

**UNIVERSITY OF NAIROBI**  
**COLLEGE OF BIOLOGICAL AND**  
**PHYSICAL SCIENCES**  
**SCHOOL OF PHYSICAL SCIENCES**

**ANNUAL REPORT 2013**

**SCHOOL OF PHYSICAL SCIENCES**

## **1.0 INTRODUCTION**

The School of Physical Sciences (SPS) is located at Chiromo Campus. It is composed of the following departments of Chemistry, Geography and Environmental Studies, Geology, Meteorology and Physics. The department of Geography and Environmental Studies is however housed at the main Campus for administrative reasons. The School offers several programmes that cater for the changing needs of the society. The Departments have fully equipped individual laboratories and libraries for teaching and research. The School has high expertise in all science disciplines. The School is home to innovations, discoveries and new knowledge. Distinguished researchers mentor students with a view to imparting expertise in scientific research. Further information regarding the activities of the School may be found from the various websites of the component departments of the School of Physical Sciences. The School is headed by a Dean, an elective post.

### **INTRODUCING SPECIFIC DEPARTMENTS OF THE SCHOOL**

#### **DEPARTMENT OF CHEMISTRY**

The Department of Chemistry is located in Department of Chemistry Building, Chiromo Campus, Off-Riverside Drive. It is in the School of Physical Sciences, College of Biological and Physical Sciences. It handles about 1800 undergraduate students each academic year, about thirty (30) Master of Science and eight (8) Ph.D students each year. These students are handled by 48 academic staff in the areas of Physical, Organic, Inorganic, Environmental, Analytical and Industrial Chemistry. To beef the academic members are 25 technologists, 1 senior Administrative Assistant and two (2) secretaries. The Detergent Unit also employs an additional four (4) casuals which gives a total of 80 staff.

The Department offers the following undergraduate programmes: Bachelor of Science in Chemistry, Bachelor of Science in Environmental Chemistry, Bachelor of Science in Industrial Chemistry and Bachelor of Science in Analytical Chemistry. In addition, the Department also services various schools and faculties as follows: Agriculture, Design, Engineering, Medicine and Pharmacy.

We also offer postgraduate programmes leading to Master of Science in Chemistry, Master of Science in Industrial Chemistry, Master of Science in Analytical Chemistry, Master of Science in Organic Chemistry, Master of Science in Inorganic Chemistry and Master of Science in Environmental Chemistry.

### **DEPARTMENT OF GEOLOGY**

The Department of Geology is one of the oldest in the Faculty of Science and was started in 1956 when the University of Nairobi was the Royal Technical College of East Africa. Initially located in the Gandhi Wing of the Main Campus, the Department later shifted to Chiromo Campus in 1975 together with the other Physical Science Departments, Physics, Chemistry, Mathematics, Meteorology and the Institute of Computer Science.

Geology Department trains personnel in the following major disciplines; mineralogy and petrology (study of minerals & rocks), exploration geochemistry, exploration geophysics, engineering geology, marine geology, environmental geology, structural geology, photogeology and remote sensing, stratigraphy, historical geology, palaeontology (study of fossils), economic geology, petroleum geology, hydrogeology and seismology (study of earthquakes) and in the recent disciplines of medical geology and agrogeology. The Department also offers service courses to the Faculties of Engineering; Architecture, Design and Development (A.D.D) as well as to Agriculture and Veterinary Medicine. The entire student population of the University of Nairobi who study some aspects of Geology are therefore estimated to be about 1000 or more. Under the present day 4 year B.Sc. degree course offered to the 8:4:4 students. The undergraduate students in Geology combine it with two other subjects selected from Physics, Chemistry, Meteorology, Mathematics, Geography and Botany and Zoology during their 1st and 2nd years of study. The students however, later specialize only in Geology during their 3rd and 4th years.

### **DEPARTMENT OF METEOROLOGY**

Weather and climate are widely recognized as crucial in the development of any nation since they impact on all sectors of economy. Moreover, many of the natural disasters in the world are related to weather and climate. Knowledge of weather and climate is necessary if it has to be appropriately factored into the national development strategic plan. It is because of the importance of the science of meteorology that the Department of Meteorology of the University of Nairobi was established in 1963 at the request of the East African Community (EAC), the World Meteorological Organization (WMO) and the United Nations Development Program (UNDP) to train professional meteorologists for the English-Speaking countries of the African continent. Ever since its inception,

the Department of Meteorology has continued to play a major role in training highly skilled meteorological personnel, most of whom are currently manning National Meteorological and Hydrological Services (NMHSs) of most countries in Africa. In response to the evolving needs the Department has developed several other programs in applied fields that are listed below. The mission of the Department is to maintain a leading role in the pursuit and development of knowledge of Meteorology through quality and relevant teaching, research, consultancy and community service.

## **DEPARTMENT OF PHYSICS**

The Department of Physics is one of the oldest departments of the University of Nairobi. It was established in 1956 when the Royal Technical College of East Africa started offering an A-level course in Physics. In 1961, the Royal Technical College became the Royal College, Nairobi, offering degrees of the University of London. The Royal College, Nairobi became the University of East Africa, Nairobi Campus in 1963. The University of Nairobi gained autonomous university status in 1970. In the early days, the department was located at the Main Campus in the present Hyslop building. The department moved to its present location in Chiromo in 1974. The Department of Physics had its first batch of physics students (six in number) in 1966.

We also offer service courses to School of Computing and Informatics, Department of Chemistry, the College of Architecture and Engineering, College of Education and External Studies and the College of Agriculture and Veterinary Sciences.

## **2.0 PROGRAMMES OFFERED**

Through the a foresaid departments, the School offers the following programmes :

### **❖ DEANS OFFICE**

#### **Programmes offered;**

<b>Programme</b>	<b>M</b>	<b>F</b>	<b>Total</b>
BSc. Science (I20)	682	301	983
B.Sc. Science (I20 M3)	13	0	13
<b>TOTAL</b>	<b>695</b>	<b>301</b>	<b>996</b>

*[The students take courses from all the departments and schools in the College].*

## ❖ DEPARTMENT OF CHEMISTRY

### Programmes offered;

<b>Programme</b>
BSc Chemistry
BSc. Analytical Chemistry
BSc. Industrial Chemistry
BSc. Environmental Chemistry
MSc. Analytical Chemistry
MSc. Chemistry
MSc. Environmental Chemistry
MSc Organic Chemistry
MSc Inorganic Chemistry
MSc. Industrial Chemistry
Ph D Chemistry
The Department also offers Ph.D in chemistry covering all areas (organic, inorganic, physical, environmental, analytical and industrial).
<b>Service Courses to:</b>
1. College of Health Sciences (School of Pharmacy),
2. College of Architecture and Engineering (Mechanical and Manufacturing Engineering, Civil and Construction Engineering, Environmental and Biosystems Engineering) and
3. College of Agriculture and Veterinary Sciences (Food Science and Technology, Agriculture)
4. College of Education (B.Ed Science)
In addition to day programmes, the Department is offering module II evening programs at both the undergraduate and post-graduate levels and also Module 3M by Distance Learning.

## ❖ DEPARTMENT OF GEOLOGY

### Programmes offered;

<b>Programme</b>
BSc. Geology
BSc. Environmental Geoscience

Msc. Geology
MSc. Geology (Mineralogy & Petrology)
MSc. Geology (Mineral and Geothermal Resources)
MSc. Geology (Environmental Geology and Management)
MSc. Geology (Engineering Geology)
MSc. Geology (Hydrogeology & Groundwater Resource Management)
MSc. Geology (Petroleum Geology)
MSc. Geology (Marine Geology & Resources)
MSc. Geology (Applied Geochemistry)
MSc. Geology (Applied Geophysics)
MSc. Geology (Seismology)
MSc. Geology (Palynology and Micropalaeontology)
MSc. Geology (Mineral Exploration)
PGD Natural and Environmental Disaster Management
PhD Geology
<b>Service Courses to:</b>
<ol style="list-style-type: none"> <li>1. College of Architecture and Engineering (Mechanical and Manufacturing Engineering, Civil and Construction Engineering, Environmental and Biosystems Engineering) and</li> <li>2. . College of Education (B.Ed Science)</li> </ol>
In addition to above programmes, the Department is offering Module 3M by Distance Learning.

## ❖ DEPARTMENT OF METEOROLOGY

### Programmes offered

<b>Programme</b>
BSc. (Atmospheric Science-I20)
BSc.Meteorology
PDG Meteorology
PGD Aviation Meteorology
PGD Operational Hydrology
MSc. Meteorology
MSc. Climate Change
MSc. Aviation Meteorology
MSc. Agrometeorology
PhD Meteorology
PhD in Climate Change (in-progress)
<b>Service Courses to:</b>
1. College of Agriculture and Veterinary Sciences (Food Science and Technology, Agriculture)
In addition to above programmes, the Department is offering Module 3M by Distance Learning for both undergraduate and postgraduate (MSC Climate change) students.

## ❖ DEPARTMENT OF PHYSICS

<b>Programme</b>
B.Sc. (Physics Option)

BSc. Microprocessor Technology and Instrumentation
BSc. Astronomy and Astrophysics
MSc. Physics
PhD Physics
<p><b>Service Courses to:</b></p> <ol style="list-style-type: none"> <li>1. College of Architecture and Engineering (Mechanical and Manufacturing Engineering, Civil and Construction Engineering, Environmental and Biosystems Engineering)</li> <li>2. College of Agriculture and Veterinary Sciences (Food Science and Technology, Agriculture)</li> <li>3. College of Education (B.Ed Science)</li> </ol>

### 3.0 ENROLLED STUDENTS IN UNDERGRADUATE AND POSTGRADUATE PROGRAMMES

The School has the following enrollments at various levels through the following departments;

#### ❖ DEANS OFFICE

Number of Students admitted into each undergraduate programme

<b>Degree Programme</b>	<b>M</b>	<b>F</b>	Total
I20-BACHELOR OF SCIENCE	406	179	585
I20M3-BACHELOR OF SCIENCE	5	0	5
<b>TOTAL</b>	<b>411</b>	<b>179</b>	<b>590</b>

<b>Degree Programme</b>	<b>M</b>	<b>F</b>	Total
Master of Science (I56)	13	1	14



❖ **DEPARTMENT OF CHEMISTRY**

**Undergraduate programme enrollment**

Programme	M	F	TOTAL
BSc. Analytical Chemistry ODL (I14M3)	14	4	18
BSc Industrial Chemistry ODL (I08M3)	9	-	9
BSc Chemistry (I64)	13	3	16
BSc. Analytical chemistry (I14)	21	8	29
BSc. Industrial chemistry (I08)	137	45	182
<b>TOTAL</b>	<b>194</b>	<b>60</b>	<b>254</b>

**Postgraduate programme enrollment**

Programme	M	F	Total
M.Sc. Chemistry	16	11	27
M.Sc. in Environmental Chemistry	17	7	24
M.Sc. in Analytical Chemistry	11	4	15
M.Sc. in Industrial Chemistry	2	1	3
Total			69

### Doctor of Philosophy in Chemistry (PhD)

Programme	Number of students
Ph.D. in Chemistry	13

### ❖ DEPARTMENT OF GEOLOGY

Programme	Male	Female	Total
BSc. Geology I13	187	67	254
BSc. Geology I13M3	35	4	39
<b>Total</b>	<b>222</b>	<b>71</b>	<b>293</b>

### Postgraduate

Category/ Programme	M	F	TOTAL
PGD in Nat & Env Dis Mgt	0	2	2
<b>MSc. Geology</b>	14	8	22
<b>PhD Geology</b>	3	3	6

### ❖ DEPARTMENT OF METEOROLOGY

#### (a) Undergraduate Programmes

Category/ Programme	M	F	TOTAL
BSc in Meteorology (I10)	200	53	253
BSc in Meteorology (I10 M3)	13	6	19
<b>Total</b>	<b>213</b>	<b>59</b>	<b>272</b>

#### (b) Postgraduate Programmes

<b>Category/ Programme</b>	<b>Female</b>	<b>Male</b>	<b>Total</b>
PGD in Meteorology	17	1	<b>18</b>
PGD in Operational Hydrology	2	0	<b>2</b>
PGD in Aviation Meteorology	1	1	<b>2</b>
<b>Total</b>	<b>20</b>	<b>2</b>	<b>22</b>
<b>MSc in Meteorology</b>			
MSc in Meteorology	2	8	<b>10</b>
MSc in Agro-Meteorology	0	1	<b>1</b>
MSc in Aviation Meteorology	0	1	<b>1</b>
MSc in Climate Change	8	20	<b>28</b>
<b>Total</b>	<b>10</b>	<b>30</b>	<b>40</b>
<b>PhD in Meteorology</b>			
PhD in Meteorology	1	2	<b>3</b>
PhD in Meteorology	0	4	<b>4</b>

#### ❖ DEPARTMENT OF PHYSICS

##### ENROLLED STUDENTS

<b>Category/ Programme</b>	<b>M</b>	<b>F</b>	<b>TOTAL</b>
BSc in Microprocessors Tech and Inst (I39))	115	10	130
BSc in Astronomy and Astrophysics (I44))	72	6	78
<b>Total</b>	<b>187</b>	<b>16</b>	<b>208</b>

##### Postgraduate

<b>Category/ Programme</b>	<b>M</b>	<b>F</b>	<b>TOTAL</b>
<b>MSc Physics</b>	6	3	9
<b>PhD Physics)</b>	1	12	13

The students taught in the service courses in other departments, schools and colleges stand at about 1000.

