Pan African University
Institute of Water
and Energy Sciences

PAU

PAN AFRICAN UNIVERSITY INSTITUTE OF WATER AND ENERGY SCIENCES (INCL. CLIMATE CHANGE)

CALL FOR SHORT TERM ACADEMIC STAFF

Fall Semester 2016-2017

Pan African University
Institute of Water
and Energy Sciences

CONTENTS

I. PRESENTATION OF THE PAN AFRICAN UNIVERSITY OF WATER AND ENERGY SCIENCES (INCLUDING CLIMATE CHANGE)

The Pan African University (PAU) Institute of Water and Energy Sciences (including Climate Change) (PAUWES) is located on the campus of the University of Tlemcen, Algeria. This beautiful Mediterranean city befittingly derives its name from the Berber word for "water springs."

PAUWES is one of the five hubs of the Pan African University established by the African Union Commission (AUC) aimed at revitalizing African higher education and at boosting research and postgraduate training. PAUWES is the fourth institute after the Institute of Governance, Humanities and Social Sciences (PAUGHSS) at the University of Yaounde II in Cameroon; the Institute of Basic Sciences, Technology and Innovation (PAUSTI) at Jomo Kenyatta University of Agriculture and Technology in Kenya; and the Institute of Life and Earth Sciences (PAULESI) at the University of Ibadan in Nigeria.

Under the leadership of the AUC and partnership with the Algerian and German governments, the PAUWES Institute offers graduate students access to leading academic teaching, research and hands-on training in areas vital to the future of African development – water, energy and the challenge of climate change.

The Institute offers four degree programs: two Masters of Science in Water engineering and Policy and two Master of Science in Energy engineering and Policy (and later PhD programs in both). The four of them are full time two-year master's programs. The language of instruction is English. The first semester at PAUWES began in September 2014 with 26 students. In the last academic year (2015- 2016), PAUWES had 48 students (Energy, Water) from 17 different nationalities across Africa. Kenya, Uganda, Rwanda, Egypt, Zambia, Mali, Senegal, Cameroon, Côte d'Ivoire, Ethiopia, Ghana, Nigeria, Zimbabwe, Algeria, Burkina Faso, Benin and Tunisia are duly represented in this truly multi-national cohort of future African leaders.

To complement our international faculty, we are seeking to fill the following short-term positions at an adequate academic and professional level of teaching, research and instruction.

II. SHORT-TERM POSITIONS

OVERVIEW

MASTER OF SCIENCE IN ENERGY (ENGINEERING TRACK):

- **1st year (Semester 1; approximately 20 students):**
- **Position EE1: Renewable Energy Technologies**
- **Position EE2: Thermal Sciences and Engineering Applications**

- **2nd year (Semester 3; 17 students, less for elective courses):**
- **Position EE3: Hybrid Systems**
- **Position EE4: Solar Photovoltaic (Elective)**
- **Position EE5: Hydro and Maritime Energy (Elective)**
- **Position EE6: Bio-Energy (Elective)**
- **Position EE7: Instrumentation**
- **Position EE8: Technical Performance Assessment**
- **Position EE9: Externalities/Impact Analysis**
- **Position EE10: Energy Efficiency and Demand Side Management**

MASTER OF SCIENCE IN ENERGY (POLICY TRACK):

- **1st year (Semester 1; approximately 20 students):**
- **Position EP1: Energy for Sustainable Development**

- **2nd year (Semester 3; 9 students, less for elective courses):**
- **Position EP2: Renewable Energy Policy and Planning**
- **Position EP3: Development of Renewable Energy Systems (Grid) (Elective)**
- **Position EP4: Urban Energy Supply (Elective)**
- **Position EP5: Ethics and Leadership**
- **Position EP6: Energy Efficiency and Demand Side Management**

MASTER OF SCIENCE IN WATER (ENGINEERING TRACK):

- **1st year (Semester 1; approximately 20 students):**
- **Position WE1: Fluid Mechanics**
- **Position WE2: Hydrology**

- **2nd year (Semester 3; 14 students, less for elective courses):**
- **Position WE3: Water for Agriculture 2: Irrigation Project Design (Elective)**
- **Position WE4: Physical Instrumentation and Measurement**
- **Position WE5: Applied Numerical Analysis and Modelling**
- **Position WE6: Geographical Information Systems**

MASTER OF SCIENCE IN WATER (POLICY TRACK):

- **1st year (Semester 1; approximately 20 students):**
- **Position WP1: Fundamentals of Water Science and Engineering**

- **2nd year students (Semester 3; 8 students, less for elective courses):**
- **Position WP2: Hydrology**

