

Mapping Report

Kwame Nkrumah University of Science and Technology (KNUST, Kumasi)

Dated: September, 2010.

The Water and Sanitation group:

No.	Name	Department
1	Prof. Mrs. Esi Awuah	Civil Engineering
2	Prof. S.N.Odai	Civil Engineering
3	Dr. K.B. Nyarko	Civil Engineering
4	Dr. Richard Buamah	Civil Engineering
5	Prince Antwi-Agyei	Civil Engineering
6	Mr Oduro Kwarteng	Civil Engineering
7	Kwaku Amaning Adjei	Civil Engineering
8	Frank Ohene Annor	Civil Engineering
9	C.S.K Kpordze	Civil Engineering
10	Dr Geophrey Anornu	Civil Engineering
11	K.Biritwum Nyarko	Civil Engineering
12	Dr Richard Boamah	Civil Engineering

Introductory note by the Water and Sanitation group at the university: xxx (e.g. on when formed, number of meetings held, etc.)

1. Research Management

1.1. Organisation

[Provide the organisational chart/ structure of your university and describe which parts of the organisation are involved in research management within water, sanitation and environmental health – to the best of your knowledge if formal mapping is not viable.]

Organisational structure

The Research and Conferences Committee has the following membership:

- Vice-Chancellor, as chairman
- Pro-Vice Chancellor
- Registrar
- Principals of KNUST University Colleges
- Provosts of Colleges

- Two Research Fellows appointed by the Academic Board not below the rank of Senior Research Fellow from the Research Centres
- Deputy Registrar (Human Resources Development)
- One member elected by each college, who is not below the rank of Senior Lecturer

The core functions of this committee subject to the approval of the Academic Board are:

- a) To formulate and publish the research policies and priorities of the University and to provide guidelines for the assessment of research proposals
- b) To examine and take appropriate action on all applications for grants chargeable to the Research and Conference Fund
- c) To receive and publish reports on research and conferences from Departments and prepare annually a comprehensive report for submission to the academic board.

Describe how the financial management of externally funded research programmes is organised at your institution (relevant to e.g. a next phase of SNOWS).

Financial Governance and Payment procedures.

The governance of Grants shall be in line with KNUST standards and procedures. Grant received are managed in accordance with three main regulations.

- The Finance and Administration Act 2003 (Act 654)
- The University's Finance and Stores regulations, and
- The Public Procurement Act, 2003 (Act 663).

The detailed governance will include the following:

1. Every payment from the Grant shall be by a payment request letter from Project Director/Manager or Principal Investigator to the Provost or head of department for approval. In the case of request for consumables and miscellaneous expenses, the request can be made by the project manager/administrative assistant to the project director for approval and forwarded directly to the Finance Officer for payment.
2. In the case of procurement of goods and services, the request shall be forwarded to the University procurement officer together with three (3) quotations, where the amount involved is above five hundred Ghana cedis (**GH¢500 equivalent of 400 US dollars**)
3. If approved, the request is forwarded to The College Finance Officer for payment. The Finance Officer makes payment after considering the budget for the payment and other procedures.
4. All payment requests must be certified by the internal auditor before the final payment can be made. Where the purchase of tangible items is concerned, then the internal auditor must physically verify such items, and certify for payment to be made to the supplier.
5. All payments must be backed by official receipts (VAT receipt is preferable). Where it is impracticable to obtain receipts (for very small amounts), a honor certificate duly approved must back the payment
6. Bank accounts are opened following the requirements of the Project.
7. The signatories to the bank account include: the Provost/head of department, the Project Director, two (2) Deans of the various faculties and the College Finance Officer. The mandate for withdrawing funds is that the Finance Officer **must sign** together with any one of the above.
8. A cash book will be maintained for each account to track the transactions between the project office and the bank. Monthly bank reconciliation is compiled for each account.

9. External auditors can be engaged by the donors to audit the projects accounts. Some projects use the University's external auditors, while others appoint different auditors. Either option attracts fees. However, the University's external auditors report to public accounts committee in parliament. There is a considerable delay in finalising audit report of the University.

Describe by which means your university maintains and develops research management capacity (e.g. research management courses offered to staff)

1.2. Resources for SNOWS

[Describe the group you have mobilised for SNOWS, i.e. the SNOWS action group and resource persons (this group corresponds to the names you have included in the new template for SNOWS action group and resource persons- Annex 2-A).

You should qualify this description with an overview of current research projects of relevance to SNOWS (Annex 2-B).

Note the number of peer reviewed publications of relevance to SNOWS produced by the SNOWS action group 2005-10 (include the full list in Annex 2-C)

Describe whether the SNOWS action group and research persons have access to external resources complementary to those provided through the SNOWS project and which could be pooled towards common action/mutual benefits.

Provide information on sentinel sites which the SNOWS action group and resource persons use/have access to.]

2. PhD Programme

2.1. Organisation

[Describe how the PhD programme is organised at your university.

If there is NO formal structure, e.g. no PhD programme but you actually have PhD students, then explain the informal set-up for enrolling and supporting PhDs at your university, and give priority to describing areas which the Water and Sanitation group at your university identifies as potential SNOWS action for enhancing the PhD organisation.

Organisational structure

In 1974, the Board of Postgraduate Studies was established as an umbrella administrative unit to coordinate the activities of departments at the university which were offering Postgraduate programmes. This board was elevated to the status of School in 2002. The main objective of graduate studies at the KNUST has been the training and development of graduates to acquire skills in Science and Technology.

The School of Graduate Studies is responsible for PhD programmes. The school is headed by a Dean, who is assisted by a Vice-Dean. The Dean and the Vice Dean are appointed by Council on the recommendation of the Academic Board in consultation with the Executive committee. The Dean shall be a Professor and shall have the status and functions of a Dean of a Faculty. He/she shall hold

office for a term of two (2) years and maybe eligible for re-appointment for another term of two (2) years only.

The board of the school has the following composition:

- Dean as Chairman
- Vice-Dean and
- Two (2) members elected by each College Board one of whom shall be a Dean and the other a Head of Department not below the rank of a Senior Lecturer or Senior Research Fellow.

