



A Case for MSc in Nuclear Energy Systems in AFCONE Member States

By

David Otwoma

25th INPRO Dialogue Forum in Kenya, 17–21 November 2025



AFRA – NEST Members

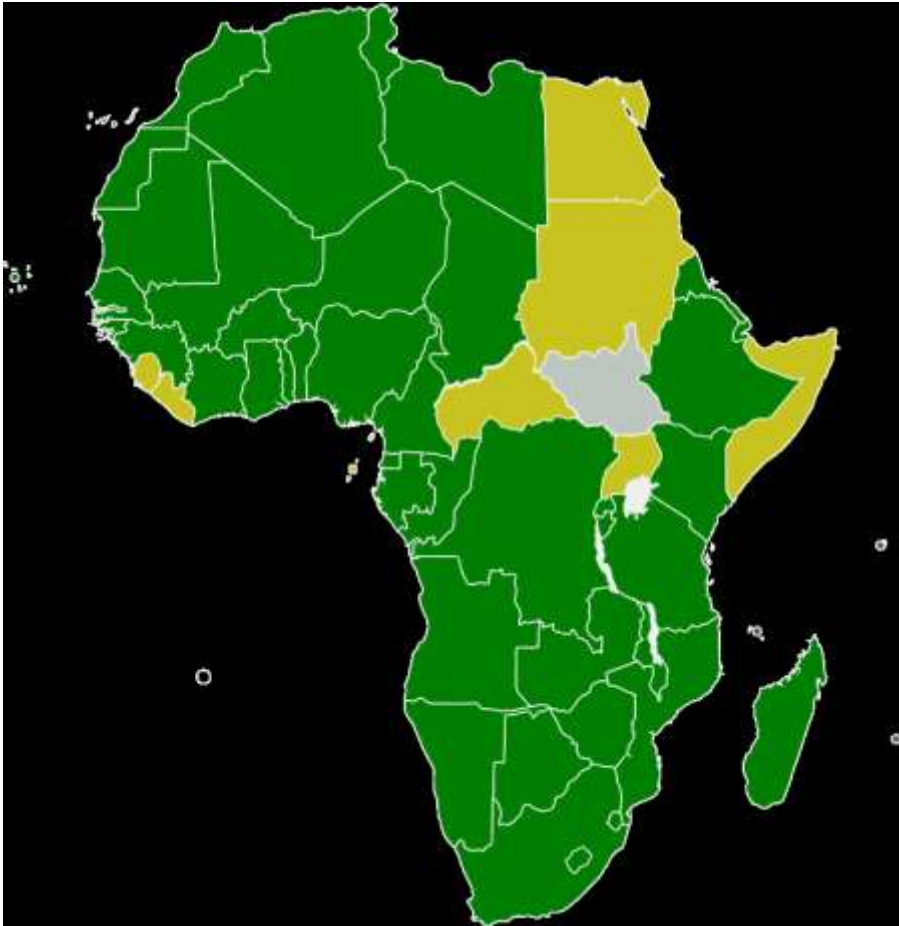


- ✓ Algeria
- ✓ Benin
- ✓ Botswana
- ✓ Burkina Faso
- ✓ Burundi
- ✓ Cameroon
- ✓ Central African Republic
- ✓ Chad
- ✓ Congo
- ✓ Democratic Republic of the Congo
- ✓ Egypt
- ✓ Ethiopia
- ✓ Ghana
- ✓ Kenya
- ✓ Madagascar
- ✓ Malawi



- ✓ Mauritius
- ✓ Morocco
- ✓ Mozambique
- ✓ Namibia
- ✓ Niger
- ✓ Nigeria
- ✓ Senegal
- ✓ Seychelles
- ✓ Sierra Leone
- ✓ South Africa
- ✓ Sudan
- ✓ Tanzania, United Republic of
- ✓ Tunisia
- ✓ Uganda
- ✓ Zambia
- ✓ Zimbabwe