#### 4.0 INTERNATIONAL STUDENTS

#### ❖ DEPARTMENT OF CHEMISTRY

The department hosts a number of foreign students undertaking postgraduate programmes. They are as follows:

	Reg no	Name	Programme	Home Country
1	I56/80611/12	Marco Makungu	MSc Chemistry	Tanzania
2	I56/79318/12	Uphrosine Ujeneza	MSc Ind Chemistry	Ethiopia
3	I56/69593/11	Fozia Ali Adem	MSc Chemistry	Ethiopia
4	I56/69599/11	Denis Akampurira	MSc Chemistry	Uganda
5	I80/92721/13	Assefa Yoseph Atilaw	PhD Chemistry	Ethiopia
6	I80/85101/12	Tsegaye Deyou	PhD Chemistry	Ethiopia
7	I80/82021/11	Abdissa Negera	PhD Chemistry	Ethiopia
8	I80/82102/09	Ivan Gumula	PhD Chemistry	Uganda

#### ❖ DEPARTMENT OF GEOLOGY

Sn.	Reg. No.	Name	Nationality
1.	I13/29906/2009	Ket James Madutwal	South Sudan
2.	I13/29805/2009	Wantlo Nggie	Botswana
3.	I13/40244/2011	Deng Jacob Jok	South Sudan
4.	I13/57051/2012	Abednego Manyiel Maker	South Sudan
5.	I13/52542/2012	Athian Dee Santos	South Sudan
6.	I13/35344/2013	Akei Maketh Ding	South Sudan
7.	I13/34388/2013	Deng Isaiah Ajang	South Sudan
8.	I13/35445/2013	Deng Veronica Chier Chuor	South Sudan
9.	I13/36603/2013	thuch Thuch Garang	South Sudan

**Postgraduate – MSc. Geology**

Sn.	Reg. No.	Name	Nationality
1.	I56/69084/2011	Duo Lawrence Bhollai	Liberia
2.	I56/70141/2011	Nkya Abraham Tumsifu	Tanzania

**❖ DEPARTMENT OF METEOROLOGY**

The following table gives the distribution of foreign student population by country

No	Country	Number of Students		
		Undergraduate	Postgraduate	Total
1	Botswana	3	0	3
2	Ethiopia	0	1	1
3	Liberia	0	1	1
4	Malawi	0	9	9
5	Namibia	8	1	9
6	République du Congo	1	0	1
7	Rwanda	7	2	9
8	South Africa	1	0	1
9	South Sudan	0	1	1
10	Tanzania	3	17	20
11	Uganda	0	3	3
12	Zambia	1	0	1
<b>Total</b>		<b>24</b>	<b>35</b>	<b>59</b>

The details of the foreign students are as given in the table below.

S/No	FULL NAMES	REG. NUMBER	GENDE R	COUNT RY OF ORIGIN	PROGRAMM E REGISTERE D	PERIOD OF STUDY
1	<b>Sabiiti</b> Geoffrey	I80/80585/2010	Male	Uganda	PhD (Meteorology)	2009-2013
2	<b>Gahigi</b> Aimable	I56/62101/2011	Male	Rwanda	MSc (Agrometeorology)	2010-2012
3	<b>Ashipala</b> Sarafia Ndapandula	I56/71911/2011	Female	Namibia	MSc (Agrometeorology)	2011-2013
4	<b>Mulbah Jr.</b> David Mawolo	I54/76311/2012	Male	Liberia	MSc (Climate Change)	2012-2014
5	<b>Ame</b> Hassan Khatib	I45/80695/2012	Male	Tanzania	PGD (Meteorology)	2012-2013

6	<b>Athuman</b> Ahmed	I45/84333/2012	Male	Tanzani a	PGD (Meteorology)	2012-2013
7	<b>Binda</b> Juma Hamisi	I45/84338/2012	Male	Tanzani a	PGD (Meteorology)	2012-2013
8	<b>Emmanuel</b> Johnson L.	I45/84341/2012	Male	Tanzani a	PGD (Meteorology)	2012-2013
9	<b>Jecha</b> Suleiman Haji	I45/84344/2012	Male	Tanzani a	PGD (Meteorology)	2012-2013
10	<b>Kapakala</b> Isaya	I45/80695/2012	Male	Tanzani a	PGD (Meteorology)	2012-2013
11	<b>Kasenga</b> Leonard Michael	I45/84347/2012	Male	Tanzani a	PGD (Meteorology)	2012-2013
12	<b>Kavishe</b> golden M.	I45/84340/2012	Male	Tanzani a	PGD (Meteorology)	2012-2013
13	<b>Levira</b> Pamela william	I45/84350/2012	Female	Tanzani a	PGD (Meteorology)	2012-2013
14	<b>Miraji</b> miraji khamis	I45/84342/2012	Male	Tanzani a	PGD (Meteorology)	2012-2013
15	<b>Mking'imule</b> Veronica	I571/84348/201 2	Female	Tanzani a	PGD (Meteorology)	2012-2013
16	<b>Mohamed</b> H. Mohamed	I45/84346/2012	Male	Tanzani a	PGD (Meteorology)	2012-2013
17	<b>Musiba</b> Musiba M.	I45/84334/2012	Male	Tanzani a	PGD (Meteorology)	2012-2013
18	<b>Mwakilembe</b> Amani Burton	I45/84343/2012	Male	Tanzani a	PGD (Meteorology)	2012-2013
19	<b>Nkuba</b> Abel M.	I45/84335/2012	Male	Tanzani a	PGD (Meteorology)	2012-2013
20	<b>Tuju</b> Peter Enos	I45/84345/2012	Male	Tanzani a	PGD (Meteorology)	2012-2013
21	<b>Tunsume</b> Gideon M.	I45/84339/2012	Female	Tanzani a	PGD (Meteorology)	2012-2013
22	<b>Kaligirwa</b> Jeanne	I10/30762/2011	Female	Rwanda	BSc (Meteorology)	2010-2013
23	<b>Nyiranteziriyayo</b> Esperance	I10/30922/2011	Female	Rwanda	BSc (Meteorology)	2010-2013
24	<b>Ngabonziza</b> Athanasie	I10/30763/2011	Male	Rwanda	BSc (Meteorology)	2010-2013
25	<b>Mbati</b> Mathieu Mugunga	I10/30921/2011	Male	Rwanda	BSc (Meteorology)	2010-2013
26	<b>Odillo</b> Usile Kgobetsi	I10/44542/2012	Male	Namibia	BSc (Meteorology)	2011-2014
27	<b>Sebastiano</b> D.J. Laurinda	I10/44561/2012	Female	Namibia	BSc (Meteorology)	2011-2014
28	<b>Masaka</b> Hendrick	I10/44562/2012	Male	Namibia	BSc (Meteorology)	2011-2014
29	<b>Somses</b>	I10/44543/2012	Female	Namibia	BSc	2011-2014

	Sieglinde				(Meteorology)	
<b>30</b>	<b>Haindongo</b> Israel Ndaendako	I10/42366/2011	Male	Namibia	BSc (Meteorology)	2011-2014
<b>31</b>	<b>Anande</b> Doreen Mwara	I10/41650/2011	Female	Tanzania	BSc (Meteorology)	2011-2014
<b>32</b>	<b>Nsonga</b> Joseph	I10/41025/2011	Male	République du Congo	BSc (Meteorology)	2011-2014
<b>33</b>	<b>Gakomati</b> Justin	I10/44407/2012	Male	Rwanda	BSc (Meteorology)	2011-2014
<b>34</b>	<b>Musayidizi</b> Jean De Dieu	I10/44409/2012	Male	Rwanda	BSc (Meteorology)	2011-2014
<b>35</b>	<b>Niyonkuru</b> Shadrack	I10/44408/2012	Male	Rwanda	BSc (Meteorology)	2011-2014
<b>36</b>	<b>Kitero</b> Beatrice Stafor	I10/58731/2012	Female	Tanzania	BSc (Meteorology)	2012-2015
<b>37</b>	<b>Maswe</b> Oratile Kelebemang	I10/30949/2013	Female	Botswana	BSc (Meteorology)	2012-2015
<b>38</b>	<b>Moreri</b> Linky	I10/30950/2013	Female	Botswana	BSc (Meteorology)	2012-2015
<b>39</b>	<b>Setoto</b> Joyce Mmapotong	I10/30951/2013	Female	Botswana	BSc (Meteorology)	2012-2015
<b>40</b>	<b>Masigani</b> Godbless John	I10/58733/2012	Male	Tanzania	BSc (Meteorology)	2012-2015
<b>41</b>	<b>Nasilele</b> Collins		Male	Zambia	BSc (Meteorology)	2012-2015
<b>42</b>	<b>Waiswa</b> Milton	I54/69928/2013	Male	Uganda	MSc (Climate Change)	2013-2015
<b>43</b>	<b>Omay</b> Paulino Omoj	I54/69929/2013			MSc (Climate Change)	2013-2015
<b>44</b>	<b>Mtingwi</b> Patrick Edward	I45/69975/2013	Male	Malawi	PGD (Meteorology)	2013-2014
<b>45</b>	<b>Kanyenda</b> Tolani	I45/69977/2013	Male	Malawi	PGD (Meteorology)	2013-2014
<b>46</b>	<b>Mughogho</b> Kapewa Paulos	I45/69978/2013	Male	Malawi	PGD (Meteorology)	2013-2014
<b>47</b>	<b>Kazembe</b> Anne	I45/69979/2013	Female	Malawi	PGD (Meteorology)	2013-2014
<b>48</b>	<b>Kisyombe</b> Winthy Lusubiro	I45/69980/2013	Female	Malawi	PGD (Meteorology)	2013-2014
<b>49</b>	<b>Milanzi</b> Hussein	I45/69981/2013	Male	Malawi	PGD (Meteorology)	2013-2014

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<b>50</b>	<b>Pagona</b> James Pilirani	I45/69982/2013	Male	Malawi	PGD (Meteorology)	2013-2014
<b>51</b>	<b>Mkandawire</b> Malazi	I45/69983/2013	Male	Malawi	PGD (Meteorology)	2013-2014
<b>52</b>	<b>Mthiko</b> Keeness	I45/69984/2013	Female	Malawi	PGD (Meteorology)	2013-2014
<b>53</b>	<b>Sebaziga</b> Ndakize Joseph	I45/69931/2013	Male	Rwanda	PGD (Meteorology)	2013-2014
<b>54</b>	<b>Henock</b> Hailu Misganaw	I45/69930/2013	Male	Ethiopia	PGD (Meteorology)	2013-2014
<b>55</b>	<b>Bogere</b> Robert	I49/67157/2013	Male	Uganda	PGD (Operational Hydrology)	2013-2014
<b>56</b>	<b>Matiapato</b> Valencia Lesedi		Female	South Africa	BSc (Meteorology)	2013-2016
<b>57</b>	<b>Simalumba</b> Michael		Male	Namibia	BSc (Meteorology)	2013-2016
<b>58</b>	<b>Philander</b> Martin M.		Male	Namibia	BSc (Meteorology)	2013-2016
<b>59</b>	<b>Nasikaku</b> Richard Zaa		Male	Namibia	BSc (Meteorology)	2013-2016