- **Position WP3: River Basin Management 2: Management of Transboundary Water Resources (Elective)**
- **Position WP4: Soil Conservation**

COMMON COURSES FOR ALL STUDENTS:

- **1st year (Semester 1; approximately 80 students):**
- **Position CEW1: African History**

COMMON COURSES FOR BOTH MASTERS IN POLICY (WATER POLICY AND ENGINEERING POLICY):

- **1st year (Semester 1; approximately 40 students):**
- **Position CP1: Introduction to Policy Analysis**

- **2nd year (Semester 3; 17 students)**
- **Position CP2: Policy Influencing and Conflict Management**

COMMON COURSES FOR BOTH TRACKS OF THE MASTER OF SCIENCE IN WATER (ENGINEERING AND POLICY):

- **1st year (Semester 1; approximately 40 students)**
- **Position CW1: African Water Resources and Scenarios**
- **Position CW2: Water Quality**
- **Position CW3: Introduction to Integrated Water Resource Management**
- **Position CW4: Project Design and Management**
- **Position CW5: Academic Writing**

- **2nd year (Semester 3; 22 students, less for elective courses)**
- **Position CW6: Water Economics**
- **Position CW7: Entrepreneurship and Intrapreneurship**
- **Position CW8: Water for Agriculture 1: Irrigation Techniques and Drainage (Elective)**
- **Position CW9: River Basin Management 1: Management of Extremes (Draughts and Flooding) (Elective)**

COMMON COURSES FOR BOTH TRACKS OF THE MASTER OF SCIENCE IN ENERGY (ENGINEERING AND POLICY):

- **1st year (Semester 1; approximately 40 students)**
- **Position CE1: African Energy Resources & Scenarios**
- **Position CE2: Introduction to Energy**
- **Position CE3: Project Design and Management**
- **Position CE4: Academic Writing**

- **2nd year students (Semester 3; 26 students)**
- **Position CE5: Entre- and Intrapreneurship**

MASTER OF SCIENCE IN ENERGY (ENGINEERING TRACK)

Position EE1: Renewable Energy Technologies (6 credits)

This course provides an introductory overview of the whole variety of renewable technologies. Renewable resources techniques assessment and renewable energy exploitation technologies are considered in a general manner. The course introduces the following topics: solar resources evaluation techniques, technology of photovoltaic cells and modules, technology of photovoltaic systems, low temperature solar technology, high temperature solar technology, wind resources evaluation techniques, WECS technology, wind system technology, geothermal resources and geothermal energy conversion technology, hydropower resources and technology, biomass conversion technologies, wave and tidal technologies, biogas, solar hydrogen.

(60 contact hours, to be taught in Energy, Engineering Track, 1st semester)

Position EE2: Thermal Sciences and Engineering Applications (4 credits)

This course covers the fundamentals of thermodynamics as applied to energy systems. First, the course provides a review of the basic concepts of thermodynamics, the first and the second law of thermodynamics and the notion of irreversibility. Then the course studies the fundamentals of chemical reactions and combustion processes. Topics on ideal and real gases as well as on steam production and thermodynamic properties of steam are covered. State-of-the-art in the thermodynamic cycles will be presented in an interdisciplinary perspective. Among the thermodynamic cycles considered, there are Carnot cycle, Otto cycle, Diesel cycle, Atkinson cycle, Ericson cycle and Brayton cycle as well as Rankin cycle. Regenerative cycle, reheat cycle and binary cycle are also considered. Topics on gas power cycles and steam power cycle are covered. Finally, the internal combustion engine topic is addressed and the two-stroke cycle engine and the four-stroke cycle engine are covered.

(40 contact hours, to be taught in Energy, Engineering Track, 1st semester)

Position EE3: Hybrid Systems (6 credits)

This course aims at introducing the student to energy generation using hybrid systems. The course first introduces the basics and the technology of the most commonly used energy generation components of hybrid systems. This course aims at familiarizing the student with energy generation using hybrid systems. The course covers the basics and the technology of the most commonly used energy generation components of the hybrid systems. Focus is on the hydrocarbon-renewable energy sources hybrid systems and on different renewable energy sources hybrid systems. The course addresses also the issue of

hybrid system design, sizing and performance estimation in relation to the expressed needs and to the availability of the different energy resources. It also includes the study of the effect of the interconnection possibilities between the different energy generation components. The course deals with the economics of hybrid systems as well. A significant part of the course is dedicated to case studies addressing African preoccupations.