AFCONE SCOPE AND MANDATE



- ❖ The African Commission on Nuclear Energy (AFCONE) is a specialized agency of the African Union (AU).
- ❖ AFCONE operates in 44 African States out of 54
- ❖ AFCONE mandate
 - a) Non-Proliferation
 - b) Disarmament
 - c) Peaceful Applications of Nuclear Science and Technology
 - d) Regional and International Cooperation

AFCONC CURRENT CAPACITY BUILDING PROGRAM

AFCONC & EU currently running a 5 years program to improve Nuclear Safeguards in Africa.

The program aims to:

- ❖ Establish and Strengthen the State Systems of Accounting and Control of Nuclear Material (SSAC)
- ❖ Improving reporting under Pelindaba Treaty, Comprehensive Safeguards Agreements (CSA) and Small Quantities Protocols (SQP).

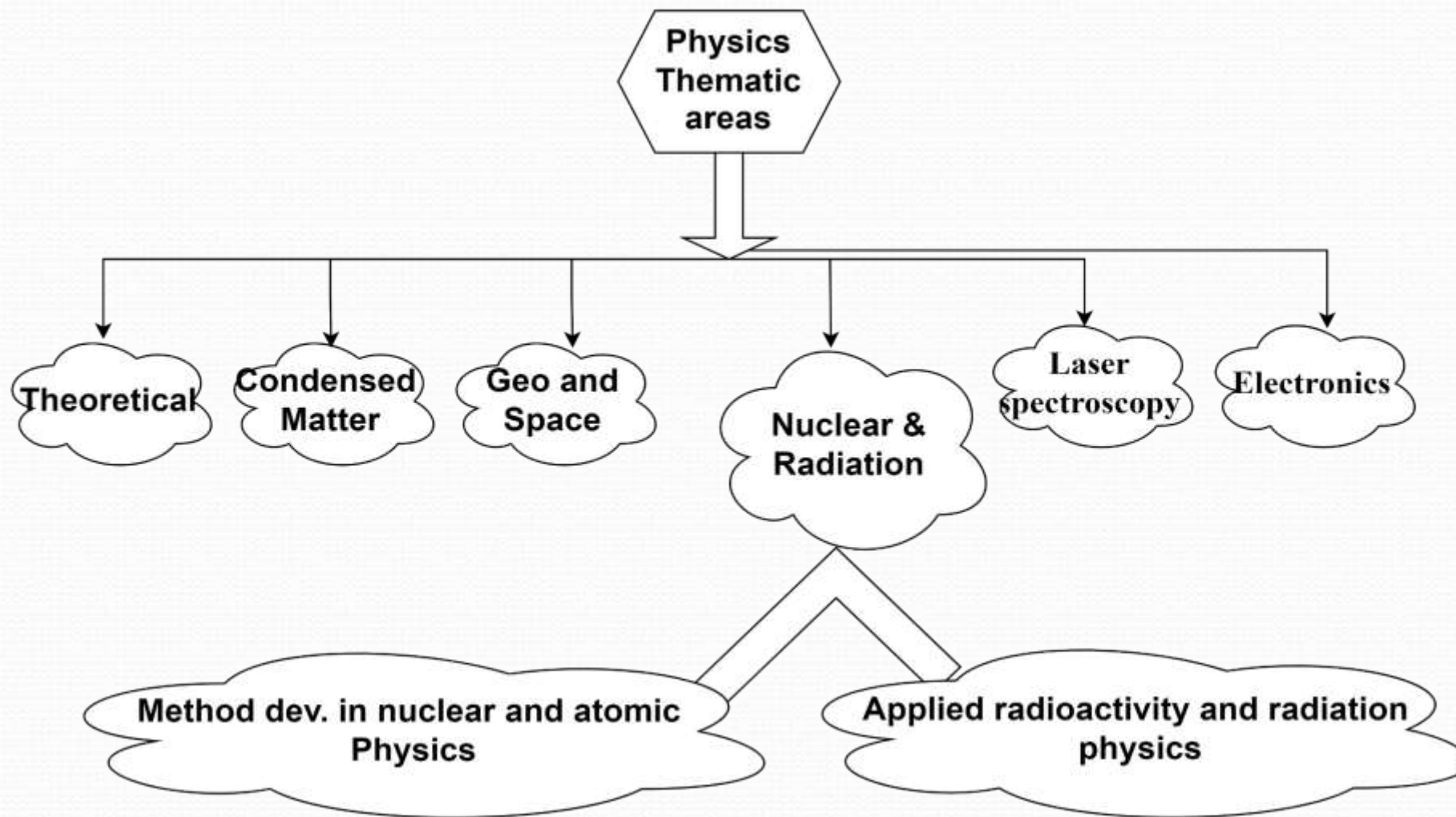


REPORT OF THE IAEA MISSION TO APPRAISE THE EDUCATION AND TRAINING PROVISIONS AND INFRASTRUCTURE IN RADIATION PROTECTION AND THE SAFETY OF RADIATION SOURCES IN KENYA 2019





DEPARTMENT OF PHYSICS

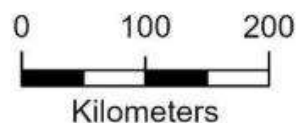
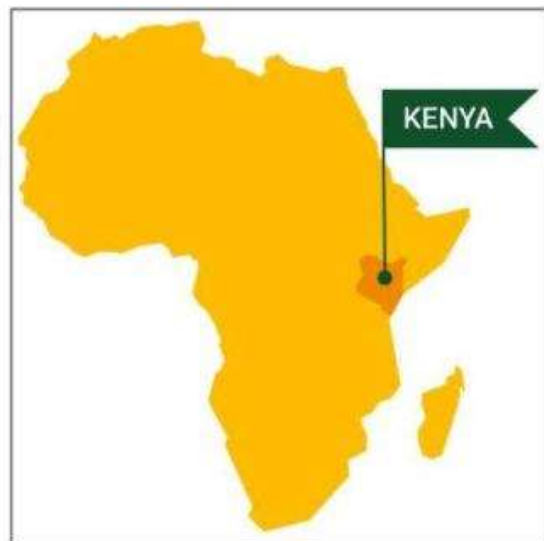




- ❖ The University of Nairobi is a research-intensive university with a reputation for excellence and a strong and vibrant research culture in the African region.
- ❖ Our research work, teaching and training are recognized for their impact and relevance in the region.
- ❖ The current staff population of the University of Nairobi stands at more than 2,220 academic staff with PhDs, 450 professors and 5,525 administrative and technical staff.