#### ❖ DEPARTMENT OF PHYSICS

Currently, The Department does not have enrolled international students. However, the Department hosted the following students on research visits in 2013:

1. Mr. Austine Mulama, M.Sc. Student, Maseno Univesity (Three months)
2. Mr. J. P. Eneku, Ph.D. Student, Makerere University (Two months)  
Mr. M. G. Asiimwe, M.Sc. Student, Makerere University (Two months)



## 5.0 RESEARCH ACTIVITIES UNDERTAKEN

The School undertakes the following research activities through the following departments:

### ❖ DEPARTMENT OF CHEMISTRY

#### M.Sc

Student	Title of research	Supervisor (s)
Kerandi, Anne Moraa.	Investigation on Genotoxicity of Solar Disinfected (SODIS) Water.	Prof Wandiga
Pembere, Anthony M	Investigation of Heavy Metals in Vegetables Grown in the Agricultural and Industrial Areas of Webuye and Mumias	Prof Jumba, Dr Oduor
Okanga, Boventure.	Determination of the Alcoholic Content of Various Spirits: Denatured and Undenatured Among Selected Small Scale Production Units with Respect to Excise Legislation in Kenya	Dr Benson Wamalwa
Karani, Christopher	Industrial Production of Sodium Hydroxide and Chlorine Gas from locally available Materials	Prof Kamau
Riungu, Emily	Municipal Wastewater Treatment with Anodizing Solid Waste	Dr H. Njenga and Prof L. Njenga
Tonkei, Wilson	Development of an Electrochemical Sensor for the Detection of Heavy Metals in	Dr Aluoch and Prof Shiundu

	Waste Water.	
Murimi J. Mbugua.	To improve on lead acid battery manufacture in a more environmental friendly manner	Prof Kamau G. and Dr Guto P.
Judith Ngugi Joseph	Chemical analysis of borehole and shallow well water in arid and semi-arid regions of kenya.	Prof Lydia Njenga and Dr Kithinji J.P.
Rael Obong'o Kasera	Determination of effectiveness of untreated and edta-treated luffa cylindrica in removal of cr <sup>3+</sup> and cu <sup>2+</sup> from waste water.	Prof Shiundu P.M. and Dr Austin Aluoch
Ndiritu, Cecilia W.	Mobility of Heavy Metals, Microorganisms and Hydrodynamics of a Section of Nairobi River	Prof Kamau G. Prof Mwaura, Dr Kithinji J.P.
Kundu, Bevin N.	Comparison of Burning effectiveness of Liquid Biofuels and their Blends with Kerosene as Alternative Fuel for Lighting and Cooking	Dr Onyari J.M. Dr Kithinji J.P.
Masenge, Edna M.	Total Petroleum Hydrocarbons in Sediments and Water in Ngong and Mathare River	Prof Wandiga S.O. Prof Shiundu P.M.
Muya, Catherine N.	Electrocatalytic Decomposition of Organochlorine Pollutants	Prof G. Kamau Dr Peterson Guto
Everlyne Kasima N.	Efficiency of municipal waste water treatment plants in Kenya: A case study of Mombasa Kipevu Treatment Works	Dr A.O. Yusuf Dr D.K. Kariuki Dr D. Abong'o

Mbewa, Tom Joseph	Heavy Metal Analysis of Thermoplastic Paints in the Kenyan Market and the Environmental Implications of Application as road Marking Paints	Prof Kamau G. Dr F. Oduor Dr Kariuki D.K.
Ogange, Elphas O.	The Role of Fertilizer Usage and Agrochemical Effluents on the Persistence of Algae Bloom on Kenyan Shores of Lake Victoria	Dr F. Oduor Dr Kariuki D.K.
Awas, Erick Okoth	A Comparative Study of the Toxicity, Protective and Cell Defense Induction Capacity of Flavones from Kenyan Plants and Lipophilic Semi-Synthetic Derivatives	Prof Midiwo, Dr Mwaniki and Ndakala
Njeru, Daisy Nyawira	Phytochemical Investigation of the Root of Desmodium Ramosissimum for Antiplasmodial Principles	Dr Derese and Prof Abiy
Ogalo, Linet	Use of Electro-Analytic Methods in the Development of Biosensor for Detection of Bisphenol A.	Dr Mbui D.
Everlyne Kasima	Effectiveness of the Kipevu Treatment Works	Dr A. Yusuf , Dr. D.K. Kariuki, Dr D. Abongo
Ochieng Fredrick Nyateng	Assessment of pesticide and polychlorinated biphenyls residue Levels in Fish from	Prof Wandiga S.

	Kericho and Upper Nyando of River Nyando drainage basin in Kenya	
Muraga, Joseph	Determination of Dissolved Ions and Microbial Coliforms in Ground Water in Selected Areas in Athi River Basin	Prof Wandiga S.
Makokha, John Wanjala	Utilization of Titanium Oxide in formulation of Refractory Clay Bricks	Dr Kariuki D.K.
Victor Nthusi Kyalo	Assessment of Organochlorine, PCB,s and Organophosphate Pesticide Residues in Fish from Lower Nyando Drainage Basin	Prof Wandiga S.
Fredrick M. Mugo	Total Elements Speciation and Soil Fertility Analysis around mount Kenya	Prof Lydia Njenga Dr M. Gatari De Keath

### Ph.D

Student	Title	Supervisor(s)
Madadi O. Vincent	Studies of pesticide and macronutrient interaction dynamics in water-sediment/soil systems	Prof. Shem O. Wandiga Prof. Paul M. Shiundu
Godfrey A. Wafula	1 A Study of atmospheric fine particulate matter and their toxic components in Nairobi	Prof. Shem O. Wandiga Prof. Paul M. Shiundu

	and its environs	
C.W. Mirikau	A computerized model for the identification and location of water polluting industries in Nairobi	Prof. G.N. Kamau Prof. I.O. Jumba
Mrs. Marina Mukabi	Development, characterization and industrial application of conductive polymers	Prof. Duke Orata Dr. Hellen Njenga
Ms. Joyce G. Njagi-Kithure	Distribution of diazinon and chlorpyrifos in selected aquatic matrices from the upper Tana River in Kenya	Prof. S.O. Wandiga Prof. I.O. Jumba
Mrs. Ruth Odhiambo	Synthesis of bionucleating macrocycles incorporating thiolato and polyether compounds fused to 1,10-phananthroline as sensors for soft heavy metal	Prof. S.O. Wandiga Prof L. Njenga Dr. Austin Ochieng'
Farida Hussein Were	Assessment of levels of selected heavy metals and their effects on the health of industrial health workers in Nairobi and Athi River, Kenya	Prof. Geoffrey Kamau Prof. P.M. Shiundu Dr. C.M. Muturi
Immaculate Achieng'	Evaluating the efficacy of selected lignocellulosic materials of Kenyan origin in the adsorption of textile dyes and inks from aqueous industrial effluents	Prof. P.M. Shiundu Dr. A. Aluoch Dr. B. Wamalwa
Beatrice Irungu	Bioprospecting for antiplasmodial compounds from some albizia, turea and zanthoylum species in Kenya	Prof. Abiy Yenesew

❖ **DEPARTMENT OF GEOLOGY**

**RESEARCH ACTIVITIES UNDERTAKEN**

1. Equatorial Africa Atmospheric Deposition Network (EADN): From April 2010 – March 2014 Headed by: Prof. E. Odada.
2. Mapping the Health Impacts of Geogenic Heavy Metal Pollution in Kilifi District: Policy Regulation and Remediation: 2012 – 2014. Dr. L. Olaka
3. January 2012 to January 2013. TECLEA – Testing Biodiversity Responses to Climate and Land-use Changes Across East African Highlands – Prof. D.O. Olago
4. December 2010 to December 2014. Building Climate Change Adaptation Capacity at African Universities:A Proposal to Establish The Climate Adaptation Research Institute (CARI) at the University of Nairobi - Prof. D. O. Olago
5. CTBTO PROJECT PERIOD COVERED: 2002- Ongoing: Monitoring of nuclear explosions and seismicity using the CTBTO stations PS24 and IS32 – Prof. N.O. Akech
6. IAEA PROJECT CODE: RAF 8048 - PERIOD COVERED: 2009-2013 : Building Capacity in Support of Regional and Sub Regional Water Resources Planning, Development and Management in Africa – Prof. N.O. Akech
7. PERIOD COVERED: 2013-2017 - Integrating isotope hydrology into water resources assessment for the upcoming Lamu Port Infrastructure in the Lower Tana River catchment (Lamu and Tana delta); Kenya – Prof. N.O. Akech
8. Hominin sites and Paleolakes Drilling Project (H.S.P.D.P) – June 2013 – Prof. Olago

❖ **DEPARTMENT OF METEOROLOGY**

**Research Activities Undertaken**

<b>Researchers Name(s)</b>	<b>Title of Research</b>	<b>Departments involved</b>	<b>Sponsor</b>
Prof. NJ	Atmospheric	• Department of	KMD & UON

Muthama Dr. J.M. Ininda Mr. W.B. Masieyi Mr. D.N. Kariithi	Resources Modeling Centre	Meteorology, UON • Kenya Meteorological Department	
Dr. AO Opere	Nile basin Project- Adapting to climate change induced water stress in the Nile River Basin; WP1: Comprehensive Assessments	• Department of Meteorology, UON	UNEP (Small Scale Funding)
Prof. NJ Muthama Dr. JN Mutemi Mr. BK Mutai Ms Stella Aura	Sensitization of the communities in Kibwezi on the use of weather and climate information for the enhancement of food security	• Department of Meteorology, UON • Kenya Meteorological Department	African Institute for Capacity Development (AICAD)
Dr. GO Ouma Mr. CB Lukorito	Enhancing the Kenyan capacity on climate risk reduction and climate change adaptation for sustainable agricultural productivity and food security	• Department of Meteorology, UON	Regional Universities Forum for Capacity Building in Agriculture (RUFORUM)
Prof. NJ Muthama Prof. MM Manene Ms Stella Aura Dr. RE Okoola Dr. AO Opere Mr. BA Chanzu Mr. PK Runanu Mr. WB Masieyi	National Survey on utilization of weather products in Kenya	• Department of Meteorology, UON • Kenya Meteorological Department • Kenya Agricultural Institute (KARI) • Kenya Police • IGAD Climate Prediction and Application Centre (ICPAC) • School of Mathematics, UON	Kenya Government through Kenya Meteorological Department

## ❖ DEPARTMENT OF PHYSICS

### Research Activities Undertaken

The following are the research groups in physics

- I. Condensed Matter Physics
- II. Applied electronics
- III. Geophysics
- IV. Laser Physics and Spectroscopy
- V. Applied Nuclear and Radiation Physics
- VI. Theoretical physics**

**(a) Condensed Matter Physics**

Condensed Matter Physics, is a thematic group headed by Prof. Bernard O. Aduda. This branch of physics deals with properties of matter, and is notably the largest field of contemporary physics. It studies "condensed" phases that occur when the number of constituents in a system is very large and the interactions between the constituents are strong. Examples of condensed matter are solids and liquids where the bonding between the atoms are mainly electromagnetic in nature.

During the year 2013 studies on dye sensitized solar cells were done with focus on:

1. Preparing and characterizing the photoactive electrode (TiO<sub>2</sub>) by (a) oblique angle reactive sputtering deposition (b) nitrogen doping and observing how such TiO<sub>2</sub> photoelectrodes prepared by PVD or doped perform compared to the sol-gel prepared photoelectrodes.
2. Identifying natural anthocyanin dye containing plants, extracting and synthesizing, and purifying the dye for use as an alternative to the costly ruthenium based dye. The charge transfer dynamics of this dye will be studied, plus its stability and adsorbing behaviour.
3. Fabricating and characterizing an ETA solar cell, particularly morphological characterization, structural analysis, optical characterization of TiO<sub>2</sub>, In(OH)<sub>x</sub>Sy and PbS thin films, photoluminescence of In(OH)<sub>x</sub>Sy, electrical characterization of the solar cell, and surface photovoltage characteristics of the thin films.
4. Fabricating and characterizing a DSSC solar cell with the TiO<sub>2</sub> surface modified with a buffer layer.
5. Studying of the charge transport characteristics of thin films prepared by different technique (Electrophoretic deposition (EPD), sputtering and sol-gel techniques)
6. Attempting theoretical models of the DSSC based on our experience.
7. Constructing prototype DSSC/ETA cells resulting from our studies.
8. Building a local pool of talent in solar cell technology.