(60 contact hours, to be taught in Energy, Engineering Track, 3rd semester)

Position EE4: Solar Photovoltaic (6 credits)

This course aims at introducing the student to solar photovoltaic energy. It covers the nature of solar radiation, solar fusion processes, solar radiation spectrum, direct and diffuse radiation, photon energy, solar constant, photovoltaic energy materials (band structure of solids, semiconductors, energy band gap and photon energy ranges), material properties suitable for PV production, production of semiconductor junctions for solar cell applications, processing of PV grade materials (purification and doping), controlled crystal growth for solar cell application; current-voltage characteristics of solar cells, encapsulation techniques, solar panels and modules; solar PV systems design, solar cell efficiencies and fill factors, as well as solar cell manufacturing processes.

(Elective course, 60 contact hours, to be taught in Energy, Engineering Track, 3rd semester)

Position EE5: Hydro and Maritime Energy (6 credits)

This course includes a review of fluid dynamics and mechanics, water-based energy systems (ocean thermal, tidal, wave, hydro, cogeneration systems); conversion techniques of each of these into other forms of energy; hydro: water reservoir, conveyer pipe, pressure head, effects of pipe friction, types of turbines, number and sizes of nozzles, jets, small and large hydro systems; capacity assessment and systems design, mechanical-to-electrical power coupling, determinations of: required turbine angular velocity, wheel size, cup size, shape factor, power transmission, losses as well as hydropower production design and management.

(Elective course, 60 contact hours, to be taught in Energy, Engineering Track, 3rd semester)

Position EE6: Bio-Energy (6 credits)

This course covers the identification and characterization of raw materials for biofuels, biofuel development and food security, natural product extraction and purification methods, chemical structures and properties of different biofuels (ethanol, biodiesel, etc.), bioenergy crops, liquid biofuels, bioenergy production by anaerobic digestion, gasification process, Charcoal production techniques, heat and electricity generation from agricultural biomass wastes.

(Elective course, 60 contact hours, to be taught in Energy, Engineering Track, 3rd semester)

Position EE7: Instrumentation (3 credits)

This course aims to provide the students with the tools for proper experimental design and experimental measurement techniques for data collection, treatment and analysis. It is also meant to provide the know-how for testing techniques and failure diagnostic. It covers primarily measurement fundamentals, sensors and transducers, techniques for signal conditioning, analogue/digital conversions, PC-interfacing (Hardware, Software), PC configurations and hardware for data acquisition, data storage and compression techniques, processing and data analysis techniques as well as commercial data acquisition products.

(30 contact hours, to be taught in Energy, Engineering Track, 3rd semester)

Position EE8: Technical Performance Assessment (2 credits)

The course provides the conceptual and analytical approaches and tools for assessing whether the technology performs up to the standards expected. These includes: statistical analysis, Bayesian confidence profile analysis, surveys/questionnaires, trial use periods, s-curve analysis, Beta testing, human factor analysis, outcomes research and technometrics.

(20 contact hours, to be taught in Energy, Engineering Track, 3rd semester)

Position EE9: Externalities/Impact Analysis (2 credits)

This course introduces students to two economic tools which are of particular importance in implementing and evaluating technical solutions: externalities and impact analysis. For externalities, the course will introduce the notion of unintended consequences of intended action/decision and apply it to technical projects in energy. In addition, it will cover impact analysis as a specific tool to anticipate, model, and evaluate the economic effects of energy projects based on input-output models (e.g. IMPLAN or EMSI) or economic simulation models (such as e.g. REMI).

(20 contact hours, to be taught in Energy, Engineering Track, 3rd semester)

Position EE10: Energy Efficiency and Demand Side Management (3 credits)

This course discusses energy efficiency, demand response, and the institutional options for delivery of energy efficiency in Africa. The module examines different demand side management/energy efficiency measures that can reduce energy demand for the end user and that can manage and control loads from the utility side. Challenges for implementing energy efficiency and demand side management programs in residential, commercial, industrial and transport sectors will also be examined.

(30 contact hours, to be taught in Energy, Engineering Track, 3rd semester)

MASTER OF SCIENCE IN ENERGY (POLICY TRACK):

Position EP1: Energy for Sustainable Development (6 credits)

This course includes a review of energy sources (oil, coal, LPG, natural gas, nuclear, solar, wind, hydro, ocean thermal, maritime, geothermal, biofuels, biogas), their distribution in Africa, developed and undeveloped potentials, African development pattern associated with energy resource distribution, conventional energies and sustainable development (economic and environmental implications), new alternative energies and sustainable development (economic and environmental implications), technical and economic limitations in the use of various energy technologies (conventional and renewable), socio-cultural issues in energy resource developments and applications, reliability of supply, centralized and decentralized power generation systems (operational costs, advantages and disadvantages), energy storage and transport issues, technological infrastructure.

