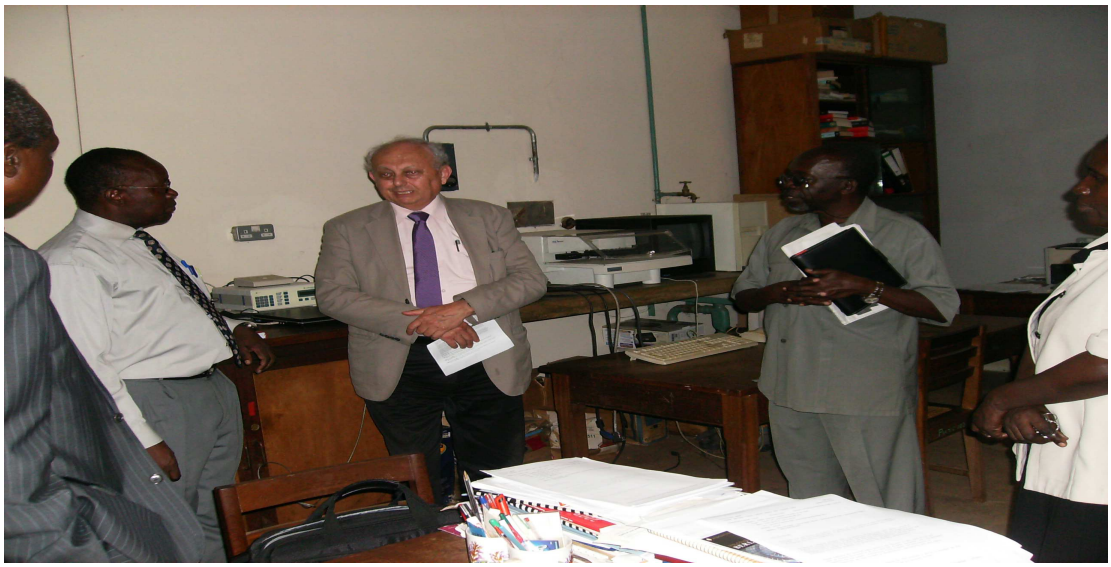
a) The College of Natural Sciences (CoNAS) will benefit from a USAID Project titled, '*Capacity Building in Environmental Management for the Oil Sector (EMOS)'* that commenced in October 2013. The U.S. Agency for International Development office in Uganda awarded a $6 million contract to TetraTech ARD and Texas A&M University in U.S.A to support strengthening of capacity of Ugandan professionals in the public and private sector to manage the environmental impacts of the oil and gas sector. Makerere University through CoNAS will serve as the lead institution for a strategic planning process and development of framework for educational capacity building activities. One of the specific activities will be to review all curriculums at undergraduate and graduate levels working with Texas A&M University to assess how the taught programmes integrate environmental mitigation in oil sector. This will allow for opportunity to improve them, or suggest new programmes at postgraduate level and short-term programmes. The USAID Director of Mission in Uganda, Leslie Reed visited CoNAS in December 2013 accompanied by the Environment Unit Leader and the Director for Economic Growth.

The USAID Delegation visit to CoNAS: from left Leslie Reed (Mission Director), Prof. J.Y.T. Mugisha (Principal – CoNAS), Jo Lesser-Oltheten (Director – Economic Growth Team), Dr. Rebecca Carter (Environment Unit Leader) and Dr. John Mango (Deputy Principal – CoNAS)

b) Professor Eva Åkesson, Vice Chancellor of Uppsala University in Sweden visited the Department of Chemistry on the 29th November 2013. She was accompanied by officials (Dr. Peter Sunden and Stephanie Petersen) of the International Science Programme (ISP) which is hosted by Uppsala University and funded by Swedish International Development Agency (SIDA). The International Science Programme has benefited many units in the College of Natural Sciences (CoNAS) beginning with the Department of Chemistry in 1989; Department of Physics in 1999 and Mathematics more recently.

The Vice Chancellor of Uppsala (Prof. Eva Åkesson) on her visit to the Department of Chemistry at CoNAS.

c) Prof. Benjamin Ehrenberg from Bar Ilan University in Israel visited the College of Natural Sciences (CoNAS) Makerere University in April 2013. This was part of a 2day visit to Makerere University.



Prof. Benjamin Ehrenberg (second left) from Bar Ilan University in Israel visiting the Optics Laboratory, Department of Physics at CoNAS.

Prof. Ehrenberg is the Vice President for Research at the Bar Ilan University. Prof. Ehrenberg held a meeting with the Principal, Prof. J.Y.T Mugisha to discuss possible areas of mutual collaboration. It is expected that the collaboration will be premised on the Israel/Africa cooperation platform and presents opportunity to approach development partners with joint proposals.

d) A delegation from the Xiangtan University, China visited CoNAS in July 2013 to discuss modalities of working together following the signing of a MoU signed between Makerere University and Xiangtan University in 2012.