The group also organized a successful the 3<sup>rd</sup> and 4<sup>th</sup> solar academy in April and August 2013, respectively. This followed the training that begun in 2012 with the 1<sup>st</sup> and 2<sup>nd</sup> held in April and August respectively. Some of the November 2013 solar academy participants are shown in the above image.

**(b) Applied Electronics**

This thematic area headed by Mr. Mjomba Kale combines the methods from physics, computing and electronics to study and fabricate electronic devices. The areas of interest include;



### 1. **Distributed embedded platform (group main project)**

- Aim is to create an infrastructure that allows quick integration of transducers, computing platforms and communication networks such as wireless sensor networks, mobile networks or the internet.
  - This will provide diverse capabilities such as remote monitoring, control and automation.
2. Digital function generator (M.Sc)
  3. Digital Oscilloscope (M.Sc.)
  4. Automated detection of malaria parasites from blood slides (M.Sc.).
  5. Multiple current and voltage channels digital meters
  6. A low cost high efficiency LED lamp
  7. University of Nairobi Integrated Services – Zigbee based integration of the physical environment to the UON intranet.

### (c) **Applied Nuclear & Radiation Physics**

This group headed by Dr. K. H. Angeyo focused their research on;

1. Medical elementology and spectral diagnosis of disease;
2. Radiometric geothermics; Spectroanalytical environmentrics;
3. Material analysis by chemometric spectroscopy;
4. Radiometric beam quality characterization;
5. Gamma ray spectrometry and detector efficiency modelling.

### (d) **Laser Physics, Spectroscopy & Imaging**

The group whose head is Dr. K. Kaduki carries out research and development on laser spectroscopy methods, optical imaging, instruments and applications. Currently their research is on;

1. Laser and spark produced dense plasmas diagnostics and modelling;
2. Tuneable diode laser spectroscopy applied to trace gas monitoring;
3. Application of LED multispectral imaging microscopy to malaria diagnosis;
4. Development of efficient image recognition algorithms with application to malaria diagnosis;
5. Radiative characterization of atmospheric aerosols using Sun Photometry;
6. Quantitative analysis of trace atomic and molecular signatures of HBRA geothermal matrices by chemometrics assisted LIBS;
7. Monitoring aquatic plants proliferation in Lake Victoria using satellite data.

### (e) **Geophysics**

The area covers integrated geophysical studies of the rocks and sediments of Kenya. It includes the explorations of minerals, geothermal reservoirs, nuclear minerals and their environmental radiations hazards. It is headed by Prof. J. P. Patel and their current research areas include;

1. Gravity and Magnetic Investigation of Greater Magadi Area.  
Research work in progress to explore possibility of finding geothermal reservoirs in Magadi area using magnetic and gravity parameters.
2. “Integrated Geophysical Study of the Southern Kenyan Coastal Sedimentary

## Rocks of Kenya”

Project involves the nuclear geophysical study of the Mrima and Jombo areas sediments for the qualification of nuclear minerals in the area.

### 3. Paleomagnetic Study of the Rocks from Mt. Kenya and Environment

This is a joint study with the University of Florida and University of Nairobi. It involves the assessment of the past magnetic field of the Earth during the last five million years.

### 4. Nuclear Geophysical Study of Carbonatite Rocks in South Western Kenya

The research involves use of nuclear techniques in the quantity assessment of nuclear elements in carbonatite rocks from the south western Kenya. The area includes Homa Mountain, Ruri Hills, Rangwe Complex and all the gold mining Migori-Transmara complex.

### 5. Radioactive Minerals in Coumbite-Tantalite (Coltan) Ores in Ruanda

This is an overseas project in Ruanda. It involves the assessment of nuclear elements in coltan currently mined ores in Ruanda.

## (f) **Theoretical physics**

Theoretical Physics is a branch of physics which is a multi-disciplinary; it includes nearly all branches of physics. It is headed by Prof. Joseph O. Malo. They carry out diverse research including;

1. Studies on neutrino mass at finite temperature;
2. Inflationary Cosmology;
3. Baryogenesis and the Big bang Nucleosynthesis;
4. Cosmic Microwave Background Radiation;
5. Hubble’s Law and the Expansion of Space;
6. FLRW Metric; Friedman – Lemaitre, Robertson-Waker Metrix;
7. Galaxy Formation in the BB Theory;
8. Physics at the Earliest Instant of time;
9. Extrapolation of the Universe Backward in Time;
10. Dark Matter and Dark Energy;
11. Cosmological Horizon (past and future);
12. Galactic evolution and distribution – Large Scale Structures of the Cosmos;

## **6. INTERNATIONAL LINKS AND COLLABORATIONS**

The School has the following international links and collaborations through the following departments:

### ❖ **DEPARMTENT OF CHEMISTRY**

The Department has the following new links:

#### **IOM-UoN linkage programme**

- Cooperation with Department in to study the effectiveness and sustainability of solar lanterns in reducing sexual and gender-based violence among IDPs in Somaliland and Puntland. Funding amounts to US \$8000.

#### **Third World Academy of Sciences (TWAS)-UoN**

- The purpose of this grant is to strengthen the capacity of the department to undertake research in the field of physical chemistry by funding the purchase of specialized equipment. The funding amounts to US \$12,575.

#### **The State University Of New York, Binghamton –UoN linkage**

- Collaboration in University of Nairobi postgraduate students' training by Binghamton University.

#### **Student Exchange programme**

- Ruth Odhiambo sandwich programme at Lund University Sweden under ISP. She was working under Prof Ola Wendt.

### **❖ DEPARTMENT OF GEOLOGY**

1. MOU between University of Nairobi and Chinese Earthquake Administration
2. MOU between University of Nairobi and Norwegian Petroleum Academy
3. MOU between University of Nairobi and Schlumberger Oilfield Services Limited
4. Memorandum of understanding for Collaboration on "Mount Kenya Lakes Project" between University of Nairobi, Kenya Wildlife Service, and University of Ghent, Belgium.
5. MOU between Arcetormettal Ltd, Liberia and the University of Nairobi
6. MOU between Akita University, Japan and the department of Geology, University of Nairobi.
7. MOU between the National Oil of Kenya and the Department of Geology

### **❖ DEPARTMENT OF METEOROLOGY**

The department of Meteorology boasts of a number of links and collaborations all of which enhance the teaching, research, consultancy and corporate social aspects of its existence. Such links and collaborations include the following.

The African Technology Policy Studies Network (ATPS) is a multi-disciplinary network of researchers, practitioners and policy makers that promotes science, technology and innovation (STI) policy research, dialogue and practice, for African Development. With

a regional secretariat in Nairobi, it operates through national chapters in 30 countries with an expansion plan in place to cover the entire Africa. (<http://www.atpsnet.org/>).

Deltares is an independent, institute for applied research in the field of water, subsurface and infrastructure. Ms Marta Faneca Sanchez, a researcher affiliated to Deltares, made a 3-week visit to the department of Meteorology between May and June, 2013 (<http://www.deltares.nl/en/>).

The East African Community (EAC), is the regional intergovernmental organisation of the Republics of Burundi, Kenya, Rwanda, the United Republic of Tanzania, and the Republic of Uganda, with its headquarters in Arusha, Tanzania

Food Security and Nutrition Analysis Unit (FSAU-Somalia) provides a broad range of information users with timely and relevant information and analysis for better decision-making relating to short-term food insecurity and malnutrition, as well as informing development planning to address underlying causes of food and livelihood insecurity, and malnutrition (<http://www.fsau.org/>).

Friend of River Nile is a project aimed at creating a better understanding and quantification of the river Nile system to enhance the management of the Nile water resources (<http://www.friendnile.org/demo/>)

The department collaborates with Kenya Meteorological Society (KMS) in facilitating communication of important findings, which contribute towards the advancement of meteorological knowledge to Kenyans and the global community at large through organizing local and international meteorological workshops, conferences, symposia; introducing public education; and, sensitizing the public on the important aspects of meteorology such as drought, desertification and climate change.

The department's link with Kenya Water Institute's (KEWI) is vital in research and consultancy services in the water, sanitation, irrigation and related Sectors for sustainable development.

The Lake Victoria Basin Commission, LVBC is a specialized institution of the East African Community (EAC). The department views a link with LVBC as being imperative in the coordination of the sustainable development agenda of the Lake Victoria Basin. The department acknowledges the fact that the Lake Victoria and its basin as an economic growth zone to be exploited in a coordinated manner (<http://www.lvbcom.org/>). The department also has a link to the Lake Victoria Environmental Management Project Phase II-Kenya (LVEMP II).

The Nile Basin Research Programme, NBRP serves as a framework for research on topics specifically relevant to the Nile Basin. This strategic, multidisciplinary research programme focuses on contested resources; climate dynamics; health; and socio-economic challenges. The research reflects regional priorities. NBRP targets post

doctoral and senior researchers of regional institutions (<http://www.uib.no/rg/nbrp>). This is a possible entry point for collaborative research with the department.

The Somalia Water and Land Information Management, SWALIM is an information management unit of FAO Somalia serving Somali administrations, non-governmental organisations, development agencies and UN organisations. (<http://www.faoswalim.org/>). This link can be one way for the departmental to help the Somali communities whose lives depend directly on water and land resources.

The collaboration with Universite De Bourgogne (France) has benefited two members of academic staff in the recent past through research attachments. One of the staff was supervised by the deputy-director of CRC, Prof Pierre Camberlin.

Others links include the Climate Research Centre, CRC (<http://climatologie.u-bourgogne.fr/liens-utiles.html>), University Of Cape Town ([uct.ac.za](http://uct.ac.za)), World Meteorological Organization (WMO), Kenya Climate Change Action Plan (KCCAP), Kenya Meteorological Services Department (KMS), Ministry Of Environment & Mineral Resources ([environment.go.ke](http://environment.go.ke)), Unesco Chair- Water Resources Sudan, UNESCO-CWR of Sudan (<http://www.ucwr-sd.org/>) and IGAD Climate Prediction and Application Centre (ICPAC). ICPAC provides industrial attachment and research facilities to students.

## ❖ DEPARTMENT OF PHYSICS

### International Links and Collaboration

- Uppsala University, Sweden
- Lund University, Sweden
- Air Force Research Laboratory/Institute for Scientific Research (Boston College), USA
- Stanford University Solar Center, USA
- University of Rome (La Sapienza), Italy
- Space Environment Research Centre, Kyushu University, Japan
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### ❖ Staff Exchange

- Dr. Justus Simiyu (June 2013 to September 2013), International Science Programmes Fellowship to carry out research at the Angstrom Laboratory, Uppsala University.
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- Dr. Sebastian Waita (September to December 2013), International Science Programmes Programmes Fellowship to carry out research at the Angstrom Laboratory, Uppsala University.
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- Mr. Thomas Nyangonda, (23.8.2013 to 23.11.13), CV Raman Fellowship to carry out research at Indian Institute of Technology-Guwahati.

## 7.0 PUBLICATIONS FOR THE YEAR (THE INDICATE AUTHOR, DATE OF PUBLICATION, TITLE PUBLISHER, PLACE OF PUBLICATION)

The School has the following publications for the year through the following departments:

### ❖ DEPARMTENT OF CHEMISTRY

#### LIST OF RESEARCH PUBLICATIONS

1. Naziriwo B. and Wandiga S. (2013): Seasonal variations of phytoplankton species in Lake Victoria and the influence of iron and zinc ions on the dominant species identified during 2006-2007 studies, *Lake and reservoirs: Research and Management*, **18**, 259-273. (published in UK)
2. Machumi F., Midiwo J.O., Melisa R.J., Shabana I.K., Babu L.T., Jin Z, Larry A.W. and Ilias M. (2013): Phytochemical, antimicrobial and antiplasmodial investigations of *Terminalia brownii*, *Natural Product Communications*, **8** (6), 761-764 (published in UK)
3. Kerubo L., Midiwo J.O., Derese S., Langat M.K., Akala H.M., Waters N.C., Peter M., and Mathias H.(2013). Antiplasmodial activity of compounds from the surface exudates of *senecio roseiflorus*, *Natural Product Communications*, **8** (0), 1-2. (published in UK)
4. Milugo T.K., Kerubo L., Ochanda J.O., Owuor B.O., Wamunyokoli F.A., Oyugi J.O., and Ochieng J.W.(2013). Antagonistic effect of alkaloids and saponins on bioactivity in the quinine tree: Further evidence to support biotechnology in traditional medicinal plants, *BMC Complementary and Alternative Medicine*, **13**, 285.
5. Chinwe O.I., Charl J.J., Kenneth I.O., Natasha W., Njomo N., Nazeem J., Baker B.G., and Iwuowa E.I. (2013). Novel Iron-cobalt derivatised lithium iron phosphate nanocomposite for lithium iron battery cathode, *Int J. Electrochem. Sci*, **8**, 753-772.
6. Ndunda B., Langat M.K., Wanjohi J.M., Midiwo J.O. and Kerubo L.O. (2013). Alienusolin, a new 4 $\alpha$ -deoxyphorbol ester derivative, and crotonimide C, a new glutarimide alkaloid from the Kenyan *Croton alienus*, *Planta Med*, **79**, 1762-1766.