The core functions of the Board of the School of graduate studies are:

- a) To give approval of candidature, supervisors, coursework, thesis, topics, titles and synopses for higher qualifications based upon the recommendations from the Department Board
- b) To recommend the appointment of Internal and External Examiners in respect of written papers, dissertations of theses to the Academic Board based upon recommendations from the departmental Boards.
- c) To keep records of all graduate students.
- d) To give provisional approval to graduate examination results upon recommendations from Departmental Boards
- e) To liaise with the Heads of Department on matters relating to graduate studies in their various Departments
- f) In liaison with the International Programmes Office of the University, to establish and maintain links with graduate schools in other Universities or Institutions and promote exchange of graduate students and Staff engaged in graduate work between this University and other universities.

Aims and Objectives of the Graduate Programmes

The aims and objectives of the graduate programmes are as follows:

- To train high-level manpower
- To improve student performance
- To solve problems of national and international dimensions
- To contribute to knowledge

The **Vision** of the School of Graduate studies is *ensuring quality graduate education*

Mission

The SGS of the KNUST is committed to providing high-level manpower training in Science and Technology with Entrepreneurial and Management skills in solving National and Sub-Regional problems.

Description of Graduate Studies

Graduate Studies have been categorised under two main headings:

Full Time and Part-Time.

- a) A Full-time student shall be taken to be a candidate pursuing a full-time programme of study the duration of which shall not be longer than twenty-four (24) months from the date of registration for a master's programme and thirty-six (36) months for Doctorate programme.
- b) A Part-time Student shall be taken to be a candidate in full time employment pursuing a programme of study the duration of which shall not exceed thirty-six months from the date of registration for Master's programme and forty-eight months for a Doctorate programme.

PhD Admissions

All candidates applying for admission to Research Programmes are required to submit (in about 500 – 700 words):

- a) An outline of Proposed Research; and
- b) Statement of Purpose

Applications shall be considered, in the first instance, by the appropriate Department Board. Where an interview or a qualifying examination is required for determining the suitability or otherwise of an applicant, the Departmental board shall decide the form of interview or qualifying examination and appoint a panel from its members to administer the interview or examination. The School of Graduate Studies shall be represented at the interview or examination.

The Head of Department shall submit to the School of Graduate Studies for its approval, a list of candidates recommended for admission together with:

- a) The pertinent extracts from the minutes of the Departmental Board
- b) Statement on the nature of the programme
- c) Dissertation/Thesis topic(s) and an outline of the proposed research (where applicable)
- d) Names of proposed supervisors

The degree of Doctor of Philosophy (PhD) is awarded on the basis of a research programme in which a candidate has made an original and significant contribution to knowledge.

Qualification for Admission.

- a) A candidate shall hold a Master's degree or its equivalent from a recognised institution and shall submit evidence of adequate training and ability to undertake the proposed programme.
- b) A candidate who does not hold a Master's degree shall first register for a Master's degree by research. If he proves himself to be of sufficient calibre by the end of the first year of the programme, he/she may be permitted by the Board, to register for the PhD degree. This registration shall be deemed retrospective from the date of the original registration for the Master's degree.
- c) A candidate who does not satisfy the requirement stated above but is otherwise adjudged suitable may be admitted. For the purpose of assessing his suitability, such a candidate may be interviewed or be required to take entrance examination, or both, as directed by the Board on the recommendation of the appropriate Departmental Board.
- d) A candidate may be required, on the recommendation of the Department concerned, to audit appropriate courses.

If the PhD programme is formalised describe the overall organisation briefly. Give priority to explaining those areas in more detail that the Water and Sanitation Group at your university identifies as areas that may be addressed by SNOWS action, e.g. revising policies; PhD rules & regulations; fundraising; monitoring & evaluation etc.

As a minimum the description should provide information on the requirements for PhDs to complete their doctorate degree. (If this information is available in an updated PhD handbook/rules and regulations document you may refer to this document but then remember to attach it to the report or provide direct URL.]

2.2. Training & Research environment / infrastructure

[Describe your research environment for PhD students. This description should include whether there are any taught courses for PhD students and whether such courses are mandatory or not. The description should also include information on your framework for providing quality supervision, access to research infrastructure including labs, IT, libraries and other support infrastructure for PhDs.

Describe by which means your university maintains and develops research supervisory skills, tutorial skills etc (e.g. PhD supervisor courses offered to staff).

Provide detailed description of those areas your Water and Sanitation group may wish to develop through SNOWS action.

The current PhD research environment is poor. In the college of engineering, which is hosting the SNOWS project, there are no offices and funding for research is highly limited. SNOWS will provide leadership in managing PhD students and policy for PhD project write-up. There is also the need to encourage staff to write proposals and take on board PhD students who are well funded. Proposals will also focused on Post doctoral research positions in the department. PhD students need to live in residential flats and be provided with decent office space in the department buildings. The PhD students who are normally taken have families and this should be a question on the application form.

3. Masters Programme

[This part should only be described if your university does not have PhD programmes. And would only cover the research part of the Masters programme, i.e. the thesis/dissertation part and research methodology courses of the Masters degree]

Describe the requirements for the Master thesis/dissertation. The description should also include information on research methodology courses and your framework for providing quality supervision, access to research infrastructure including labs, IT, libraries and other support infrastructure for Masters during their theses work.

Qualification for Admission

- i. A candidate shall hold a First Class or Second Class (Upper Division) honours degree, or its equivalent, in an appropriate field of study, from a recognised University.
- ii. A candidate who does not satisfy the requirement stated above but is otherwise adjudged suitable by the Departmental Board, shall, where practicable, be interviewed and in addition may be required to take an entrance examination as determined by the Departmental Board concerned. A candidate who has satisfactorily completed a Graduate Diploma course may be considered for admission on the recommendation of the Departmental Board concerned.
- iii. A candidate registered for the M.Phil degree may be required to audit appropriate courses on the recommendation of the departmental Board concerned.

Examinations

- i. The examination shall include:
 - a) Written examination (where appropriate)
 - b) Assessment of thesis
 - c) Oral Examination
- ii. Not less than three (3) examiners, of whom, one shall be an External Examiner shall be appointed by the Board of the School of Graduate Studies, on the recommendation of the Departmental Board, to examine the thesis.

- iii. A panel of not less than three (3) examiners, including one external examiner, shall conduct the oral examination. In each case, the Chairman of the panel shall be the Dean, or his representative.

When recommending the appointment of an external examiner, the Departmental Board shall submit an outline Curriculum Vitae of the proposed examiner based on a format obtainable from the Board of the School of Graduate Studies.

- iv. The panel shall submit its recommendations to the Departmental Board in the form of a joint report signed by both internal and external examiners with respect to the oral examination, and separate reports with respect to the thesis, on the basis of prescribed criteria approved by the Board of the School of Graduate Studies.