KENYA

GEOLOGY

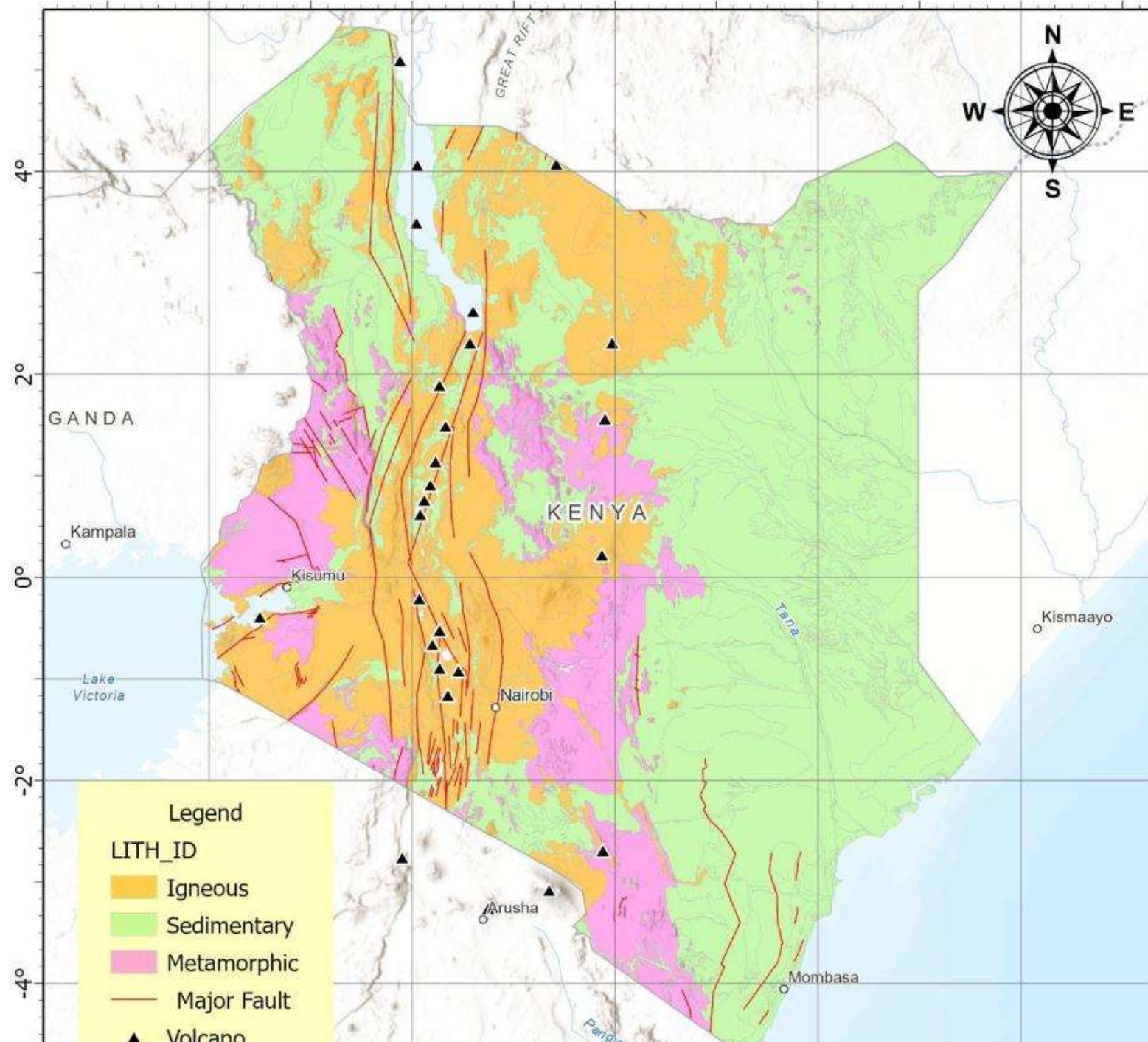


Author: NFC/RWM TWG

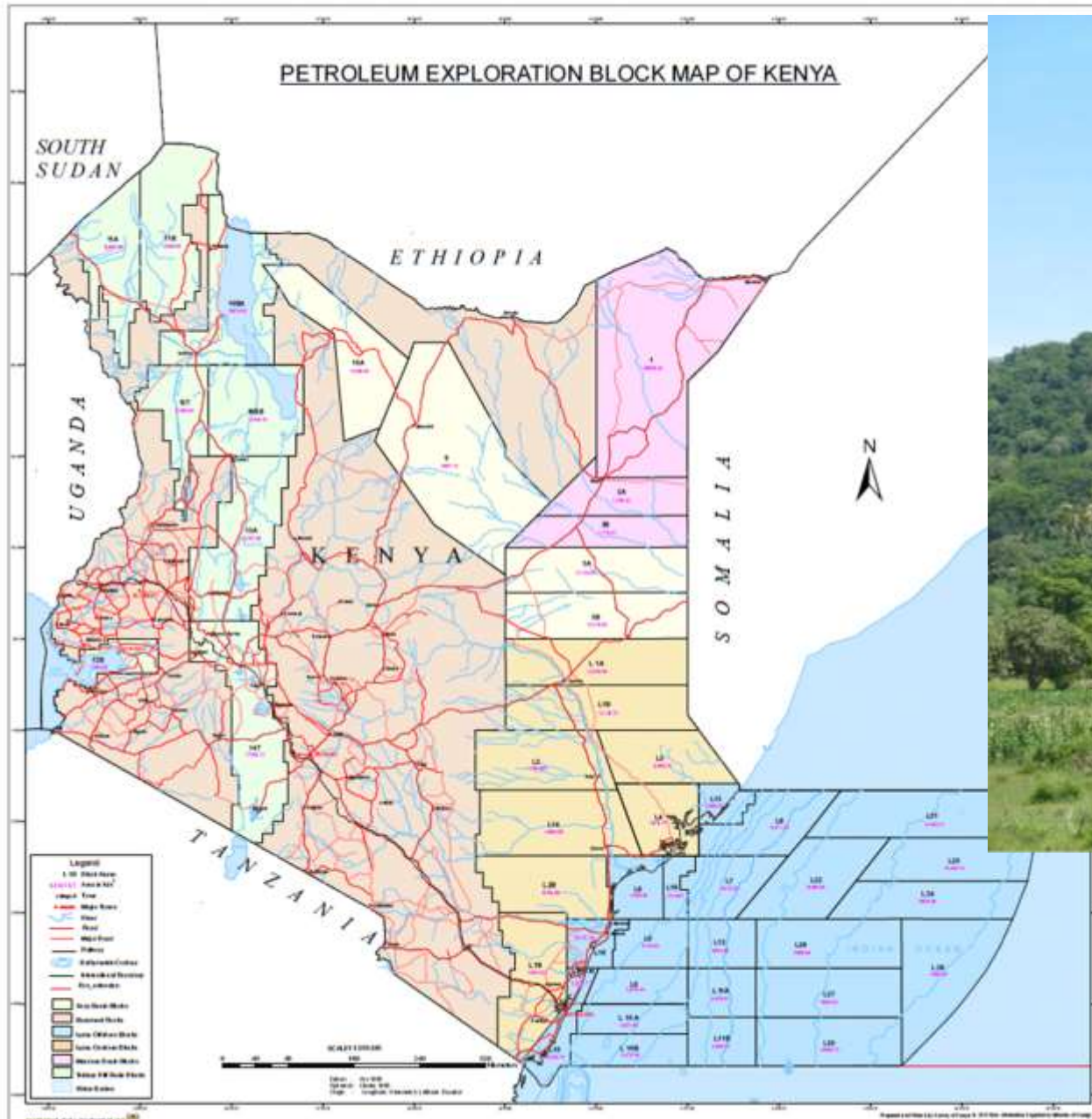
NuPEA

Date: 09 May 2023

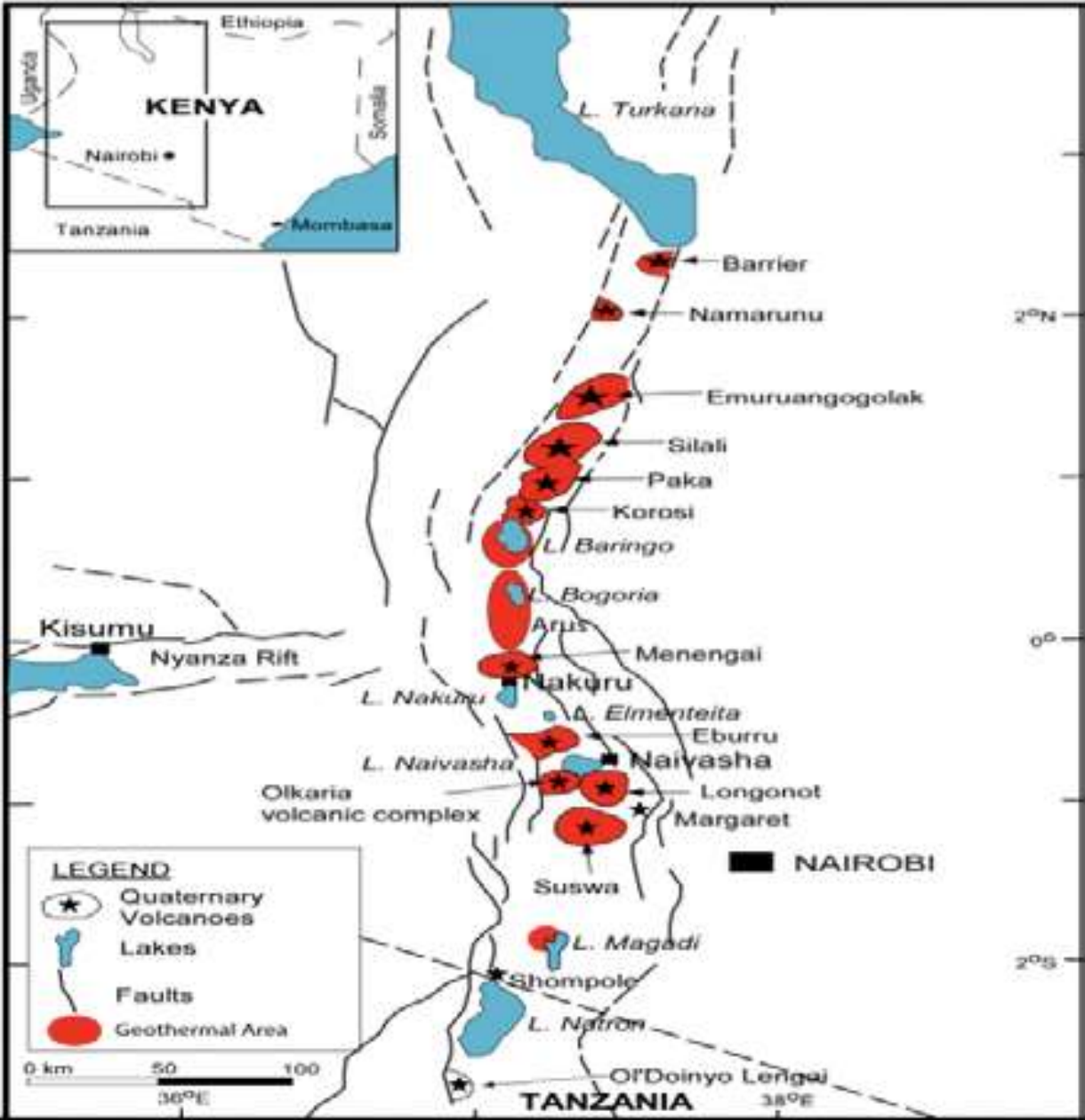
Coordinate System: GCS WGS 1984



the need for strategic planning for sustainable nuclear energy



the importance of national educational programmes to address existing gaps





- ❖ In this regard, Kenya is in the process of adopting the proposed IAEA's International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO) curriculum at the postgraduate level for human capacity building.
- ❖ The university is in the process of adjusting and reviewing its curriculum in line with INPRO proposed curriculum at the master's level on strategic energy planning for sustainable nuclear energy.



opportunities for collaboration

IAEA-PGEC Training



- IAEA-PGEC training held from 02 October 2023 to 29 March 2024 in Nairobi, KENYA.
- Supported by Technical Cooperation, Division for Africa.
- Coordinated by [Kenya Nuclear Regulatory Authority \(KNRA\)](#)



opportunities for collaboration

IAEA – IRL Project in Africa



Successful test transmission between the IAEA-IRL host at CNESTEN in Rabat, Morocco and the guest countries – Kenya, Nigeria

More information: <https://www.iaea.org/newscenter/news/africa-gets-its-first-host-research-reactor-under-internet-reactor-laboratory-initiative>

Near Term Plan



- Kenya, led by Department of Physics and NuPEA, seeks to establish Certificate Courses, Diploma up to MSc in Nuclear Energy Systems before we launch our own nuclear power plants for electricity generation and research reactor.