(60 contact hours, to be taught in Energy, Policy Track, 1st semester)

Position EP2: Renewable Energy Policy and Planning (5 credits)

The course provides an overview of the key issues within renewable energy policies, including drivers of the energy market, market structures and concepts, international climate policies, main stakeholders, interests and strategies. The course will particularly examine political frameworks and support mechanisms for introduction of renewable energy technologies into the local market. It will review experiences with different voluntary and regulative support mechanisms and draw lessons from these experiences.

(50 contact hours, to be taught in Energy, Policy Track, 3rd semester)

Position EP3: Development of Renewable Energy Systems (Grid) (4 credits)

The course provides an overview on regulatory, legal and contractual aspects in RE-projects. It provides understanding of the economics of renewable energy projects (specific value creation chains, finance market conditions, project calculation scenarios, input parameters, comparative calculation and financing schemes). The objective of this module is that students know and understand important non-technical aspects for the successful implementation of RE-projects. The course gives an insight into RE-specific legal and contractual aspects and enables students to perform an economic analysis of typical RE businesses and projects. Students will learn about economics of RE-systems, possible funding schemes and will develop their strategies for RE-market development.

(Elective, 40 contact hours, to be taught in Energy, Policy Track, 3rd semester)

Position EP4: Urban Energy Supply (4 credits)

This course delivers and overview on grid-connected RE-technologies which generate electricity in urban areas or supply electricity to urban areas and on RE-technologies generating heat. Through a blended mix of instructor-led training and hands-on workshops, students will get a comprehensive overview of the main commercially-viable renewable technologies, and come to understand how they work and how systems are designed. In the second part the course covers economic assessment (investment costs, life-cycle costs and revenues) and financing of different technologies. At the end of this course students will be able to assess the appropriateness of different technologies for different situations and to undertake their own initial designs for renewable energy systems.

(Elective, 40 contact hours, to be taught in Energy, Policy Track, 3rd semester)

Position EP5: Ethics and Leadership (4 credits)

In this course, the students will enhance their capacity to analyse and evaluate the ethical positions and assumptions of different parties involved in sustainability disputes. The course shall include an overview of sustainability ethics but also introduce theories of identity-building, change and leadership (group dynamics, alternative narratives, networks). Case studies should be presented.

(40 contact hours, to be taught in Energy, Policy Track, 3rd semester)

Position EP6: Energy Efficiency and Demand Side Management (6 credits)

This course discusses energy efficiency, demand response, and the institutional options for delivery of energy efficiency in Africa. The module examines different demand side management/energy efficiency measures that can reduce energy demand for the end user and that can manage and control loads from the utility side. Challenges for implementing energy efficiency and demand side management programs in residential, commercial, industrial and transport sectors will also be examined.

(60 contact hours, to be taught in Energy, Policy Track, 3rd semester)

MASTER OF SCIENCE IN WATER (ENGINEERING TRACK):

Position WE1: Fluid Mechanics (4 credits)

This course allows students to understand the various theories of fluid mechanics.

Aside from basic concepts (characteristics and properties of fluids, compressibility, viscosity, surface tension, basic characteristics of fluid flow and fluid statics) it will also cover topics such as laminar unidirectional flow, fundamentals of turbulent flows, hydrodynamic lubrication, the flow of an ideal fluid as well as flow with a free surface.

(40 contact hours, to be taught in Water, Engineering Track, 1st semester)

Position WE2: Hydrology (5 credits)

This course introduces hydrologic cycle, system concept, hydrologic system model, hydrologic model classification and the development of hydrology. It then moves on to watershed morphometry (definition, study of form, study of stream networks, relief study), atmospheric water (atmospheric circulation, precipitation, rainfall, evaporation and evapotranspiration, climate study), subsurface and surface water (unsaturated flow, infiltration, sources of stream flow, stream flow hydrograph), hydrologic measurement (measurements of surface water, hydrological measurement system) and finally hydrologic analysis (hydrologic statistics and frequency analysis, modelling in hydrology).

(50 contact hours, to be taught in Water, Engineering Track, 1st semester)

Position WE3: Water for Agriculture 2: Irrigation Project Design (5 credits)

At the end of this course, the student should be able to study a full irrigation project, namely collecting the data and information necessary for the project, design and sizing of all components of the irrigation system. The project design should include the estimate of its cost as well as the benefits and environmental impact assessment of the project.