The Principal of CoNAS meeting the delegation from the Xiangtan University of China

e) A delegation from the Swedish University of Agricultural Sciences visited the College to discuss exchange visits by academic staff between the two universities.

f) The College also received a delegation from the Safe Global Water Institute of the University Illinois, U.S.A to discussion future collaboration between the two institutions.

g) Delegations from the Universities of Mzumbe and Great University of Zimbabwe to discuss modalities of handling joint projects.

4.0 SUPPORT FUNCTIONS

4.1 Human Resource: Promotions and Appointments of CoNAS 2013

The College human resource base comprises of Academic, Technical, administrative and support staff. With the launch of the collegiate system at Makerere University, a human resource office has been created for the College to ensure efficiency in handling of labour issues.

During the year 2013, the College received newly appointed staff while others were promoted. The College also registered departure of staff. The details are presented in the table below:

Table 7: Appointments in the College during 2013

NAMES	TITLE	DEPARTMENT/UNIT
Dr. Winston Ireeta Tumps	Head/Senior Lecturer	Physics
Dr. Florence Mutonyi D'ujanga	Associate Professor	Physics
Dr. Eric Sande	Senior Lecturer	Biological Sciences
Dr. Denis Okello	Lecturer	Physics
Dr. Keridwa Nyeinga	Lecturer	Physics
Dr. Betty Nannyonga	Lecturer	Mathematics
Dr. Joseph F. Hawumba	Senior Lecturer	Biochemistry & Sports Science
Dr. Kasozi Denis Matovu	Lecturer	Biochemistry & Sport Science
Prof. Jolocam Mbabazi	Professor	Chemistry
Dr. Juma Kasozi	Dean	School of Physical Sciences
Mr. Richard Ochieng	Assistant Lecturer	Chemistry
Dr.David Ssevviiri	Lecturer	Mathematics
Dr. Arthur Godfrey Batte	Lecturer	Geology And Petroleum Studies
Dr. Arthur K. Tugume	Senior Lecturer	Biological Sciences

NAMES	TITLE	DEPARTMENT/UNIT
Dr. Maud Kamatenesi Mugisha	Associate Professor	Biological Sciences
Dr. George William Nyakairu Atwooki	Associate Professor	Biological Sciences
Dr. Ismail Geoffrey Mirumbe	Lecturer	Mathematics
Dr. Godwin Kakuba	Ag. H.O.D	Mathematics
Dr. Robert Byamukama	Associate Professor	Chemistry
Mr. Hassan Wasswa Kayondo	Assistant Lecturer	Mathematics
Mr. Onesfole Kurama	Assistant Lecturer	Mathematics

On a sad note, we lost one of our long serving staff, Professor Remegius Bukenya-Ziraba on the 7th December 2013. Professor Bukenya-Ziraba was a professor of Taxonomy and Systematics in Botany in the Department of Biological Sciences, College of Natural Sciences – Makerere University. He was the only Professor of Taxonomy and Systematics in Uganda and possibly in the region. He joined Makerere University in 1977 as a Special Assistant in Botany in the then Faculty of Science. He generously gave us his knowledge, his expertise, his skills. As such, he contributed much to the development of Botany as a unit, department and research area; College of Natural Sciences and its predecessor the Faculty of Science. May his soul rest in peace!

4.2 Library services

The newly formed College of Natural Science library has a collection of approximately 25,000 information materials constituting of monographs, journals, serials and archival materials. Before the collegiate system, each of the departments in the College had its own library or book-bank where departmental – specific scientific information has been kept for only its staff and students, and usually manned by technicians. With the advent of a collegiate system and deployment of a professional librarian, all these libraries have been merged to compose one college library. Scientific information materials in the

College of Natural Science remains unprocessed, hence an information gap to the numerous scientific research.

Building on the work accomplished in the previous year, the college now has three fully functional libraries. These include: the **School of Biosciences** book bank housing books received under the book bank vote for botany, zoology, biochemistry and sports science; **School of Physical Sciences** book bank housing books received under the book bank vote for chemistry, mathematics, physics, geology and petroleum studies; and the **CONAS Library** comprising of books received through donations, purchase, dissertations and theses.

This year, the library embarked on the activity of processing scientific information in its collection in order to ease access for its users. The library processing is done using open source software called *librarything*. At the moment 2,548 materials can be accessed online on the CONAS library website, on the CONAS webpage under special facilities

4.3 Information Communication Technology

In a period of transformation, information and communication technology plays an important role in the College services to students and staff. The College has 3 IT labs reserved for use by students i.e. the E-learning lab, in the Mathematics and Physics departments. The labs have a total of 150 computers between them; however some of the computers have been vandalized or stolen due to the rampant thefts that have dogged the College throughout this year. E-learning forms an integral part of teaching and learning at the College particularly through the MUELE platform. However, the ratio of the available computers to the number of students is still unfavourable standing at 1:8.

5.0 CONCLUSION AND WAYFORWARD

In Conclusion, 2013 was a fruitful year for the College in terms of publications research and innovations at the College of Natural Sciences. The achievements were realized despite the challenges of funding, staffing and new changes as a result of the conversion to the collegiate system. In the year 2014 the College plans to work on recruitment of staff to match establishment with the staff on ground. Plans are also in place to increase partnerships so as to increase its research initiatives.