The graduate school has a common room with access to internet for all graduate students. Special offices need to be created for Master's students who use their classrooms and Halls of residence as their places of study.

Annexes

Annex 1. SNOWS action group and resource persons

Name	Position* Affiliation** Contact details	Main interest in SNOWS	Relevant research (key words)	CV attached y/n
Category 1 – Individuals interested in SNOWS activities and with current relevant research activities				
1. Prof. Mrs. Esi Awuah	Lecturer	Environmental Health/Sanitation		No
2. Prof. E. Mensah	Lecturer	Environmental Health		No
3. S.K Gawu	Lecturer	Environmental Health		No
4. Dr. K.B. Nyarko	Lecturer	Water Supply		Yes
5. Dr. Duker	Lecturer	Water Supply		No
6. Dr. Richard Buamah	Lecturer	Water Supply		Yes
7. Dr. Ali	Lecturer	Water Supply		No
8. Prof. S.N Odai	Lecturer	Water Supply		Yes
9. Mr. Sampson Oduro-Kwarteng	Lecturer	Sanitation		Yes
10.				
Category 2 – Individuals with interest in actively engaging in SNOWS, can add value, but have no current research activities				
			n.a	
Category 3 – Resource persons - Individuals doing relevant research but not currently actively engaging in SNOWS				
		n.a		n.a

Category 4 – External stakeholders & resource persons for SNOWS				
Category 5 – Other resource persons relevant to SNOWS that can enable and support achievement of SNOWS objectives				
				n.a

Annex 2-A SNOWS-relevant research projects

The list includes larger research projects initiated, implemented or terminated in the period 2005-2010

Project responsible party / Principal Investigator	Funding (USD)	External (yes: X)	Project title	Start year – end year
Nemanja Trifunovic n.trifunovic@unesco-ihe.org	1.5million Euros	UNESCO-IHE	WSESP Capacity building for post graduate training in water supply and sanitation in Ghana	1996-2001
Nemanja Trifunovic n.trifunovic@unesco-ihe.org	1.5 Million Euros	UNESCO-IHE	WRESP Capacity building for post graduate training in water engineering and environmental sanitation in Ghana	2003-2008
Patrick Moriarty moriarty@irc.nl	1.5 million Dollars	IRC, Netherlands	WashCost This project seeks to examine the life cycle analysis of water and sanitation projects to determine the overall cost for planning purposes.	2008-2013
Sandy Cairncross Sandy.Cairncross@lshtm.ac.uk +4420792722 Esi Awuah esiawuahrt@yahoo.com +233 20 7417766	1million pounds	Wellcome Trust	SNOWS Is a consortium of 9 institution seeking to build research capacity in water supply, sanitation and environmental Health? This the consortium hopes to achieve by carrying out a needs assessment and organizing training for staff involved in research and provision of fellowships for PhD and Masters students to carry out research. It is a Wellcome Trust funded project. The Institutions are London School of Hygiene, University of Copenhagen, East Anglia, Tswane and Venda in South Africa, University of Edgerton in Kenya, Mbari in Uganda and KNUST in Ghana	2009-2014
Kala Vairavamoorthy <k.vairavamoorthy@bham.ac.uk	13,million Euros	UNESCO-IHE Netherlands	SWITCH This is a 33 partner Institutions from 15 countries with the aim of achieving more sustainable urban water management in the city of the future. They use innovative scientific, technological and socio-economic solutions, which can then be more speedily replicated around the world. It has research across six themes and	2005-2010

			these are paradigm shift to sustainable and integrated urban water management, storm water management, efficient water supply and use for all, innovations in sanitation and waste management, urban water environments and planning and Governance and institutional change.	
Ludwin Daal <Ludwin.Daal@kema.com T/M +31 26 356 26 65 F +31 26 445 46 59	62,000Euros	KEMA Netherlands	CaPWA A water conservation project in industries. This involves the collection of data on the energy and water conservation practices in industries in Ghana. A water capturing devise will be developed in counterpart institutions and presented in Ghana. A workshop will be organised to present results to stakeholders	2010-2013
Jetze Heun j.heun@unesco-ihe.org; Tel: +31-15-2151721 Fax: +31-15-2122921	100,000 Euros	UNESCO-IHE Delft Netherlands	UPaRF funds projects that have primary focus on water and sanitation. Pays for compensation for staff time, cost for travel, consumables, Equipment, PhD and Masters Fellowships, Dissemination audit control and third party	2009-to date
Total				

Peer reviewed publications relevant to SNOWS
by the SNOWS action group and resource persons.
Kwame Nkrumah University of Science and Technology

The list covers peer-reviewed publications SNOWS action group contribution within the period 2005–2010:

1. Buamah, R.; Petrusevski, B.; de Ridder, D.; van de Wetering, T.S. C. M. and Schippers, J.C. (2009) Manganese removal in groundwater treatment: practice, problems and probable solutions. *Journal of Water Science and Technology* 9.1, 89 – 98.
2. Buamah, R.; Petrusevski, B and Schippers, J.C. (2009) Oxidation of adsorbed ferrous: kinetic and influence of process conditions. *Journal of Water Science and Technology*, 60.9: 2353 – 2363.
3. Buamah, R.; Petrusevski, B. and Schippers, J.C. (2008) Adsorptive removal of manganese (II) from the aqueous phase using iron oxide coated sand. *Journal of Water Supply: Research and Technology – AQUA* 57.1: 1 – 12
4. Buamah, R.; Petrusevski, B. and Schippers, J.C. (2008) Presence of arsenic, iron and manganese in groundwater within the gold-belt zone of Ghana. *Journal of Water Supply: Research and Technology – AQUA* 57.7: 519 – 529
5. Awuah, E., Nyarko.K.B and Owusu P. A (2009). Water and Sanitation in Ghana. *The International Journal of the Science and Technology of Desalination and Water Purification*. Elsevier, Vol 248 Issues 1-3.
6. Oduro-Kwarteng, S., Nyarko. K.B., Odai. S. N and Aboagye-Sarfo P (2009) Water conservation potential in educational institutions in developing countries: case study of a university campus in Ghana. *Urban Water Journal*, Taylor and Francis,
7. Nyarko, K.B., Awuah. E and Ofori, D (2009) Local initiative in community water supply: Case study in Ashanti Region, Ghana . *The International Journal of the Science and Technology of Desalination and Water Purification*. Elsevier, Vol 248 Issues 1-3.
8. Nyarko, K.B. (2008), ‘Private sector involvement in drinking water supply in Ghana’, *Int. J. Of Water*, Vol. 4, No.3/4, pp.197–215.
9. Nyarko, K. B., Oduro-Kwarteng, S and Adama, I. (2007).“Cost recovery of community managed piped systems in Ghana”. *Water and Environment Journal* 21(2007) 92–99
10. Oduro-Kwarteng, S., Nyarko K. B., Odai, S. N. and Aboagye-Sarfo, P. (2009). Water Conservation potential in educational institution: Case Study of a University Campus in Ghana. *Urban Water Journal* 6(6), 449 – 455.
11. Adwubi, A., Amegashie, B. K., Agyare, W. A., Tamene. L., Odai, S. N., Quansah, C. and Vlek, P. (2009). Assessing sediment inputs to small reservoirs in Upper East Region, Ghana. *Lakes and Reservoirs: Research and Management*, 14(4), 279 – 287.
12. Annor, F.O., van de Giesen, N., Liebe, J., van der Zaag, P., Tilmant, A. and Odai, S. N. (2009). Delineation of small reservoirs using radar imagery in a semi-arid environment: a case study in the Upper East Region of Ghana. *Physics and Chemistry of the Earth* 34: 309 – 315