### ❖ DEPARMTENT OF GEOLOGY

1. **Mulwa JK**, Mariita NO. "A comparative analysis of gravity and micro-seismic results from Arus-Bogoria geothermal prospect, Kenya." *Scholarly Journal of Scientific Research and Essay (SJSRE)*, ISSN 2315-6163. 2013; 2(6):77-84.
2. Paolo, P., **Olago, D.**, & Omuto, C.T. (2013). *Kenya: A Natural Outlook, Geo-Environmental Resources and Hazards*. In Shroder Jr, J.O. United Kingdom: Elsevier.
3. Mwega BW, Mati B, **Mulwa JK**, GM K. "Identification of groundwater potential zones using remote sensing and GIS in Lake Chala watershed, Kenya.". In: Mechanical Engineering Annual Conference on sustainable research and innovation. Jomo Kenyatta University of Agriculture and Technology, Thika, Kenya; 2013.
4. **Aketch, O., & Omumbo, C. A.**(2013).General Geology of Kenya. In Shroder Jr, J.O,*Kenya: A Natural Outlook, Geo-Environmental Resources and Hazards* (pp.3-8).United Kingdom: Elsevier.
5. **Mulwa JK**, Mwega BW, Kiura MK. "Hydro-geochemical analysis and evaluation of water quality in Lake Chala catchment area, Kenya." *Global Advanced Research Journal of Physical and Applied Sciences*. 2013; 2(1):001-007.
6. **Olago, D., & Aketch, O.** (2013).Mineral oil and Gas Resources.In Shroder Jr, J.O,*Kenya: A Natural Outlook, Geo-Environmental Resources and Hazards*(pp. 11-22). United Kingdom:Elsevier
7. **Gichaba. C. M.**(2013).Relief, Physiography and Drainage.In Shroder Jr, J.O,*Kenya: A Natural Outlook, Geo-Environmental Resources and Hazards* (pp.23-30). United Kingdom: Elsevier.
8. Mark SR, Kelly MR, Gheorghe C, Raymond M, Nikolay A, Sansanee C, Navy H, Karen KA, **Odada EO**, Oscar P, Geoffrey P, Sergei R. "Science and Management of Trans boundary Lakes: Lessons Learned from the Global Environment Facility Program.". 2013.
9. **Kuria. Z** (2013). Ground Water Distribution and Aquifer Characteristics in Kenya.In Shroder Jr, J.O,*Kenya: A Natural Outlook, Geo-Environmental Resources and Hazards* (pp.83 - 107).United Kingdom: Elsevier.

10. **Omuombo, C.A., Olago, D., & Odada, E.O.** (2013). Coastal Waters. In Shroder Jr, J.O, *Kenya: A Natural Outlook, Geo-Environmental Resources and Hazards* (pp.109 - 112). United Kingdom: Elsevier.
11. **Nyamai, C.M** in Feyerol J., Giuliani G., Ohrestetter D., Malisa E., Le Goff E., Pardien V., **Ichang'i D.**, Simonet C., Omito E., Saul M. et al (2003). Worldwide Deposits: New Aspects and perspectives on Tsavorite Deposits. *Ore Geology Reviews* 53 pp 1-25.
12. **Odada, E.O** & Cherlet, M. (2013). Impacts on Climate Variability and Change
13. **Odada, E.O** (2013). Our Freshwater Under Threat-Vulnerability of Water Resources to Environmental Change in Africa.
14. Verschuren D, **Olago DO**, Rucina SM, Odhengo PO. "DeepCHALLA: Two Glacial Cycles of Climate and Ecosystem Dynamics from Equatorial East Africa.". 2013.
15. **Mulwa JK**, Kimata F, Duong NA. "Seismic hazards in Kenya." In: *Developments in Earth Surface Processes*. Amsterdam: Elsevier B.V.; 2013.
16. **Omuombo C, Olago D**, Rucina S, Williamson D. Late Holocene variations from Lake Rutundu, mount Kenya. Goa, India: PAGES; 2013.
17. **Kanoti JR**. Investigation of Ground Water dynamics in the Lake Victoria Basin using Hydrogeochemical and Isotope Hydrology. Nairobi - Kenya: University of Nairobi; 2013.

#### ❖ DEPARMTENT OF METEOROLOGY

The table below gives the publications by the members of staff in the department in the year 2013.

<b>AUTHOR</b>	<b>TITLE</b>	<b>JOURNAL</b>	<b>PERIOD</b>	<b>EVIDENCE</b>	<b>F / No</b>
Ongoma, V., <b>Muthama, J. N.</b> and <b>Gitau, W.</b>	Evaluation of urbanization influences on the urban winds of Kenyan cities.	Ethiopian Journal of Environmental studies and Managemen	2013	Article	



		t . 6(2):223-231.			
<b>Ongoma, V., Muthama, J. N. and Gitau, W.</b>	Evaluation of urbanization influences on urban temperature of Nairobi City, Kenya	Global Meteorology 2(1):1-5.	2013	Article	
<b>Okuku, C. C., Muthama, J. N. and Opijah, F. J.</b>	Observed Similarity In Satellite Derived Total Column Ozone Data And Ground Based Dobson And Ozonesonde Over Nairobi Kenya.	JKMS	2013	Book of Abstracts	
<b>Kaume, C. M., Mutai, B. K., Muthama, J. N. and J. K. Ng'ang'a</b>	Simulation of Potential Impact of Air Pollution from the Proposed Coal Mining Sites in Mui Basin	JKMS	Accepted Mar,2013	Review comments	
<b>Ngaina, J. N. and B. K. Mutai.</b>	Observational evidence of climate change on extreme events over East Africa	Global Meteorology	Oct, 2013	Article	
<b>Ouma, G. O., Ogallo, L. A. and M. Onyango</b>	Coping with local disasters using indigenous knowledge: Experiences from Nganyi Community of Western Kenya	Lambert Academic Publishing ISBN 978-3-659-45101-0	Nov, 2013	Copy of Title page	3 2
<b>Oludhe, C.</b>	The Use Of Renewable Energy Resources In Reducing Green House	JKMS Vol. 7	Nov. 2013	Book of Abstracts	3 3
<b>Ng'ang'a, J. K.</b>	Kenya technology needs for climate change resilience	JKMS Vol. 7	Nov. 2013	Book of Abstracts	3 4
<b>Mutua, F.</b>	Major sources of uncertainty in IWRM science and practice as everything Flows	JKMS Vol. 7	Nov. 2013	Book of Abstracts	3 5
<b>Mutai, B. K., Muthama, J. N. and Ngaina, J. N</b>	Investigation of the weather-dependence of fine particulate matter air pollution over Kenya	JKMS Vol. 7	Nov, 2013	Book of Abstracts	3 6
<b>Mukabana, J.</b>	Applied Weather and Climate Prediction	JKMS Vol. 7	Nov, 2013	Book of Abstracts	3 7
<b>Bosire, E. N., Opijah F. J. and Gitau, W.</b>	Accuracy evaluation of the climate forecast system model in predicting rainfall on	JKMS Vol. 7	Nov, 2013	Book of Abstracts	3 8

	seasonal time scales over East Africa				
Gateri, <b>Opere, A. O.</b> and <b>Gitau, W.</b>	Domestic Rainwater Harvesting in Embu County: A case study	JKMS Vol. 7	Nov. 2013	Book of Abstracts	39
Ngaina, J. N., <b>Ininda J. M.</b> and <b>Mutai, B. K.</b>	Assessment of the potential of harvesting atmospheric water resources over Nairobi	JKMS Vol. 7	Nov, 2013	Book of Abstracts	40
Ngaina, J. N., Njoroge, <b>Mutua, F.</b> and <b>Opere, A.O.</b>	Improvement of flood forecasting using ensemble Kalman Filter on River Nzoia	JKMS Vol. 7	Nov, 2013	Book of Abstracts	41

## ❖ DEPARMTENT OF PHYSICS

### (a) Journal Publications

The year 2013 saw a number of Journal publications done by our staff and students as listed below.

1. II. Yakub, A. Plappaly, M. Leftwich, K. Malatesta, K. C. Friedman, S. Obwoya, F. Nyongesa, A. H. Maiga et al, *Porosity, flow and filtration characteristics of frustrum-shaped ceramic water filters*, Journal of Environmental Engineering, V. 139, pp. 986-994, July 2013.
2. Musembi R, Aduda B, Mwabora J., M. Rusu, K. Fostiropoulos, M. Lux-Steiner, *Light soaking induced increase in conversion efficiency in solar cells based on  $In(OH)_xSy/Pb(OH)_xSy$* , Materials Sciences and Applications, V.4, 718-722, November 2013.
3. Otakwa, R. V. M., Simiyu, J. and Mwabora, J. M., *Dye sensitized and amorphous silicon photovoltaic devices' outdoor performance: a comparative study*, International Journal of Emerging Technology and Advanced Engineering, V.3, (7),pp 532, July 2013.
4. P. M. Mukhono, K.H., Angeyo , A. Dehayem-Massop, K. A. Kaduki, *Laser induced breakdown spectroscopy and characterization of environmental matrices utilizing multivariate chemometrics*, Spectrochimica Acta Part B, V. 87, Pp. 81-85, 1 September 2013.
5. Musembi R, Aduda B, Mwabora J., M. Rusu, K. Fostiropoulos, M. Lux-Steiner, *Effect of recombination on series resistance in eta solar cell modified with  $In(OH)_xSy$  buffer layer*, International Journal of Energy

- Engineering, V. 3(3), pp. 183-189, 2013.
6. Otakwa R.V.M., Simiyu J., Mwabora, J.M., *Dye-Sensitized and Amorphous Silicon Photovoltaic (PV) Devices' Outdoor Performance: A Comparative Study*, International Journal of Emerging Technology and Advanced Engineering, V. 3(7), PP. 532 -538, July 2013.
  7. C.O. Ayieko, R. J. Musembi, S. M Waita, B. O. Aduda and P. K. Jain, *Perfomance of  $TiO_2/In(OH)_iS_j/Pb(OH)_xS_y$  Composite ETA Solar cell fabricated from nitrogen doped  $TiO_2$  thin film window layer*, International Journal of Materials Engineering, V.3(2), pp.11-16, 2013
  8. D. Otwoma, J. P. Patel, S. Bartilol and A. O. Mustapha, *Estimation of annual effective dose and radiation hazard due to natural radionuclides in Mt Homa, southwestern kenya*, Radiation Protection Dosimetry, pp. 1-8, 2013.
  9. B. V. Odari, M. Mageto, R. Musembi, H. Othieno, F. Gaitho and V. Muramba, *Optical and electrical properties of Pd doped  $SnO_2$  thin films deposited by spray pyrolysis*, Austrian journal of basic and applied sciences, V. 7 (2), pp. 89-98, 2013.
  10. B. V. Odari, M. Mageto, R. Musembi, H. Othieno, F. Gaitho M. Mughendi and V. Muramba, *Optoelectronic properties of F-co-doped PTO thin films deposited by spray pyrolysis*, American Journal of material science, V.3(4) pp. 91-99, 2013.
  11. Musembi R, Aduda B, Mwabora J., M. Rusu, K. Fostiropoulos, M. Lux-Steiner, *Effect of recombination on series resistance in eta solar cell modified with  $In(OH)_xS_y$  buffer layer*, International Journal of Energy Engineering, V. 3(3), pp. 183-189, 2013.
  12. Catherine K. Kianji, Njeri W. Kaniaru, Philip K. Mutai and Julius M. Mwabora, *Importance of Law and Policy on successful utilization of nuclear Technology for electricity generation*, proceedings of 2013 mechanical engineering conference on sustainable Research and Innovation, V. 5, pp. 82-90, 2013.
  13. Lilian N. Matu and Julius M. Mwabora, *The role of Communication in a Nuclear power programme*, proceedings of 2013 mechanical engineering conference on sustainable Research and Innovation, V. 5, pp. 156-159, 2013.