Proposed New Courses as per INIPRO Model Curriculum



SPH 672:	Energy development	
SPH 675:	Sustainable energy method development	Merge
SPH 673:	Nuclear energy planning & sustainability	
SPH 674:	Nuclear energy system sustainability	Merge
SPH 676:	Nuclear energy system modeling	Stand alone

Mode of Delivery: Lectures and tutorials; group discussions.

Instructional materials and equipment: LCDs, Whiteboards/black boards

Course Assessment: Continuous assessment Tests 30%, End of semester examination 70%

SPH 715: Nuclear energy research project (The students taking projects proposed in this course are expected to have completed basic courses in the nuclear energy curriculum in 1st Semester)



involvement in relevant IAEA projects
MSC IN NUCLEAR ENERGY SYSTEMS



CODE	COURSE TITLE
SPH 672	Innovations in Nuclear Energy Development (N)
SPH 673	Strategic Energy Planning for Sustainable Development (N)
SPH 674	Nuclear Energy Systems I (N)
SPH 675	Nuclear Energy Systems II (N)
SPH 676	INPRO Methodology for Assessing the Sustainability of NES (N)
SPH 677	Sustainable Nuclear Energy Development I (N)
SPH 678	Sustainable Nuclear Energy Development II (N)
SPH 679	Modelling and Analysis of Nuclear Energy Systems I (N)
SPH 680	Modelling and Analysis of Nuclear Energy Systems II (N)
SPH 681	Innovations in Nuclear Energy Systems (N)



Curriculum approval Process



Proposed curriculum presented at the department level



Present and defend at Faculty of Science and Technology



Present and defend at the Senate



If seen as completely novel and is approved by senate



Seek approval at the Commission for the University Education



Implementation of the Course

the required workforce and competencies





Nuclear Society of Kenya



Functions and objects of the Society

- i. To promote the peaceful and responsible use of nuclear technology in Kenya, including nuclear energy, medicine, agriculture, and industrial applications.
- ii. To foster knowledge, research, and public awareness regarding nuclear science, safety, and policy.
- iii. To create a platform for networking among professionals in the nuclear industry, academia, government, and civil society.
- iv. To advocate for the safe and secure disposal of nuclear waste and encourage the development of sustainable nuclear waste management practices.
- v. To engage with policymakers, stakeholders, and the international community on nuclear-related matters.
- vi. To contribute to the training and capacity building of personnel in the nuclear sector in Kenya and the East African region.

AFCONE AND UNIVERSITY COOPERATION



- ❖ AFCONE and University of Nairobi collaboration is aimed at
 - To enhance professional skills development through training and exchange of experiences and information.
 - To implement capacity building activities in Nuclear Energy, Science and Technology ;
 - Engage in joint research and educational activities
 - Promote international experiences through the exchange programs.
 - Conduction research activities
 - Participation in conferences, symposia, and seminars;
 - Exchange of information and documentation both written and electronic;
 - Collaboration in joint research and publications;





Way forward



- Local training started at universities and technical institutions
- IAEA training assistance is required
- Utilization of personnel during early stages in the RR project (e.g. design, procurement, manufacturing and construction)
- Building capacity concerning contractual arrangements. HR capacity to be developed for local tender and bid evaluation and subsequent project management of QC, regulator and vendor
- Sustainable capacity building require local training facilities including RR
- Develop local industrial infrastructure to support RR and NPP