(Elective, 50 contact hours, to be taught in Water, Engineering Track, 3rd semester)

Position WE4: Physical Instrumentation and Measurement (4 credits)

The goals of the course are to make better measurements, understand the physical principals of the parameters, to use those measurements in any research project to better evaluate their use and their spatial variability, and to make better use of them in the evaluation, planning or in the management of water. The course covers the physical principles of measurement, principal parameters (measurement of water level, flow rate, speed of water, sedimentation and conductivity of water), the chains of measurement (automatic) and the equipment for manual measurement.

(40 contact hours, to be taught in Water, Engineering Track, 3rd semester)

Position WE5: Applied Numerical Analysis and Modeling (4 credits)

This course will provide students with an understanding of the basic concepts, of

computer implementation and water models. It should impart the basic skills needed to use the finite element method to solve numerical problems. It will thus cover finite and element difference methods as well as finite volume methods (Godunov scheme summary; Minmod limiter, flux limiting function formulation, Hartens's sufficient conditions for numerical method to be TVD, extension to systems of linear PDE's, extension to nonlinear PDE's, mat lab implementation; two dimensional advection; groundwater modelling by finite element method). At the same time it should guide the student in developing a critical eye for computational matters and in developing practical skills in applying methods to predict applied situations.

(40 contact hours, to be taught in Water, Engineering Track, 3rd semester)

Position WE6: Geographical Information Systems (4 credits)

At the end of the course, the student will be able to design a GIS application, to understand how multi sources data is structured in a GIS software, to know the potential analysis that can be done in various situations to produce useful information to support decision making in planning, monitoring and management of resources (water, forests, soil, lands) and infrastructures (drinking-water systems, a network of roads and tracks, ...), to choose the type of GIS software to operate according to its needs, be aware of the problems associated with the information flow and the reliability of data used in a GIS for the success of its operations. The course will cover modelling geographical space (systemic approach), the methodology for developing a Data Conceptual Model (DCM), numeric Modelling in GIS (topologic and non-topologic system), acquisition digital, Digital Elevation Model (DEM), Quality of data.

(40 contact hours, to be taught in Water, Engineering Track, 3rd semester)

MASTER OF SCIENCE IN WATER (POLICY TRACK):

Position WP1: Fundamentals of Water Science and Engineering (5 credits)

The course is designed to give students an understanding of the basic concepts in fluid mechanics, water chemistry and water microbiology. It will thus cover fundamental concepts of fluid flow (fluid statics, dynamics of fluid flow, laminar and turbulent flows, pipe flow systems); water chemistry (elements, radicals, and compounds, chemical water analysis, hydrogen ion concentration and pH, chemical equilibria, chemical kinetics, colloids and coagulation, organic compounds, organic matter in wastewater) and water microbiology (bacteria, fungi, viruses and algae, protozoa and multi-cellular animals, aquatic food chain, waterborne diseases, coliform bacteria as indicator organisms).

(50 contact hours, to be taught in Water, Policy Track, 1st semester)

Position WP2: Hydrology (4 credits)

This course introduces hydrologic cycle, system concept, hydrologic system model, hydrologic model classification and the development of hydrology. It then moves on to watershed morphometry (definition, study of form, study of stream networks, relief study), atmospheric water (atmospheric circulation, precipitation, rainfall, evaporation and evapotranspiration, climate study), subsurface and surface water (unsaturated flow, infiltration, sources of stream flow, stream flow hydrograph), hydrologic measurement (measurements of surface water, hydrological measurement system) and finally hydrologic analysis (hydrologic statistics and frequency analysis, modelling in hydrology).

(40 contact hours, to be taught in Water, Policy Track, 3rd semester)

Position WP3: River Basin Management 2: Management of Transboundary Water Resources (5 credits)

The course confers knowledge about the challenges for management of transboundary water resources, the legislative framework for management of transboundary water resources (International water law, regional protocols, agreements and treaties, principles for allocating transboundary water resources), the institutional arrangements for integrated management of transboundary water resources (types and functions of transboundary river basin organizations, stakeholder participation at national and transboundary levels), the planning methods (transboundary diagnostic analysis, strategic action planning), practices of integrated management of transboundary river basins, lakes, and transboundary aquifers. Case studies of past and current approaches used for transboundary water resources management in Africa will be presented.

(Elective, 50 contact hours, to be taught in Water, Policy Track, 3rd semester)

Position WP4: Soil conservation (3 credits)

The course confers knowledge about the issues facing soil erosion and sedimentation, their determinants and modelling as well as the land use and technical options to control and the socio-economic factors influencing soil erosion and sedimentation. It will also draw implications for the nutrient and carbon processes in soil and water. The students will learn to derive proposals to solve problems related to soil and water conservation and to assess existing policies.