13. Odai, S. N., Mensah, E., Sipitey, D., Shoji. R., Awuah, E. (2008.), Heavy Metals Uptake by Vegetables Cultivated on Urban Waste Dumpsites: Case Study of Kumasi, Ghana. *Research Journal of Environmental Toxicology* 2(2): 92 – 99.
14. Mensah, E., Odai, S. N., Kyei-Baffour N., and Ofori, E. (2008). Influence of Transpiration on Cadmium and Lead Uptake by Cabbage, Carrots and Lettuce from Irrigation Water in Ghana. *Asian Journal of Agricultural Research* 2(2): 56 – 60.
15. Mensah, E., Allen H. E., Shoji, R. Odai, S. N., Kyei-Baffour N., Ofori, E., and Mezler, D. (2008). Cadmium and Lead Concentrations Effects on Yields of Some Vegetables due to Uptake from Irrigation Water in Ghana. *International Journal of Agricultural Research* 3(4): 243 – 251.
16. Mensah, E., Bonsu. M., Kyei-Baffour N., Ofori, E., Odai, S. N. (2008). Influence of Cadmium and Lead Concentrations of Irrigation Water on Dry Matter Yield of Vegetables. *Journal of Environmental Science and Technology*, 2(1), 68-72.
17. Oduro-Kwarteng, S., Nyarko, K. B., Odai, S. N., and Aboagye-Sarfo, P. (2007). Strategies for Improving Water End-Use Efficiency on KNUST Campus in Kumasi. *Journal of Engineering and Technology*. 1(1) 60 – 66.

ANNEX 3

LIST OF CORE DOCUMENTS

Include a list of documents relevant to the mapping of resources, e.g. documents relevant to research management and PhD programme (rules and regulations etc.) at your university

1. KNUST, (2007). Quality Assurance Bullentin (Vol.4),
2. KNUST (2007). Vice Chancellor's report – 41st congregation
3. KNUST (2009). Vice Chancellor's report – 43st congregation
4. KNUST (2004). The Statutes of the KNUST, Kumasi, KNUST (2005).
5. Corporate Strategic Plan (Abridged version) – 2005-2014 (PLAN2K14)
6. KNUST & School of Graduate studies (2009). Entry Requirements & General Regulations for Graduate Programmes (2009-2011 Academic Year)
7. KNUST (2004). Conference Proceedings: Way Forward for PhD Studies at KNUST
8. KNUST (2008). Student's Guide.
9. WASHCOST Project documents
10. SWITCH Project documents.

ANNEX 4

CV – SCIENTIFIC STAFF PROFILE

CV – Scientific Staff Profile

Name	Dr. Richard Buamah	
Department	Civil Engineering Department	
Working Address	Civil Engineering Department, KNUST – Kumasi	
Contact details	Email – main: buamah77@yahoo.com	Skype:
	Phone (office): 032260235	Phone (cell): 0205915990
Formal education	PhD	
Current position	Lecture & Head of Env. Quality Laboratory	
Research area and expertise of relevance for SNOWS (max 5 lines)	Water Treatment -Adsorption of contaminants from groundwater used for drinking water production. Assessment / Analysis of water quality of surface water bodies. Assessment of quality of wastewater discharged from mining industries.	
Current research project(s) relevant to SNOWS	Water Treatment -Adsorption of contaminants from groundwater used for drinking water production. Assessment / Analysis of water quality of surface water bodies. Assessment of quality of wastewater discharged from mining industries	
Courses at Post – Graduate level, relevant to SNOWS	Water Treatment, Filtration Environmental Chemistry Water quality management	
Courses and seminars at Doctorate level relevant to SNOWS	Adsorptive removal of Arsenic, fluoride, iron and manganese from groundwater	
Other courses of relevance to SNOWS	Assessment of quality of wastewater discharged into water bodies / environment from mining industries	
Number of Post Graduate students tutored at present	15 (Fifteen)	
Number of PhDs supervised at present	1 (One)	
Number of PhD fellows supervised that are / were not enrolled at own department (last 5 years)	1 (One)	
Scientific Production	Number of peer-reviewed articles in international scientific journals: 7 Number of conference abstracts published in conference proceedings: 3 Number of articles in national journals: 1 Major reports: 1	
Distinctions	0	
List max. 10 selected articles related to	1. Buamah, R.; Petrusovski, B.; de Ridder, D.; van de Wetering, T.S. C. M. and Schippers, J.C. (2009) Manganese removal in groundwater	