#### **(b) Papers / lectures presented at conferences / workshops**

1. Alex Ogacho, Abdelhak Belaidi, Th. Dittrich, Robinson J. Musembi, and Bernard O. Aduda, *Surface Passivation of Ultrathin Nanoporous  $TiO_2$  for Photovoltaic Application*, Workshop on Material Science for Energy Conversion, iThemba Labs Cape Town , S. Africa 4<sup>rd</sup> – 8<sup>th</sup> November 2013.
2. Ajuoga, A. Ogacho, J. Mwabora and B. Aduda, *Niobium doped  $TiO_2(Nb:TiO_2)$ : Effects of doping concentration on the optical properties of  $TiO_2$* , 1<sup>st</sup> Young Scientists' MSSESA Conference on Material Science and Solar Cell Technology, United Kenya Club, Kenya. 28-29 November 2013.
3. M. Kineene, J. Simiyu, M. Munji *Synthesis and characterization of*

- Niobium Oxide thin films for DSSC application*, 1<sup>st</sup> Young Scientists' MSSESA Conference on Material Science and Solar Cell Technology, United Kenya Club, Kenya. 28-29 November 2013.
4. Simiyu J., *Sizing a stand alone photovoltaic electrical solar system for domestic application*, 1<sup>st</sup> Young Scientists' MSSESA Conference on Material Science and Solar Cell Technology, United Kenya Club, Kenya. 28-29 November 2013.
  5. J.G. Mbae, M. Munji, R.J. Musembi., *Analysis of optimized Deposition temperature of Zn:Al thin film on SnxSeyZnO:AlP-N junction solar cell*, 1<sup>st</sup> Young Scientists' MSSESA Conference on Material Science and Solar Cell Technology, United Kenya Club, Kenya. 28-29 November 2013.
  6. B. K. Mutange, P. M. Karimi, R.J. Musembi, D. M. Wamwangi, *Characterization of Indium doped Tin Selenide (In:SnxSey) Thin films for phase change memory application*, 1<sup>st</sup> Young Scientists' MSSESA Conference on Material Science and Solar Cell Technology, United Kenya Club, Kenya. 28-29 November 2013
  7. A.K. Mulu, P. M. Karimi, R.J. Musembi, D. M. Wamwangi, *Characterization of Tin doped Antimony Selenium (Sn:SbxSe1.5x) Thin film for phase change memory applications*, 1<sup>st</sup> Young Scientists' MSSESA Conference on Material Science and Solar Cell Technology, United Kenya Club, Kenya. 28-29 November 2013.
  8. J.Ndungu, F.W. Nyongesa,A.A. Ogacho, B.O. Aduda, *Nanoporous ceramics for Water Filtration*, 1<sup>st</sup> Young Scientists' MSSESA Conference on Material Science and Solar Cell Technology, United Kenya Club, Kenya. 28-29 November 2013.
  9. R .O. Onchuru, M. K. Munji and R.J. Musembi, *Fabrication and characterization of TiO<sub>2</sub>/In(OH)<sub>x</sub>Sy/SnS Composite ETA solar cell*, 1<sup>st</sup> Young Scientists' MSSESA Conference on Material Science and Solar Cell Technology, United Kenya Club, Kenya, 28-29 November 2013.
  - 10.N. Mugambi, M. Munji, R.J. Musembi, *Characterization of SnxSey/SnO<sub>2</sub>:Ni P-N junction prepared by spray pyrolysis for photovoltaic application*, 1<sup>st</sup> Young Scientists' MSSESA Conference on Material Science and Solar Cell Technology, United Kenya Club, Kenya, 28-29 November 2013.
  - 11.C.K. Wangati, W. Njoroge, P.K. Karanja, J.M. Mwabora, R.J. Musembi, J. Simiyu, *Deposition and characterization of CuAl<sub>x</sub>B<sub>1-x</sub>Se<sub>2</sub> thin film deposited by DC-RF Co-sputtering for photovoltaic application*, 1<sup>st</sup> Young Scientists' MSSESA Conference on Material Science and Solar Cell Technology, United Kenya Club, Kenya, 28-29 November 2013
  - 12.R.G. Gitonga, R.J. Musembi M. Munji, *Characterization of SnxSey/SnO<sub>2</sub>:Co P-N junction deposited by spray pyrolysis for photovoltaic application*, 1<sup>st</sup> Young Scientists' MSSESA Conference on Material Science and Solar Cell Technology, United Kenya Club, Kenya, 28-29 November 2013
  - 13.R.V.M. Otakwa, J.M. Mwabora, and J. Simiyu, *The complementarity of Dye-sensitized and amorphous Silicon photovoltaics in field application in the tropics*, 1<sup>st</sup> Young Scientists' MSSESA Conference on Material Science and Solar Cell Technology, United Kenya Club, Kenya, 28-29 November

- 2013.
14. S. Nyaga, J. Simiyu, M. Munji, *Projection for PV sizing for a stand alone "all direct current" Telecommunication system using mismatch factor algorithms*, 1<sup>st</sup> Young Scientists' MSSESA Conference on Material Science and Solar Cell Technology, United Kenya Club, Kenya, 28-29 November 2013
  15. P. Kabuga, W. Njoroge and J. Simiyu *Optical characterization of compounds for dye-sensitized solar cell applications*, 1<sup>st</sup> Young Scientists' MSSESA Conference on Material Science and Solar Cell Technology, United Kenya Club, Kenya, 28-29 November 2013.
  16. V. Muramba, M. Mageto, F. Gaitho, V. Odari, R. Musembi, J. Simiyu, J. Mwabora, *Preparation and Characterization of transparent and conducting doped Tin Oxide*, 1<sup>st</sup> Young Scientists' MSSESA Conference on Material Science and Solar Cell Technology, United Kenya Club, Kenya, 28-29 November 2013
  17. A. Alfred, J.M. Mwabora, R.J. Musembi, S.M. Waita, *Effects of oxygen partial pressure and substrate temperature on optical properties of sputter deposited CuCrO<sub>2</sub> thin films*, 1<sup>st</sup> Young Scientists' MSSESA Conference on Material Science and Solar Cell Technology, United Kenya Club, Kenya, 28-29 November 2013.
  18. P. V. Mwonga, N. W. Makau, G. O. Amolo, S. Lutta, M. D. O. Okoth, J.M. Mwabora, R.J. Musembi, C.M. Maghanga, R. Gateru, *Ab-initio Studies of point defects in TiO<sub>2</sub>: A density functional approach* 1<sup>st</sup> Young Scientists' MSSESA Conference on Material Science and Solar Cell Technology, United Kenya Club, Kenya, 28-29 November 2013.
  19. M.N. Muendo, M. Munji and J. Simiyu, *Characterization of TiO<sub>2</sub> based Dye-sensitized solar cell prepared by screen printing method*, 1<sup>st</sup> Young Scientists' MSSESA Conference on Material Science and Solar Cell Technology, United Kenya Club, Kenya, 28-29 November 2013
  20. P.M. Mwathe, R.J. Musembi, M. M. Munji, B.V. Odari, *Optoelectronic properties of Palladium doped Tin(IV) oxide (Pd:SnO<sub>2</sub>) thin films deposited by spray pyrolysis*, 1<sup>st</sup> Young Scientists' MSSESA Conference on Material Science and Solar Cell Technology, United Kenya Club, Kenya, 28-29 November 2013.
  21. M.G. Asiimwe, T. Otiti, J.M. Mwabora *Optical and electrical properties of Magnesium Doped Zinc Oxide for photovoltaic applications*, 1<sup>st</sup> Young Scientists' MSSESA Conference on Material Science and Solar Cell Technology, United Kenya Club, Kenya, 28-29 November 2013
  22. Njogu S M, *Fabrication and characterization of Germanium Doped Titanium Dioxide (Ge:TiO<sub>2</sub>) thin film for photovoltaic application*, 1<sup>st</sup> Young Scientists' MSSESA Conference on Material Science and Solar Cell Technology, United Kenya Club, Kenya, 28-29 November 2013
  23. J. N. Nguu, F W Nyongesa, R. J Musembi, B.O. Aduda, *Morphological and structural characterization of TiO<sub>2</sub>/Nb<sub>2</sub>O<sub>5</sub> composite electrode thin films synthesized by electrophoretic deposition (EPD) technique*, 1<sup>st</sup> Young Scientists' MSSESA Conference on Material Science and Solar Cell Technology, United Kenya Club, Kenya, 28-29 November 2013.
  24. J.P. Eneku, Otiti Tom, J.M. Mwabora, *Fabrication and characterization of*

- Aluminium and Gallium mono and Co-doped Zinc Oxide thin films by radio frequency sputtering for photovoltaic applications*, 1<sup>st</sup> Young Scientists' MSSESA Conference on Material Science and Solar Cell Technology, United Kenya Club, Kenya, 28-29 November 2013.
25. S. R. Tsisambo, M.K. Munji, R.J. Musembi, *Optical and electrical characterization of  $Cd_xNi_{1-x}S$  and  $Sb_2S_3$  thin films for photovoltaic applications*, 1<sup>st</sup> Young Scientists' MSSESA Conference on Material Science and Solar Cell Technology, United Kenya Club, Kenya, 28-29 November 2013
  26. S. Ndonge, R.J. Musembi, M.K. Munji, *Effect of substrate deposition temperature on the properties of  $Sn_xSe_y/ZnO:Sn$* , 1<sup>st</sup> Young Scientists' MSSESA Conference on Material Science and Solar Cell Technology, United Kenya Club, Kenya, 28-29 November 2013.
  27. C.O. Ayieko, B.O. Aduda, R.J. Musembi, S.M. Waita, P.K. Jain, *Performance of  $TiO_2/In(OH)_xS_y$  composite eta solar cell fabricated from nitrogen doped  $TiO_2$  thin film window layer*, 1<sup>st</sup> Young Scientists' MSSESA Conference on Material Science and Solar Cell Technology, United Kenya Club, Kenya, 28-29 November 2013.
  28. P. K. Nyaga, R. J. Musembi and M. K. Munji, *Effect of Sn Doping on the electrical properties of as prepared and annealed  $ZnO$  thin films prepared by Reactive evaporation*, 1<sup>st</sup> Young Scientists' MSSESA Conference on Material Science and Solar Cell Technology, United Kenya Club, Kenya, 28-29 November 2013
  29. D. Magero, N. W. Makau, G. O. Amolo, S. Lutta, M. D. O. Okoth, J.M. Mwabora, R.J. Musembi, C.M. Maghanga, R. Gateru, *Hydrogen as an alternative fuel: An ab-initio study of Lithium Hydride and Magnesium Hydride*, 1<sup>st</sup> Young Scientists' MSSESA Conference on Material Science and Solar Cell Technology, United Kenya Club, Kenya, 28-29 November 2013.
  30. V. K. Mengwa, N. W. Makau, G. O. Amolo, S. Lutta, M. D. O. Okoth, J.M. Mwabora, R.J. Musembi, C.M. Maghanga, R. Gateru, *A density functional theory study of electronic structure of  $TiO_2$  Rutile (110) surfaces with catechol adsorbate*, 1<sup>st</sup> Young Scientists' MSSESA Conference on Material Science and Solar Cell Technology, United Kenya Club, Kenya, 28-29 November 2013.
  31. B.V. Odari, R.J. Musembi, M.J. Mageto, H. Othieno, F. Gaitho, M. Mghendi, V. Muramba, *Optoelectronic properties of F-co-doped PTO thin films deposited by spray pyrolysis*, 1<sup>st</sup> Young Scientists' MSSESA Conference on Material Science and Solar Cell Technology, United Kenya Club, Kenya, 28-29 November 2013.
  32. B.V. Odari, M. Mageto, R. Musembi, H. Othieno, F. Gaitho, V. Muramba, *Optical and electrical properties of Pd Doped  $SnO_2$  thin films deposited by spray pyrolysis*, 1<sup>st</sup> Young Scientists' MSSESA Conference on Material Science and Solar Cell Technology, United Kenya Club, Kenya, 28-29 November 2013.
  33. W. Mulwa, N. W. Makau, G. O. Amolo S. Lutta, M. D. O. Okoth, J.M. Mwabora, R.J. Musembi, C.M. Maghanga, R. Gateru, *Structural and electronic properties of  $TiO_2$ ,  $Nb:TiO_2$  and  $Cr:TiO_2$ : A first principles study*,