(30 contact hours, to be taught in Water, Policy Track, 3rd semester)

COMMON COURSES FOR ALL STUDENTS:

Position CEW1: African History (4 credits)

This course aims at providing the history of Africa in the wider context of the world history. It examines the evolution and development of African states and societies, the cultural systems, the social and political structures, the development of technology and agriculture as well as broad changes and continuities in Africa's historical development. The course will also illustrate how Africans have influenced regions beyond their continent's borders, how they have been influenced from the outside.

(40 contact hours, to be taught in all four tracks, 1st semester)

COMMON COURSES FOR BOTH MASTERS IN POLICY (WATER POLICY AND ENERGY POLICY):

Position CP1: Introduction to Policy Analysis (4 credits for Water Policy, 3 for credits Energy Policy)

The course will give an overview of the the policy cycle and the challenges for each of its steps. It will introduce the basic concepts and tools (hierarchical means, financial incentives, provision of information, marketing and influencing strategies, target control) of public policies. It will also introduce students to general limitations of public policies, their unintended consequences and possible unwanted outcomes (like harmful externalities). Attention will also be devoted to aspects and tools for evaluating public policies and their impact on further policies.

(40 contact hours for water policy, 30 hours for energy policy, 1st semester)

Position CP2: Policy Influencing and Conflict Management (5 credits)

The course provides an introduction to the general theoretical framework (policy arenas, multi-level games, advocacy coalitions, policy processes) and give tools for situation analysis prior to any intervention in a given policy arena. The different modes of advocacy will be discussed, including the role of social media. The students will gain an understanding of the complexity of policy interventions as well as insights into different types of conflicts. The course will also present different methods of conflict resolution and present the qualities needed to negotiate successfully in a complex policy setting.

(50 contact hours, to be taught in both policy tracks, 3rd semester)

COMMON COURSES FOR BOTH TRACKS OF THE MASTER OF SCIENCE IN WATER (ENGINEERING AND POLICY)

Position CW1: African Water Resources and Scenarios (4 credits)

This course confers knowledge about the African water resources and their characteristics and uses; the range of issues African countries face when dealing with water resources; the policy approaches developed to deal with the issues and the

various plans to improve their use and situation as well as the range of relevant climate change and socio-economic scenarios and their effect on African water resources and their use.

(40 contact hours, to be taught in Water, Engineering and Policy tracks, 1st semester)

Position CW2: Water Quality (4 credits)

The first part of this course covers general concepts of the problems related to organic and inorganic substances of natural or anthropogenic origin in aquatic systems such as lakes, rivers, dams, oceans, groundwater, drinking and wastewater. The basics of thermodynamics, acid-base, precipitation-dissolution, co-ordination and oxidation-reduction reactions are provided which are necessary to understand the environmental behaviour of such compounds. The second part of the course covers general concepts of environmental microbiology with the specific focus on aquatic systems including quantification of microbial processes, energy fluxes in microbial ecosystems, microbial diversity and nutrient cycles. The focus of the second part will be on key waterborne pathogens, their transmission, life cycle, survival and growth in natural environment, drinking and wastewater systems and disease burden. The third part of the course is organized as a laboratory practicum which demonstrates important analytical methods and gives insights in application of state-of-the-art microbiological tools.

(40 contact hours, to be taught in Water, Engineering and Policy Tracks, 1st semester)

Position CW3: Introduction to Integrated Water Resource Management (4 credits)

This course provides an introduction to the fundamental concepts and practice of Integrated Water Resource Management and fosters skills required to understand and manage water resources. It introduces students to the technical, economic, social and environmental complexities of water resources management so that they will be able to appreciate the importance of IWRM approach for sustainable development. It will provide students with context and a view of water use and management by presenting some examples of integrated water resource plans already implemented in various parts of Africa. The general principles of IWRM will be visualized as three interlocking and interdependent areas: the hydrologic cycle, watershed and land-use features and the economics, social interactions and institutions involved. There are external impacts such as global climate change, water transfer between watersheds and others.

(40 contact hours, to be taught in Water, Engineering and Policy Tracks, 1st semester)

Position CW4: Project Design and Management (3 credits)

The course aims at imparting to the students knowledge of theories and commonly used processes of project cycle management and Logical Framework Approach (LFA), and will cover the tools and techniques for identification, analysis, design, implementation, monitoring and evaluation of sustainable development of water and energy programmes and projects.