SNOWS	<p>treatment: practice, problems and probable solutions. <i>Journal of Water Science and Technology</i> 9.1, 89 – 98.</p> <p>2. Buamah, R.; Petrusovski, B and Schippers, J.C. (2009) Oxidation of adsorbed ferrous: kinetic and influence of process conditions. <i>Journal of Water Science and Technology</i>, 60.9: 2353 – 2363.</p> <p>3. Buamah, R.; Petrusovski, B. and Schippers, J.C. (2008) Adsorptive removal of manganese (II) from the aqueous phase using iron oxide coated sand. <i>Journal of Water Supply: Research and Technology – AQUA</i> 57.1: 1 – 12</p> <p>4. Buamah, R.; Petrusovski, B. and Schippers, J.C. (2008) Presence of arsenic, iron and manganese in groundwater within the gold-belt zone of Ghana. <i>Journal of Water Supply: Research and Technology – AQUA</i> 57.7: 519 – 529</p> <p>5. Buamah, R. Hackman, S. F. and Awudza, J. A. M. (2002) Feasibility studies of the use of activated Asokwa clay as coagulant in water treatment. <i>In: Proceedings of the 2nd School of Engineering research retreat.</i> – KNUST.</p>
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Name	Kwabena Biriwtum Nyarko	
Department	Civil Engineering Department	
Working address	Civil Eng Depart, KNUST	
Contact details	Email, main: nyarko.k.b@gmail.com Email, secondary: Phone (office): 233 03220 60226	Skype: kwabena.b.nyarko Phone (Cell): 233-2-8165515
Formal education	BSc, MSc, PhD	
Current position	Snr Lecturer	
Research area and expertise of relevance for SNOWS (max 5 lines)	Water Pricing Water utility Management Modelling Water distribution systems Sanitation services	
Current research project(s) relevant to SNOWS	1. WASHCost Project, [Ghana Country Director] 2. [Title of research project], [Responsibility in team] ..add more if needed..	
Courses at Post Graduate level, relevant to SNOWS	1. [Water Transport and Distribution], [Course leader] 2. [Inst Development], [Course leader] 3. [Engineering Economy] [Course leader].	
Courses and seminars at Doctorate level relevant to SNOWS		
Other courses of relevance to SNOWS		
Number of Post Graduate students tutored at present	4	
Number of PhDs supervised at present	1	
Number of PhD fellows supervised that are/were not	Number:1	

enrolled at own department (last 5 years)	Enrolled at : 1: Civil Engineering Department, KNUST
Scientific Production	Number of peer-reviewed articles in international scientific journals: 6
	Number of conference abstracts published in conference proceedings: 4
	No. of articles in national journals:2
	Major reports:2
Distinctions	
List max. 10 selected articles related to SNOWS	<ol style="list-style-type: none"> 1). Awuah, E., Nyarko.K.B and Owusu P. A (2009). Water and Sanitation in Ghana. <i>The International Journal of the Science and Technology of Desalination and Water Purification. Elsevier</i>, Vol 248 Issues 1-3. 2). Oduro-Kwarteng, S., Nyarko. K.B., Odai. S. N and Aboagye-Sarfo P (2009) Water conservation potential in educational institutions in developing countries: case study of a university campus in Ghana. <i>Urban Water Journal</i>, Taylor and Francis, 3). Nyarko, K.B., Awuah. E and Ofori, D (2009) Local initiative in community water supply: Case study in Ashanti Region, Ghana . <i>The International Journal of the Science and Technology of Desalination and Water Purification. Elsevier</i>, Vol 248 Issues 1-3. 4). Nyarko, K.B. (2008), 'Private sector involvement in drinking water supply in Ghana', <i>Int. J. Of Water</i>, Vol. 4, No.3/4, pp.197–215. 5). Nyarko, K. B., Oduro-Kwarteng, S and Attakora, S (2008) "Performance of Community Managed Small Towns' Water Supply in Upper West of Ghana" On-Line Development 2008 'Water and Development' www.sidint.org/development. 6). Oduro-Kwarteng, S., Nyarko, K. B., Odai, S.N and Aboagye-Sarfo, P. (2007) "Strategies for Improving Water End Use Efficiency on KNUST Campus. <i>Journal of Engineering and Technology</i>, College of Engineering, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana. 7). Nyarko, K. B., Oduro-Kwarteng, S and Essandoh, H.K.M (2007) "Computer Modelling of Hydraulic Performance of the Kumasi Water Distribution Network. <i>Journal of Engineering and Technology</i>, College of Engineering, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana. 8). Nyarko, K. B., Oduro-Kwarteng, S and Adama, I. (2007). "Cost recovery of community managed piped systems in Ghana". <i>Water and Environment Journal</i> 21(2007) 92–99 9). Nyarko, K. B., Odai, S. N. and Oduro Kwarteng, S. (2006). "Water Distribution System Modelling for Water Quality Management: A case study of Kumasi in Ghana" <i>Journal of Science and Technology</i>, KNUST. Vol. 26 No.3 December 2006. 10). Oduro-Kwarteng, S., Nyarko, K. B. and Adams, C. A. (2004). "A Methodology for Assessing conditions of Water Asset in Small Towns in Ghana", <i>Journal of the Ghana Institution of Engineers</i>, Vol. 2 No. 2. December 2004, pp 25-32. 11). Attah-Konadu, R. and Nyarko, K. B. (2003). "Water Treatment and Solar Pumps for Rural Water Supply". <i>Journal of The Ghana Institution of Engineers</i>, Vol.1, No 1, 2003, pp 65-72. .