- 1<sup>st</sup> Young Scientists' MSSESA Conference on Material Science and Solar Cell Technology, United Kenya Club, Kenya, 28-29 November 2013
34. A. A. Mulama, J.M. Mwabora, A.O. Oduor, and C. Muiva, *Optical properties of flash evaporated Se<sub>100-x</sub>Bix thin films: Effects of film thickness*, 1<sup>st</sup> Young Scientists' MSSESA Conference on Material Science and Solar Cell Technology, United Kenya Club, Kenya, 28-29 November 2013
  35. L. K. Munguti, R.J. Musembi, W.K. Njoroge *Optimization of SnxSey Deposited by reactive thermal evaporation for solar cell, application*. 1<sup>st</sup> Young Scientists' MSSESA Conference on Material Science and Solar Cell Technology, United Kenya Club, Kenya, 28-29 November 2013
  36. Kaduki K, *Physics at the university of Nairobi*, High level physics and appropriate solutions to real life problems in developing countries, Yaounde, Cameroon, 25-29 November 2013
  37. Dehayem-Massop, *Research activities in Physics in East Africa*, High level physics and appropriate solutions to real life problems in developing countries, Yaounde, Cameroon, 25-29 November 2013
  38. Birech Z., *Ultrafast dynamics of excited states in molecular crystals: The case of tetracene ultrathin single crystals*, 6th ALC student workshop 2013, Zevenwacht wine estate, Cape town, South Africa, 21-24 November 2013.
  39. Angeyo H, Kaduki K, Dehayem-Massop, *Trace quantitative and exploratory analysis by multivariate chemometric laser induced breakdown spectrometry applied to malaria and radiogeothermal diagnostics*. RIAO/OPTILAS 2013 VIII Iberoamerican Conference on Optics and XI Latin-American Meeting on Optics, Lasers and Applications, Porto, Portugal, July 22 - 26, 2013
  40. Angeyo H, Dehayem-Massop, Kaduki K, *Development of laser education and research towards biophotonics at Nairobi*. 12th International Conference on Education and Training in Optics and Photonics , Porto, Portugal, July 23 - 26, 2013.
  41. Birech Z. *Types of laser sources and their applications*, ALC workshop, ARC Hotel, Egerton university, Kenya, 08-13 September 2013.
  42. Silas Mureramanzi, *An investigation on the output stability and properties of photovoltaic PEC cells using semiconductor thin films of CdX(X=S,Se,Te) electrophoretically deposited on TiO<sub>2</sub> substrate*, ANSOLE Mini-symposium in Kenya 2013, 9<sup>th</sup> may 2013.

## **8.0 CONSULTANCIES EITHER UNDERTAKEN BY STAFF MEMBERS OR IN THE UNIT AS A WHOLE:**

The following consultancies were undertaken by through the following individuals and departments of the school:

### **❖ DEPARTMENT OF CHEMISTRY**

<b>Client</b>	<b>Parameter</b>	<b>Staff involved</b>
Public Complaints Committee	Analysis of water Samples	Mr Wafula
NEGST	Fluoride content in borehole water	Dr Yusuf
Kenya Wine Agency	Heavy Metals in Water	Mr Wafula
Ivce Aqua EPZ Ltd	Infra-Red Analysis	Mr Wafula
National Oil Corporation	Chromatographic analysis	Dr Madadi
SGS Kenya Ltd	Vitamin Analysis	Dr Madadi
Booth Extrusion	Moisture Content in samples	Mr Wafula
Osho Chemicals	Malathion analysis	Dr Madadi
Ministry of Higher Education	Alcohol content in Alvaro Drink	Dr. Madadi/Dr Yusuf
KEWI	Laboratory training in AAS, HPLC etc	Dr Yusuf, Mr J. Nganga, Mr Katiku, Mr Mirikau, Ms Muia, Mr Njoroge, Mr Katembu, Mr Rop,
Mura	Identification of active ingredient in a pesticide	Mr Wafula/Dr Yusuf
KEMRI	NMR	Dr Abiy/Dr yusuf
Anonymous	Quantity of ethanol in a sample	Dr Madadi/Dr Yusuf
Allan Paul	Calorific value and viscosity	Dr Yusuf/Mr Wafula

#### ❖ DEPARMTENT OF GEOLOGY

1. GIA – Consultancy Training Seminar on Gemology
2. SEUCO – Consultancy Laboratory sessions with students
3. Moi university - Consultancy Laboratory sessions with students
4. UNES- Lab Fee
5. Lake Basin Action Network (LBAN) - Training facilities (GIS Lab) and lab fee



❖ **DEPARMTENT OF METEOROLOGY**

<b>Title</b>	<b>Client</b>	<b>Staff Involved</b>
Provision of consultancy services on Verification of the Internally Displaced Persons due to 2007 elections	Ministry of State for Special Programmes	Prof. Muthama
Advancing the objectives of the CGIAR Research Program CCAFS	International Crops Research Institute for Semi-Arid Tropics (ICRISAT)	Mr Lukorito

❖ **DEPARTMENT OF PHYSICS**

Consultancy on Data Analysis Customer Care Course at UON. Value Ksh.350, 000.00. Participants Involved- Department of Physics through Dr. Musembi, and Ministry of Higher Education Science and Technology (Period July 2012 – July 2013).

**9.0 NO OF STAFF AND THEIR DESIGNATIONS**

The School is endowed with high calibre staff from the following department

❖ **DEAN's OFFICE, SPS**

**Staff Members and their designation**

Senior Administrative Assistant E/F	2
Senior Computer Technologist DEF	2
Computer Technologist (ABC)	1
Secretary Grade D	1
Secretary Grade C	9
Secretary Grade B	4
Secretary Grade A	10
Clerk Grade IV	2
Office Assistant Grade IV	1
<b>Total</b>	<b>28</b>

❖ **DEPARMTENT OF CHEMISTRY**

**Staff Members and their designation**

Professors	6
Associate Professors	7
Senior Lecturers	12
Lecturers	15
Tutorial Fellows	3
Assistant Lecturer	1
Graduate Assistants	3
Principal Technologist	1
Chief Technologist	1
Senior Technologist DEF	12
Technologist ABC	9
Technical Assistant II	1
Documentalist	1
Senior Administrative Assistant	1
Secretary	2
<b>TOTAL</b>	75

**Staff On Leave Of Absence**

<b>NAME</b>	<b>TITLE</b>	<b>STATUS</b>
Prof. Raphael	Professor	At CRA

Munavu		
Dr Evans Kituyi	Snr Lecturer	At IDRI
Prof. Paul Shiundu	Professor	At PUK
Dr. Wenwa A. Odinga	Snr. Lecturer	In U.S.A. , Los Angeles

#### ❖ DEPARMTENT OF GEOLOGY

##### **Academic**

- |                         |   |   |
|-------------------------|---|---|
| 1. Professor            | - | 2 |
| 2. Associate Professors | - | 4 |
| 3. Senior Lecturers     | - | 5 |
| 4. Lecturers            | - | 4 |
| 5. Assistant Lecturer   | - | 1 |
| 6. Tutorial Fellows     | - | 3 |
| 7. Graduate Assistants  | - | 2 |

##### **Non-academic**

- |                           |   |   |
|---------------------------|---|---|
| 1. Chief Technologist     | - | 1 |
| 2. Senior Technologist    | - | 5 |
| 3. Technologist ABC       | - | 3 |
| 4. Technical Assistant IV | - | 3 |

#### ❖ DEPARMTENT OF METEOROLOGY

<b>Designation</b>		<b>No. of staff</b>
Professor	-	2
Associate Professor	-	3
Senior Lecturer	-	8
Lecturer	-	3
Assistant Lecturer	-	0
Tutorial Fellow	-	0
Graduate Assistant	-	2
Administrator	-	0
Principal Technologist-		1

Senior Technologist -	2
Technologist -	3
Trainee Technologist-	0
Secretary -	2
Clerk -	0
Driver -	0
Messenger -	0
<b>Total</b>	<b>26</b>

❖ **DEPARTMENT OF PHYSICS**

**Teaching**

Professors	4
Associate professors	1
Senior Lecturers	6
Lectures	11
Tutorial fellows	10
Part-time lecturers	12
<b>Non-teaching staff</b>	<b>21</b>

**10.0 NUMBER OF GRADUANDS (DIPLOMA, BACHELORS, PGD, MASTERS AND PHDs):**

The School has produced the following graduates as listed below:

❖ **DEAN'S OFFICE, SPS**

<b>BSc.</b>	<b>120</b>
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❖ **DEPARMTENT OF CHEMISTRY**

<b>Ph.D.</b>	<b>1</b>
<b>M.Sc</b>	<b>12</b>
<b>B.Sc Industrial Chemistry</b>	<b>19</b>

## ❖ DEPARMTENT OF METEOROLOGY

The number of undergraduate and postgraduate students who graduated from the department in the academic year 2012/13 is as follows.

S/N <sup>o</sup> .	Certificate	Number Graduands
1	Diplomas	N/A
2	Bachelor of Science in Meteorology	49
3	Postgraduate Diploma in Meteorology	16
4	Postgraduate Diploma in Aviation Meteorology	2
5	MSc in Meteorology	3
6	MSc in Agrometeorology	2
7	PhD	0
<b>Total</b>		<b>72</b>

## 11. Papers Presented at Conferences and other Academic Fora Department of Chemistry

	Title of paper	Date presented	Venue
<b>1</b>	Alienusolin, a new deophorbol ester derivative and crotonimide C, a new glutarimide alkaloid from the Kenyan Croton alienus	October, 2013	Kottayam, Kerala, India
<b>2</b>	Prediction of soil physiochemical properties in Mount Kenya using MIR-PLSR	26-27 August 2013	ICRAF Campus, Nairobi, Kenya
<b>3</b>	Traffic and mineral dust impact on air quality in Nairobi, Kenya	19-23 August 2013	Geneva, Switzerland
<b>4</b>	Prediction of soil properties: An experiment using Mt. Kenya forest soils	23-27 September, 2013	Osaka, Japan

## Department of Meteorology

The following papers were presented by the indicated members of staff from the department in conferences and other academic forums.

<b>No.</b>	<b>Staff Name</b>	<b>Title of the Paper</b>	<b>Conference/Journal</b>	<b>Venue</b>	<b>Date</b>
1	Dr. Oludhe	Methods and Tools for VIA Assessment	Vulnerability Impact Assessment (VIA) Scoping Workshop (PREPARED)	Imperial Hotel, Kisumu	July 10-13
2	Dr. Oludhe	Review of the 2012/2013 Rainfall over the GHA Sub-region	SARCOF 17	Rainbow Hotel, Harare, Zimbabwe	August 28-30
3	Dr. Mutemi	Performance of GHACOF 34 outlook and the GHACOF 35 outlook: SOND 2013	Thirty Fifth Greater Horn of Africa Climate Outlook (GHACOF 35) Forum	Boma Inn, Eldoret	August 21-23
4	Dr. Oludhe	Climate change and sustainable development in the GHA	Thirty Fifth Greater Horn of Africa Climate Outlook (GHACOF 35) Forum	Boma Inn, Eldoret	August 21-23
5	Dr. Ouma	Community Based Climate Services for Disaster Risk Reduction	Thirty Fifth Greater Horn of Africa Climate Outlook (GHACOF 35) Forum	Boma Inn, Eldoret	August 21-23
6	Dr. Opere	Historical and future climate projections over Mount Elgon area	Consultative stakeholders workshop-Resilience Framework for Climate Change (RFCC) Project	Kisumu Hotel, Kisumu	July 11-12