(30 contact hours, to be taught in Water, Engineering and Policy Tracks, 1st semester)

Position CW5: Academic Writing (2 credits)

The course will focus on the connections between the research process, academic writing and the structure of academic texts. Students will be introduced to grammar and style for academic purposes with a particular focus on technical subjects and to the problem of communicating technical subjects in an understandable manner (to a non-expert audience). Special attention will also be given to issues of clarity, logic and coherence. Finally, the course will cover citation techniques, referencing and the issue of plagiarism.

(20 contact hours, to be taught in Water, Engineering and Policy Tracks, 1st semester)

Position CW6: Water Economics (6 credits)

The course confers knowledge about the economic principles and economic tools applicable to water policy issues prevalent in African countries. It will focus on the determinants of water demand and water supply. Students will learn to apply adequate economic tools to specific problems in the African context, to derive policy proposals to solve water resource related problems and to assess existing national and international policy proposals. They will also practice assessing the quality of related scientific research and identifying research gaps.

(60 contact hours, to be taught in Water, Engineering and Policy Tracks, 3rd semester)

Position CW7: Entrepreneurship and Intrapreneurship (2 credits)

This course seeks to enhance students' entrepreneurial/intrapreneurial mindset, skills and behaviour – with or without a commercial objective. Students should learn to identify, explore and promote business opportunities or opportunities for development/advancement as independent actors or embedded in institutions in the public, private or civil society sector. They are to confront practical business challenges and opportunities in the private sector and challenges for development in the public and civil society sector, conduct a market and needs analysis as well as competitor and stakeholder mapping for business / project ideas and draft a first

business / project plan presenting milestones and risks.

(20 contact hours, to be taught in Water: Engineering and Policy Tracks, 3rd semester)

Position CW8: Water for Agriculture 1: Irrigation Techniques and Drainage (5 credits)

The goal of the drainage course is to provide students with the knowledge and skills required to assess, plan and design agricultural surface and sub-surface drainage works. At the completion of the course the students should be able to: understand crop water needs; manage soil moisture to promote desired crop response; evaluate irrigation; optimize the use of available water supplies; minimize irrigation induced erosion; decrease non-point source pollution of surface and groundwater resources; manage salts in the crop root zone; choose the appropriate and effective techniques of irrigation to the crop, understand tile drainage design. Students will be able to design, test, and analyze agricultural irrigation systems and their components (gravity irrigation, sprinkler irrigation, trickle irrigation).

(Elective, 50 contact hours, to be taught in Water, Engineering and Policy tracks, 3rd semester)

Position CW9: River Basin Management 1: Management of Extremes (Droughts and Flooding) (5 credits)

The course confers knowledge about the causes and occurrences of droughts and floods under the different African climate regimes and river basins, the hydrology and hydraulics of extremes, the role of the watershed, the effects on the affected population and the resulting damages, the technical and land use related options to minimize the effects. The course covers the hydrological and hydraulic bases for droughts and floods as they occur in African rivers. The approaches of analyzing the impact of climate change and the status of research will be applied to the African context. The course will cover the approaches of the local population when dealing with both extremes (land use, storage techniques, adjustment of living quarters). The classical technical options of water storage and flood protection will be analyzed from a technical and economic point of view. Non-technical approaches in land use changes and planning will also be examined.

(Elective, 50 contact hours, to be taught in Water, Engineering and Policy tracks, 3rd semester)

COMMON COURSES FOR BOTH TRACKS OF THE MASTER OF SCIENCE IN ENERGY (ENGINEERING AND POLICY):

Position CE1: African Energy Resources and Scenarios (6 credits)

This course is an introduction providing an overview of the energy resources in Africa, with a particular emphasis on renewable energies. The key issues that will be covered include: the availability of energy resources in the different parts of the continent, the current levels of exploitation, and future/planned developments; technical, social, economic, and cultural challenges (if any) in the development of energy from the different resources. The course will allow the students to identify the available energy resources in Africa, to understand how these can be utilized to deal with energy challenges such as energy access particularly for poor countries in the continent, energy insecurity, and reliance on conventional energy. The course also introduces the linkages between energy production, energy use and climate change

(60 contact hours, to be taught in Energy, Engineering and Policy Tracks, 1st semester)

Position CE2: Introduction to Energy (for Engineering track, 6 credits; for Policy track, 5 credits)

This course aims to provide students with the knowledge and skills to utilize basic scientific and engineering principles to analyse the fundamentals of energy sources and systems. Topics include an overview on energy supply and demand systems, life cycle analysis, energy efficiency, and the environmental consequences of various sources such as global climate change in the 21st century. The course discusses energy sources and usage, sustainability tools for energy systems analysis, economics of energy systems, conventional energies (fossil fuels, peak oil Issues, Combustion systems, climate change, carbon sequestration, nuclear and energy politics) and renewable energy strategies.