Name	Samuel Nii ODAI	
Department	Department of Civil Engineering	
Working address	Kwame Nkrumah University of Science and Technology, Kumasi Ghana	
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	Email, secondary: odains@hotmail.com	
	Phone (office): +233 – 3220 60226	Phone (Cell): + 233 – 24 479 7711
Formal education	BEng , Hohai University, China. July 1992 MSc , Tokyo University of Agriculture and Technology Japan, March 1996 PhD , Tokyo University of Agriculture and Technology Japan, March 1999	
Current position	Associate Professor	
Research area and expertise of relevance for SNOWS (max 5 lines)	<ol style="list-style-type: none"> 1. Computational Hydraulics in environmental flows 2. Numerical modelling of urban water distribution systems 3. Heavy Metals Uptake by Vegetables from Irrigation Water 4. Effect of on-site sanitation on the quality of groundwater 5. Regulation for water supply to the poor 	
Current research project (s) relevant to SNOWS	1. [Assessment of Characteristics of Wastewater flows from Unsewered urban Slums in African cities], [Principal Investigator]	
Courses at Post Graduate level, relevant to SNOWS	<ol style="list-style-type: none"> 4. [Urban Drainage], [Lecturer] 5. [Environmental Impact Assessment], [Lecturer] 	
Courses and seminars at Doctorate level relevant to SNOWS	N/A	
Other courses of relevance to SNOWS	N/A	
Number of Post Graduate students tutored at present	Six	
Number of PhDs supervised at present	Two (co-supervision)	
Number of PhD fellows supervised that are/were not enrolled at own department (last 5 years).	<p>Number: One</p> <p>Enrolled at :</p> <p>1: Agricultural Engineering Department, KNUST</p>	
Scientific Production.	Number of peer-reviewed articles in international scientific journals: 15	
	Number of conference abstracts published in conference proceedings: 27	
	No. of articles in national journals: 5	
	Major reports: 3	
Distinctions	Commonwealth Academic Fellow at Imperial College London	
List max. 10 selected articles related to SNOWS	<ol style="list-style-type: none"> 1). Oduro-Kwarteng, S., Nyarko K. B., Odai, S. N. and Aboagye-Sarfo, P. (2009). Water Conservation potential in educational institution: Case Study of a University Campus in Ghana. <i>Urban Water Journal</i> 6(6), 449 – 455. 2). Adwubi, A., Amegashie, B. K., Agyare, W. A., Tamene. L., Odai, S. N., Quansah, C. and Vlek, P. (2009). Assessing sediment inputs to small reservoirs in Upper East Region, Ghana. <i>Lakes and Reservoirs: Research and Management</i>, 14(4), 279 – 287. 3). Annor, F.O., van de Giesen, N., Liebe, J., van der Zaag, P., Tilmant, A. and Odai, S. N. (2009). Delineation of small reservoirs using radar imagery in a semi-arid environment: a case study in the Upper East Region of Ghana. <i>Physics and Chemistry of the Earth</i> 34: 309 – 315 4). Odai, S. N., Mensah, E., Sipitey, D., Shoji. R., Awuah, E. (2008.), Heavy Metals Uptake by Vegetables Cultivated on Urban Waste Dumpsites: Case Study of Kumasi, Ghana. <i>Research Journal of Environmental Toxicology</i> 2(2): 92 – 99. 5). Mensah, E., Odai, S. N., Kyei-Baffour N., and Ofori, E. (2008). Influence of Transpiration on Cadmium and Lead Uptake by Cabbage, Carrots and Lettuce from Irrigation Water in Ghana. <i>Asian Journal of Agricultural Research</i> 2(2): 56 – 60. 6). Mensah, E., Allen H. E., Shoji, R. Odai, S. N., Kyei-Baffour N., Ofori, E., and Mezler, D. (2008). Cadmium and Lead Concentrations Effects on Yields of Some Vegetables due to Uptake from Irrigation Water in Ghana. <i>International Journal of Agricultural Research</i> 3(4): 243 – 251. 	

	<p>7). Mensah, E., Bonsu. M., Kyei-Baffour N., Ofori, E., Odai, S. N. (2008). Influence of Cadmium and Lead Concentrations of Irrigation Water on Dry Matter Yield of Vegetables. <i>Journal of Environmental Science and Technology</i>, 2(1), 68-72.</p> <p>8). Oduro-Kwarteng, S., Nyarko, K. B., Odai, S. N., and Aboagye-Sarfo, P. (2007). Strategies for Improving Water End-Use Efficiency on KNUST Campus in Kumasi. <i>Journal of Engineering and Technology</i>. 1(1) 60 – 66.</p> <p>9). Nyarko, K. B., Odai, S. N., and Oduro-Kwarteng, S. (2006): Water Distribution System Modelling for Water Quality Management: A Case Study of Kumasi in Ghana. <i>Journal of Science and Technology, Kumasi, Ghana</i>, 26(3), 159 – 170.</p> <p>10). Odai, S. N., and Abban, B. (2005): Runoff Modelling and Drain-Sizing Software – KNUST DrainDesign. <i>Journal of the Ghana Institution of Engineers, Accra, Ghana</i>, 3(1), 54 – 61. [Did about 50% of the work – Developed the concept of stormwater drainage and the mathematical model, supervised the software development, and wrote the paper].</p>
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Name	PETER AGYEI-BAFFOUR	
Department	COMMUNITY HEALTH	
Working address	DEPARTMENT OF COMMUNITY HEALTH, SMS, KNUST, UPO, KNUST, KUMASI	
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	Phone (office): +233 3220 60293	Phone (Cell): +233244049594
Formal education	PHD (COMMUNITY HEALTH)	
Current position	RESEARCH FELLOW	
Research area and expertise of relevance for SNOWS (max 5 lines)	<ol style="list-style-type: none"> 1. Health Systems & Policy Research, Health Economics Health sector financing, 2. Human Resource for Health 3. Health Service Planning, Project Management 4. Public Healthg Sociology [Social Science in Health] 	
Current research project(s) relevant to SNOWS	<ol style="list-style-type: none"> 1. Feasibility, Acceptability, Cost and Policy Contextual Issues in Home Management of Malaria in children aged 6-59 months in the Kumasi Metropolis, Ghana], [Co-PI & coordinator] 2. Evaluation of School Health Programme In The Period 2001-2006 In The Bosomtwe-Atwima-Kwanwoma District, Ghana.[Supervisor] 3. Adherence to Hazard analysis and critical control point among food services staffs in Subin sub-metro, Kumasi.], [Supervisor] 	
Courses at Post Graduate level, relevant to SNOWS	<ol style="list-style-type: none"> 6. Health System Research, [Lecturer] 7. Community Health community diagnosis - Practicals [leacturer] 	
Courses and seminars at Doctorate level relevant to SNOWS	NIL	
Other courses of relevance to SNOWS		
Number of Post Graduate students tutored at present	63	
Number of PhDs supervised at present	NIL	
Number of PhD fellows supervised that are/were not enrolled at own department (last 5 years)	Number: NIL Enrolled at : 1: 2: ..	
Scientific Production	Number of peer-reviewed articles in international scientific journals: 2	
	Number of conference abstracts published in conference proceedings: 2	
	No. of articles in national journals: NIL	
	Major reports: 5	
Distinctions		

List max. 10 selected articles related to SNOWS	NIL
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ANNEX 5 CV – PHD STUDENT PROFILE