7	Dr. Opere	Climate service for risk assessments & risk reduction of hydro meteorological hazards in GHA	Thirty Fifth Greater Horn of Africa Climate Outlook Forum (GHACOF 35)	Boma Inn, Eldoret	August 21-23
8	Prof. Ng'ang'a	The Use Of Renewable Energy Resources In Reducing Green House	11th KMS Conference on Meteorological Research Applications and Services	Institute for Meteorological Training and Research, Nairobi	Nov 12-16
9	Dr. Oludhe	Kenya technology needs for climate change resilience	11th KMS Conference on Meteorological Research Applications and Services	Institute for Meteorological Training and Research, Nairobi	Nov 12-16
10	Prof. Mutua	Major sources of uncertainty in IWRM science and practice as everything Flows	11th KMS Conference on Meteorological Research Applications and Services	Institute for Meteorological Training and Research, Nairobi	Nov. 12-16
11	Mr. Mutai	Investigation of the weather-dependence of fine particulate matter air pollution over Kenya	11th KMS Conference on Meteorological Research Applications and Services	Institute for Meteorological Training and Research, Nairobi	Nov 12-16
12	Dr. Mukabana	Applied Weather and Climate Prediction	11th KMS Conference on Meteorological Research Applications and Services	Institute for meteorological Training and Research, Nairobi	Nov. 12-16

13	Ms. Bosire	Accuracy evaluation of the climate forecast system model in predicting rainfall on seasonal time scales over East Africa:	11th KMS Conference on Meteorological Research Applications and Services	Institute for Meteorological Training and Research, Nairobi	Nov. 12-16 2013
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#### ❖ DEPARMTENT OF PHYSICS

- uiva CM, Sathiaraj TS and Mwabora J (2012), “Chemical bond approach to crystallisation kinetics and thermal stability in some  $\text{Se}_{90x}\text{In}_{10}\text{Sb}_x$  chalcogenide glassy alloys”, 2<sup>nd</sup> African Materials Science and Engineering Network (AMSEN) Workshop, 21-23 March 2012, Nairobi, Kenya
- Angeyo HK (2012), “Coupling energy dispersive X-ray fluorescence and scattering (EDXRFS) and chemometrics for rapid non-invasive quality assurance analysis and characterisation of complex matrix materials”, 2<sup>nd</sup> African-European conference on chemometrics, November 19-23, 2012, Stellenbosch, South Africa
- Omucheni DL (2012), “Utility of multivariate chemometric techniques in multispectral image analysis: an application to malaria diagnostics”, 2<sup>nd</sup> African-European conference on chemometrics, November 19-23, 2012, Stellenbosch, South Africa
- Musembi RJ (2012), “Solar PV training kit, a novel community outreach program in Kenya”, 1<sup>st</sup> international conference on physics for the development, 10-14 October 2012, Belgium
- Nyang’onda T (2012), “Analysis of Root Mean square roughness of Microcrystalline silicon thin films using scanning probe image processor software”, International Conference on Nanoscience+Technology, July 23- 27, 2012, Paris, France.
- Omucheni DL (2012), “A joint Kenyan-Ivory Coast Malaria Measurement campaign”, International workshop on Spectral Imaging in remote sensing, 17-28<sup>th</sup> September 2012, Nairobi, Kenya.



- Omucheni DL, Kaduki KA and Angeyo HK (2012), “Application of Principal Component Analysis (PCA) to Multispectral Imaging Microscopy for Malaria Diagnostics”, International workshop on Spectral Imaging in remote sensing, 17-28<sup>th</sup> September 2012, Nairobi, Kenya.
- Mukhono P (2012), “Chemometrics -Assisted Laser Induced Breakdown Spectroscopy of High Background Radiation Areas Geothermal Field Matrices”, International workshop on Spectral Imaging in remote sensing, 17-28<sup>th</sup> September 2012, Nairobi, Kenya
- Mukhono PM, Angeyo HK, Massop D and Kaduki KA (2012), “Laser induced breakdown spectroanalysis and characterization of environmental matrices utilizing multivariate chemometrics “,International workshop on Spectral Imaging in remote sensing, 17-28<sup>th</sup> September 2012, Nairobi, Kenya
- Cheruiyot EK, Mito CO and Kaduki KA (2012), “Application of Multi-spectral Satellite Imagery in Monitoring of Aquatic Vegetation and Water Quality Parameters in Large Inland Waters”, International workshop on Spectral Imaging in remote sensing, 17-28<sup>th</sup> September 2012, Nairobi, Kenya
- Memeu, DM, Kaduki KA and Mjomba CK (2012), “Automatic classification of plasmodium parasites using stained RGB images”, International workshop on Spectral Imaging in remote sensing, 17-28<sup>th</sup> September 2012, Nairobi, Kenya
- Gathoni R (2012), “Gas in scattering media absorption spectroscopy”, International workshop on Spectral Imaging in remote sensing, 17-28<sup>th</sup> September 2012, Nairobi, Kenya
- Aduda B(2012), “Opportunities for and challenges to energy sufficiency and sustainability in the Kenya energy sector”, Building a future energy system in Africa How can science academies contribute? Workshop, 10<sup>th</sup> September 2012, Stockholm, Sweden

## **12.0 Corporate Social Responsibility**

Department of Chemistry

1. Prof. J.O. Midiwo: NAPRECA Executive secretary; External examiner, Maseno University

2. Dr. D.K. Kariuki: KEBS Water Quality committee; NEMA Hazardous and Toxic Materials committee member; WRMA Threshold Pollution in Waste Water Committee.
3. Dr. B.M. Wamalwa: Board member of Japan Government scholarships
4. Prof. Wandiga S.O.: Chancellor, Egerton University; Pan African Chemistry Network Chairman, Regional Chapter; UNEP/GEF-UoN Project coordinator, UNEP POPs project coordinator
5. Dr. A.O. Yusuf: External examiner JKUAT; IDB Scholarship Selection Committee Board Member.
6. Prof L. W. Njenga: Board of Governors at Gatura Girls Secondary School

### **Department of Meteorology**

The Nairobi University Meteorological Association undertook charity work activities during the calendar year as part of the university's corporate responsibility. The students visited St. Elizabeth Secondary school on two occasions; one during the Children's Home visit and the other during the school's examination prayer day. The staff members and students also contributed generously to the visit to Kajiado children's home by the University.

### **13.0 Any other Activities**

The following are other activities by the school:

Department of Chemistry

#### **Promotion**

**Dr John Onyari was promoted from senior lecturer to associate professor.** Four lecturers were also promoted to senior lecturer. The four senior lecturers are: Dr. Albert Ndakala, Dr. Martin Njogu, Dr. John Wanjohi and Dr. Fredrick Odour.

Other staff promoted from tutorial fellow to lecturer were: Dr. E. Korir, Dr. Vincent Madadi and Dr. N. Njomo. Congratulations.

### **Department of Meteorology**

- **Promotions:**

Mrs Ann Kamau was promoted to a senior grade and posted to Lower Kabete campus. She was a secretary at the Department of Meteorology.

- **Academic Staff Research Visits**

Dr W Gitau, a Lecturer at the Department of Meteorology, made a research visit to centre de Recherches de Climatologie (Centre for Research on Climate), Universite de Bourgogne, Dijon, France. This was a 7-week visit made between 1<sup>st</sup> May, 2013 and 22<sup>nd</sup> June, 2013.

Ms Marta Faneca Sanchez made a 3-week visit to the department of Meteorology between May and June. She is affiliated to Deltares, an independent Research Organization in Netherlands. Deltares undertakes research in collaboration with Department of Meteorology.

Mr Bethwel Mutai visited the Max Planck Institut fur Chemie, Mainz, Germany. Mr Mutai is a graduate Assistant at the department of Meteorology. This two-month visit came between 15<sup>th</sup> July, 2013 and 15<sup>th</sup> September, 2013.

- **Visitors to the Department:**

During the year 2013, the following visited the department as invited speakers, courtesy calls, and walk-in guests' e.t.c

<b>DATE</b>	<b>NAME OF VISITOR</b>	<b>ADDRESS/AFFILIATION</b>
25.01.2013	Ruth Maina	UN Habitat
04.02.2013	Makuto Suwa	World Meteorological Organization [WMO]
17.04.2013	Prof. L A Ogallo	IGAD Climate Prediction and Application Centre [ICPAC]
10.05.2013	Prof R O Genga	School Of Mathematics [SOM], UON
13.05.2013	Prof D Olago	
21.06.2013	Ayub Shaka	Kenya Meteorological Services [KMS]
11.07.2013	Kanthy-Ann L. Caesal	
12.09.2013	Sandra K Baptista	CIESEN, Columbia University, USA
12.09.2013	Wassila Mamadon Thiaw	Climate Prediction Centre [CPC]-African Desk, NOAA
16.09.2013	Hikari Fujit	Akita University- JAPAN
17.09.2013	Japanese Students	JAPAN
10.10.2013	Yinka Adebayo	World Meteorological Organization [WMO] , SWITZERLAND
10.10.2013	Elijah Mukhala	World Meteorological Organization [WMO] Regional Office, Nairobi, KENYA
16.10.2013	David Gikung'u	Kenya Meteorological Society [KMS]
16.10.2013	Bahati Musilu	Kenya Meteorological Society [KMS]
20.11.2013	Dlafer Roguldse	Belgingur, ICELAND

20.11.2013	Logi Rogersson	Belgingur, ICELAND
20.11.2013	Robert Wayumba	IGAD Climate Prediction and Application Centre [ICPAC]
20.11.2013	Fiona Percy	Care International

- **Nairobi University Meteorological Association's Activities (NUMA)**

NUMA is an organization that brings together students of meteorology with a mission to further understanding knowledge and research applications in the science of meteorology and other related fields. The following activities were undertaken by NUMA during the calendar year 2013:

**Students Orientation:** Organized general and department orientation of first year meteorology students

**Field trips:** Organized a field trip to Kenya Meteorological Service to orient the students to the centre and register them with Kenya Meteorological Society. It organized a tour to JKIA particularly for 3<sup>rd</sup> year students taking aviation meteorology. Students made a trip to Ngong Hills to appreciate the role of meteorology in wind power production.

**Sports Day:** Took part in the Departmental and Interdepartmental Sport Day. This was a competitive bonding session for meteorology and other students.

**Career talks:** Two speakers were invited to talk to students and staff; one on the potential meteorological career employers and the other on the perspectives of the users of meteorological products in Kenya.

**Charitable activities:** The students visited St. Elizabeth Secondary school on two occasions; one during the Children's Home visit and the other during the school's examination prayer day.

**World Meteorological Day:** NUMA showcased at the Kenya Meteorological Service head quarters, with student as participating actively in KMS activities and as ushers during the same day.

Two **other crucial activities** are earmarked for the end of the academic year 2013/14. These are the Career Day and End of year Dinner. During the career day NUMA will showcase the department, inform other students on importance of the science of meteorology in an economy, student presentations on various research projects and other general career talks that will benefit all SPS students. The end of year farewell dinner to final year students will also include awards ceremony for outstanding association members in research, academia and service to all.

## **Department of Physics**

### **Events, meetings and conferences**

A number of events took place within the year 2013 at the physics department. These included

(a) The solar academy organized by the condensed matter group in April and August 2013.

(b) ANSOLE Workshop, May 2013

(c) The Network for Astronomy School Education(NASE) and Square kilometer Array (SKA) international workshop organized in November 2013.

(d) The Department hosted Material Science and Solar Energy for Eastern and Southern Africa (MSSEESA) *two activities*:

- Technical Training in Instrumentation Workshop held on 26 – 27 November 2013 **at the Department of Physics** targeting the technical staff working within the MSSEESA network universities. The main aim was training the technicians in instrumentation and interfacing of equipment. This is part of MSSEESA objective in dissemination and exchange of information. The workshop attracted 15 participants from Kenya, Uganda, Tanzania and Uganda.
- 1st Young Scientist MSSEESA Conference on Materials Science and Solar Energy Technology held on 28– 29 November 2013 **at the United Kenya Club**. The participants were only drawn from MSSEESA participating nodes. The participants got an opportunity to interact and exchange ideas in their areas of research. This was also an opportunity for the Young Scientist to learn from senior scientists from other regions within the MSSEESA network. The conference attracted 70 participants

from Kenya, Uganda, Tanzania and Zambia.

e) Victor Katontwo (I39/1990/1990/2011) a third year B.Sc. (Microprocessor Technology and Instrumentation) competitively won a Chinese Ambassador Scholarship in November 2013 through the Special Student Advisor office at the University of Nairobi. Mr. Katonto is a partial orphan from a poor background in Pokot County.

d) Ten staff members comprising of both academic and Technical participated in a two week Tailor Made Training in Photovoltaics from 10-24<sup>th</sup> November 2013 at the Deft University of Technology in Netherlands.