(60 contacts hours for Energy Engineering track, 50 contact hours for Energy policy track, 1st semester)

Position CE3: Project Design and Management (3 credits)

The course aims at imparting to the students knowledge of theories and commonly used processes of project cycle management and Logical Framework Approach (LFA), and will cover the tools and techniques for identification, analysis, design, implementation, monitoring and evaluation of sustainable development of water and energy programmes and projects.

(30 contact hours, to be taught in Energy, Engineering and Policy Tracks, 1st semester)

Position CE4: Academic Writing (2 credits)

The course will focus on the connections between research process, academic writing

and the structure of academic texts. Students will also be introduced to grammar and style for academic purposes with a particular focus on technical subjects and the problem of communicating technical subjects in an understandable manner (to a non-expert audience). Special attention will also be given to issues of clarity, logic and coherence. Finally, the course will cover citation techniques, referencing and the issue of plagiarism.

(20 contact hours, to be taught in Energy, Engineering and Policy Tracks, 1st semester)

Position CE5: Entrepreneurship and Intrapreneurship (2 credits)

This course seeks to enhance students' entrepreneurial/intrapreneurial mindset, skills and behaviour – with or without a commercial objective. Students should learn to identify, explore and promote business opportunities or opportunities for development/advancement as independent actors or embedded in institutions in the public, private or civil society sector. They are to confront practical business challenges and opportunities in the private sector and challenges for development in the public and civil society sector, conduct a market and needs analysis as well as competitor and stakeholder mapping for business / project ideas and draft a first business / project plan presenting milestones and risks.

(20 contact hours, to be taught in Energy, Engineering and Policy Tracks, 3rd semester)

III. REQUIRED QUALIFICATIONS AND EXPERIENCE

TASKS AND RESPONSIBILITIES

In addition to teaching, all short-term position holders will also be required to:

Set and mark examinations in accordance with the Institute regulations and guidelines;

Carry out all academic duties including interaction with students;

Support the development and supervision of laboratories as required.

All short-term lecturers will be responsible to the PAUWES Director.

MANDATORY REQUIREMENTS FOR ALL SHORT-TERM POSITIONS

Must be a full Professor of a recognized University/ a Director of Research with an earned Ph.D. or an Associate Professor with minimum 5 years' experience at an institution of higher education in the thematic field.

Must have excellent English language proficiency.

Additional criteria are:

Experience in relevant areas of teaching and learning, innovative programme design, academic/research development and support;

Experience of the higher education and research environment in Africa;

Membership in academic and professional national and international networks;

Commitment to supporting the institutional and programme development;

Knowledge of national, regional and international accreditation and quality assurance standards and processes;

Knowledge of French and/or Arabic would be an advantage.

IV. REMUNERATION OF SHORT-TERM LECTURERS

Courses are paid as per contact hours, where one credit = 10 contact hours.

Contact hours of courses	Honorarium/hour (US$)	Subsistence allowance/day (US$)
20 to 60 hours	80	40

Additionally, travel insurance, visa costs and travel expenses will be covered according to PAUWES' guidelines.

V. STARTING DATE AND DURATION OF CONTRACTS

Appointment: during July 2016.

Duration of short-term positions: between two to four weeks depending on workload (credits) allocated, see above. The fall semester runs from September 28th, 2016 to February 23rd.

VI. HOW TO APPLY

Applications for academic staff positions should be sent to the Pan African University (PAU) Institute of Water and Energy Sciences (including Climate Change) only at jobs@pauwes.univ-tlemcen.dz

Please submit (every document should be in a pdf format):

- Application letter stating your motivation and making clear reference to advertised position indicating availability between September and February (flexibility is an asset);

- Updated curriculum vitae: personal details, education, professional experience, teaching experience (courses taught, level of courses), number and themes of supervised Master and PhD theses, language proficiency, list of publications (major publications of last 5 years, books, patents) in the thematic fields relevant for the application, research projects, consultancy projects and other assignments, prizes, grants, awards, etc.

- The contact details of three referees should also be listed and a complete set of copies of academic certificates and testimonials be provided (pdf).

In the framework of the AU Gender Policy, the Pan African University strives for gender equality at all levels and for all university positions to fully use the potential of both men and women. PAUWES would hence like to encourage especially female candidates to apply and join its faculty.

CLOSING DATE FOR APPLICATIONS

10.07.2016, 11.00 PM (UTC)

Pan African University
Institute of Water
and Energy Sciences

FURTHER INFORMATION

For more details on the PAUWES institute, its study programs and job opportunities, please see http://pauwes.univ-tlemcen.dz/and www.pau-au.org

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