**Kwame Nkrumah University of Science and Technology
CV – PhD Fellow Profile**

Name	Lukman Y. Salifu	
Department	Civil Engineering	
Working address	P.O. Box LG486 Legon, Accra, Ghana	
Contact details	Email, main: lysalifu@yahoo.com Email, secondary: Luksalifu@gmail.com Phone (office): 233-30-2786072	Skype:kojaklys Phone (Cell):233-24-4670128
Formal education	BSc. (Civil Engineering); MSc. (Eng) Tropical Public Health	
Current position	Lead Sector Expert Environmental Sanitation Policy and Facilities Management/CEO WasteCare Associates	
Title of PhD Project	Definition of Hierarchy of Options, Standards and Levels-of-Service for Environmental Sanitation Services in Ghana	
Year of Enrolment – expected year of PhD Defence	2008 – 2012	
Description of PhD project (max 5 lines)	The research work is about defining a hierarchy of options for environmental sanitation services (with initial focus on solid waste and excreta management). The hierarchy is to be determined by considering and balancing sustainability objectives (environmental, socio-cultural and economic growth) by reviewing and scoping currently applied cost-benefit methods these objectives including Life-Cycle Assessment (or Inventory) etc. The research work will focus on practical application of the assessment methods to be selected on a case study basis using Kumasi as a project area.	
Name and Department of main supervisor	Professor (Mrs) Esi Awuah, Civil Engineering Department	
Contact details of main supervisor	Email, main:esiawuahrt@yahoo.com secondary: Phone (office):233-32-2063731	Skype: Phone (cell):233-20-7417766
Name and address of co-supervisor		
Contact details of co-supervisor	Email, main: Email, secondary: Phone (office):	Skype: Phone (cell):
Name and address of additional co-supervisor (if relevant)		
Contact details of project supervisor	Email, main: Email, secondary: Phone (office):	Skype: Phone (cell):
Scientific Production	<p>Number of peer-reviewed articles in international scientific journals:</p> <p>Number of conference abstracts published in conference proceedings:</p> <p>2008 Planning for Sustainable Sanitation in Cities (“Clean towns: progress and prospects for sanitation planning in Ghana”) World Water Week, August 2008, Stockholm, Sweden.</p> <p>2008 (with A.K. Opoku and E. Darko-Mensah), Decentralised strategy setting and action-planning for environmental sanitation in Ghana, 33rd WEDC Conference, April 2008, Accra-Ghana.</p> <p>2008 (with E. Darko-Mensah) , Mainstreaming SEA in Water and Environmental Sanitation in Ghana, 33rd WEDC Conference, April 2008, Accra – Ghana.</p> <p>2008 (with E. Darko-Mensah, K. Mensah Afful), Environmental Sanitation Assessment Aids Town Environmental Sanitation Planning, 33rd WEDC International Conference, April 2008, Accra, Ghana.</p> <p>2007 (with E. Darko-Mensah), The Potential of SEA in Strategic Waste Management Planning – Considerations for Landfill Development and Management in Developing Countries, Sardinia 2007, Proceedings of the X1 International Waste Management and Landfill Symposium, October 2007, Cagliari, Sardinia, Italy.</p> <p>2005 Sanitation Policy in Ghana, Assessing Key Elements and Policy Measures – 31st</p>	

	<p>WEDC International Conference. September 2005, Kampala, Uganda.</p> <p>2001 Identifying Demand Drivers for Sanitation Technologies – The Case of Ecosan in Africa. World Bank-Water and Sanitation Program (WSP)-Africa publication. October 2001.</p>
	No. of articles in national journals:
	<p>Major reports:</p> <p>2010 National Environmental Sanitation Strategy and Action Plan (NESSAP), EHSD/MLGRD, April, 2010.</p> <p>2009 Environmental Sanitation Policy (Revised, 2009)</p> <p>2007 Handbook on preparation of District-Level Environmental Sanitation Strategies and Action Plans (DESSAPs), MLGRDE, 2007.</p> <p>2007 Design Reports and Tender Documents for Improving Sanitation Facilities and Services in Low-Income Areas (Sabon Zongo), UN-HABITAT/WaterAid-Ghana, Water for African Cities Project Phase II (WACII)</p> <p>2006 A Practical Guide, SEA of Water and Environmental Sanitation. MWRWH/EPA. (with others)</p> <p>2005 National Water Policy (part of SEA/Process consulting team tasked with reviewing/drafting of policy), MWRWH-Water Directorate</p> <p>2005 SEA Report of Sustainability Test of National Water Policy , MWRWH-Water Directorate</p> <p>2005 Final Report – Policy analysis and assessment of National Environmental Sanitation Policy (for WaterAid-Ghana:)</p> <p>2004 Project Operational Manual (POM) for DANIDA/IDA community water and sanitation projects, Danida/MWRWH-Water Directorate</p> <p>2004 Project Implementation Plan (PIP) – IDA/GoG Small Towns Water Supply and Sanitation Project (MWRWH – Water Directorate)</p>
List max. 5 selected articles related to SNOWS	<p>Planning for Sustainable Sanitation in Cities (“Clean towns: progress and prospects for sanitation planning in Ghana”) World Water Week, August 2008, Stockholm, Sweden.</p> <p>Final Report – Policy analysis and assessment of National Environmental Sanitation Policy (for WaterAid-Ghana)</p> <p>National Environmental Sanitation Strategy and Action Plan (NESSAP), MLGRDE, April 2008.</p>

Name	Richard Amankwah Kuffour	
Department	Civil Engineering, Kwame Nkrumah University of Science and Technology (KNUST)	
Working address	College of Agriculture Education, UEW – Mampong Campus	
Contact details	Email, main: kuffour62@yahoo.com Email, secondary: Phone (office):	Skype: Phone (Cell): 0277432848
Formal education		
Current position	Lecturer, UEW-Mampong Campus	
Titel of PhD Project	Criteria for improving the operation and maintenance of unplanted filter beds for dewatering of faecal sludge.	
Year of Enrolment – expected year of PhD Defence	2004 – 2010	
Description of PhD project (max 5 lines)	The project was designed to use miniature sand filter beds raised under roofed shed to dewater faecal sludge (mixture of septage public toilet sludge) with respect to the effect of the particles sizes of the sand, the effect of solid loading rate, the roles and effects of physical conditioner (sawdust) on faecal sludge dewatering and nutrient and heavy metal quality of the biosolid produced.	
Name and Department of main supervisor	Prof. Mrs. Esi Awuah/ Civil Engineering, KNUST	
Contact details of main	Email, main: esiauwahrt@yahoo.com	Skype:

supervisor	Email, secondary: Phone (office): 0322063731	Phone (cell): 0207417766
Name and address of co-supervisor	Dr. F. O.K. Anyemedu/Civil Engineering, KNUST	
Contact details of co-supervisor	Email, main: fokanyemedu@yahoo.co.uk Email, secondary: Phone (office): 0322060226	Skype: Phone (cell):
Name and address of additional co-supervisor (if relevant)		
	Email, main: Email, secondary: Phone (office):	Skype: Phone (cell):
Scientific Production	Number of peer-reviewed articles in international scientific journals: 1	
	Number of conference abstracts published in conference proceedings: 2	
	No. of articles in national journals: -	
	Major reports:	
List max. 5 selected articles related to SNOWS	<p>Awuah E, Kuffour, A. R., Lubberding, H. J and Gijzen H. J. (2002). Characterization and management of domestic wastewater in two suburbs of Kumasi. In: Proceedings of Water and Health Conference Ottawa, Canada, September, 2002.</p> <p>Kuffour A.R., Awuah E., Anyemedu F. O. K., Strauss M. Koné D., and Coffie O. (2009). Effect of using different particle sizes of sand as filter media for dewatering faecal sludge. <i>Desalination Land</i>. ASA-CSSA-SSSA, Madison, pp. 665–703.</p>	

Name	Samuel Gyasi Fosu	
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Formal education	O'Level Certificate, Opoku Ware School, 1991 A'Level Certificate, Osei Tweretwie Secondary school,1993 Bsc Hons. Biological Sciences, KNUST, 1999 MSc Environmental Science, KNUST, 2004	
Current position	1st year, PhD student	
Titel of PhD Project	Behavioral patterns and mode of transmission of <i>Mycobacterium ulcerans</i> in some endemic communities in Ghana	
Year of Enrolment – expected year of PhD Defence	2009 – 2012	
Description of PhD project (max 5 lines)	Buruli ulcer, a neglected tropical necrotizing disease of the skin affects individuals living in riverine environment. The mode of transmission is unknown though the causative organism is thought to be in soil of wetlands with infection controlled by behavioral pattern and presence of arsenic. This work seeks to detect <i>Mycobacterium ulcerans</i> in the soil, the role of some heavy metals relating it to behavioral patterns to map up preventive strategies for control in Ghana.	
Name and Department of main supervisor	Prof. (Mrs) Esi Awuah,-Dean, Dept. Of Civil & Geomatic Engineering, KNUST	
Contact details of main supervisor	Email, main:esiawuahrt@yahoo.com Email, secondary:	Skype: Phone (cell):00233-207417766

	Phone (office):00233-51-63731	
Name and address of co-supervisor	Dr. John Asiedu Larbi, Dept. Of Theoretical & Applied Biology, KNUST	
Contact details of co-supervisor	Email, main:larbijay@yahoo.com Email, secondary: Phone (office):	Skype: Phone (cell):00233-243303948
Name and address of additional co-supervisor (if relevant)		
Contact details of project supervisor	Email, main: Email, secondary: Phone (office):	Skype: Phone (cell):
Scientific Production	Number of peer-reviewed articles in international scientific journals:	
	Number of conference abstracts published in conference proceedings:	
	No. of articles in national journals:	
	Major reports:	
List max. 5 selected articles related to SNOWS		

Name	Sena Peace HOUNKPE WENDEOU	
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Formal education	MSc in WATER SUPPLY AND ENVIRONMENTAL SANITATION	
Current position	PhD Student KNUST; Lecturer at Civil Engineering Department/ Université d'Abomey-Calavi (UAC)- Benin	
Titel of PhD Project	WASTEWATER TREATMENT AND RESOURCE RECOVERY FOR POVERTY ALLEVIATION: MACROPHYTE ALGAL BASED TREATMENT SYSTEM	
Year of Enrolment – expected year of PhD Defence	2011 – 2012	
Description of PhD project (max 5 lines)	The <i>main objective</i> of this research is to determine the performance of the macrophyte and algal based treatment plants and their resource recovering capacity in Benin. To achieve this, the existing management system at Cotonou will be assessed; a pilot wastewater treatment plant will be designed, constructed at UAC and monitoring for 18months; agriculture and aquaculture experiments will be conducted using the effluent from the treatment plant.	
Name and Department of main supervisor	Prof Esi AWUAH COLLEGE OF CIVIL AND GEOMATIC ENGINEERING	
Contact details of main supervisor	Email, main: esiawuart@yahoo.com Email, secondary: Phone (office): 00233 (0) 51 63 732	Skype: Phone (cell):00233 (0) 20 7417766
Name and address of co-supervisor	Prof Edmond ADJOVI – University of Abomey-Calavi (UAC) Benin	

Contact details of co-supervisor	Email, main: adjed2001@yahoo.fr Email, secondary: Phone (office):00229 21 36 09 93	Skype: Phone (cell):00229 97 13 90 69
Name and address of additional co-supervisor (if relevant)		
Contact details of project supervisor	Email, main: Email, secondary: Phone (office):	Skype: Phone (cell):
Scientific Production	Number of peer-reviewed articles in international scientific journals:	
	Number of conference abstracts published in conference proceedings:	
	No. of articles in national journals:	
	Major reports:	
List max. 5 selected articles related to SNOWS		

<i>Current or Recently graduated Post-Graduate Students</i>		
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<i>Recently Graduated Post-Graduate Students</i>		
1	Jane Naki Tetteh	janenaki@yahoo.com
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3	Gyabaah Daniel	danygyabaah@yahoo.co.uk
4	Barbara Gyapong-Korsah	barbygk@yahoo.com
5	Yaayin Boniface	niberbon@yahoo.co.uk
6	Prince Antwi-Agyei	princekaagyei@gmail.com
7	Appiah-Effah Eugene	appiaheffah@yahoo.com
8	Dwumfour-Asare Bismark	dwumfourasare@gmail.com
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19	Akomeah Eric	Quameakomeah@yahoo.com
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5	Amadu Casmed Charles	Casmed07@yahoo.com
6	Salifu Abdulai	abdulaisalifu@yahoo.com
7	Gyasi Samuel	
8		
9	Tyhra Carolyn	
10		
11		
<i>Academic University Personnel</i>		
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5	Mr. S.Oduro Kwarteng	sokwarteng@yahoo.com
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8	K.Biritwum Nyarko	Nyark10@yahoo.com
9	Dr Richard Boamah	Buamah7733@hotmail.com
10	E.A Donkor	donkordce@yahoo.com
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13	Dr. Bukari Ali	
14	E. K. Appiah-Adjei	
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11	Mr. K. Appiah-Koranteng	0208164391
12	Mr. Abdulai Suglo	sugloabdulai@yahoo.co.uk