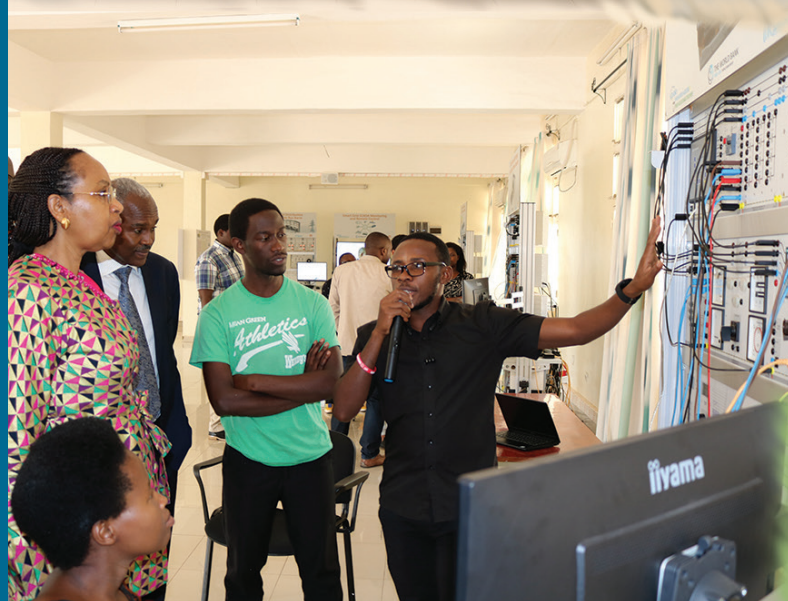




UNIVERSITY of
RWANDA

ACEs NEWSLETTER



**A monthly Newsletter highlighting key activities
of UR- African Centres of Excellence**

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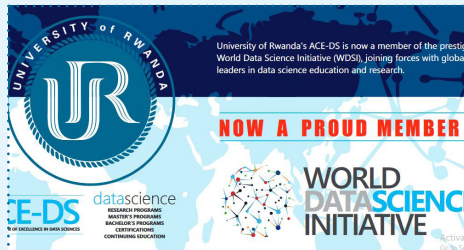
Eastern and Southern Africa Higher Education Centers of Excellence Project

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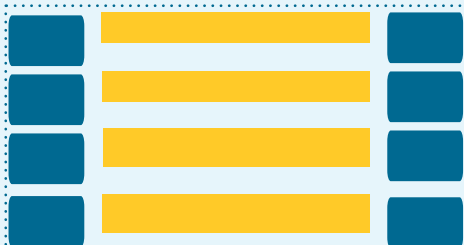
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Eastern and Southern Africa Higher Education Centers of Excellence (ACE II) Project at glance



ACE II is a World Bank-funded project

In order to deliver relevant and quality education, and applied research addressing key development challenges, the World Bank has funded the Eastern and Southern Africa Higher Education Centers of Excellence Project (ACE II) to establish and strengthen specialization and collaboration in the region.

The project is being implemented in 8 countries namely Rwanda, Uganda, Kenya, Zambia, Ethiopia, Malawi, Kenya and Tanzania. They are all training postgraduates (Master and PhD) in different field.

Among the 24 Centers selected through an open and merit-based competitive process in the above mentioned countries, UR is home to

four Centers: African Center of Excellence in Data Science (ACE-DS), African Center of Excellence in Energy for Sustainable Development (ACE-ESD), African Center of Excellence in Internet of Things (ACE-IoT), and African Center of Excellence for Innovative Teaching and Learning Mathematics and Science (ACE-ITLMS).

“ The overall objective of ACEs is delivering quality postgraduate education and building collaborative research capacity in education, energy, technology and applied statistics. ”

These ACEs are training national and regional researchers who will contribute to skills development and reverse the shortage of qualified researchers in these fields in Africa.

The overall objective of ACEs is delivering quality postgraduate education and building collaborative research capacity in education, energy, technology and applied statistics.

To date, more than 600 research students are enrolled in different programs at ACEs and by the end of 2025, with continued enrolment they will have contributed substantially to the research base in the region.

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4 YEARS DOWN THE ROAD: KEY MILESTONES

The five-year ACEs project started in 2017 with the first call for MSc and PhD applications. Four years now, a number of achievements were registered:

African Centre of Excellence in Data Science gets International Accreditation, introduces new certified professional courses, joins World Data Science Initiative



Data Analyst (SBDA™), Senior Data Scientist (SDS™) and Principal Data Scientist (PDS™).

DASCA certifications are the world's most advanced cross-platform programs of their kind, and they address the career needs of ambitious African talents who wish to develop themselves into world-class Data Analysts, Data Engineers and Data Scientists.

After ACE-DS got international accreditation, it became an official member of the World Data Science Initiative (WDSI) joining the massive mission of WDSI to build a global workforce of 250,000 data science professionals.

WDSI provides the opportunities necessary for ACE-DS to cultivate a large pool of highly trained expert data science professionals not only locally in Rwanda but throughout other parts of Africa as well.

"Data Science education and research are very important to solving many development challenges, so we are glad to bring that to Rwanda and East Africa. We are extremely excited and proud to join the World Data Science Initiative," said Dr. Charles Ruranga, Director of ACE-DS, said.

www.aceds.ur.ac.rw

University of Rwanda's African Centre of Excellence in Data Science (ACE-DS) has acquired the international accreditation from the Data Science Council of America (DASCA) for offering different PhD and Masters programs in Data Science. This followed a rigorous evaluation of the modules taught and the teaching capacity of the Centre among other criteria.

The programs that are internationally recognized are PhD/ MSc in Data Science in Actuarial Sciences/ Data Mining/ Econometrics and Biostatistics. The ACE-DS and DASCA are now leveraging this partnership to enhance professional employability of African technology talent and improve their technology research and development outcomes.

Under this framework, both institutions have launched the globally renowned Data Science certification programs of the Data Science Council of America (DASCA).

"Data Science education and research are very important to solving many development challenges, so we are glad to bring that to Rwanda and East Africa."

These certifications which will be offered online include Associate Big Data Engineer (ABDE™), Senior Big Data Engineer (SBDE™), Associate Big Data Analyst (ABDA™), Senior Big

The African Centre of Excellence in Internet of Things train regional professionals in Rola technologies, Multi-Sensor Deployment Drone among others



A group photo after completing a shortcourse in Multi-Sensor Deployment Drone

Over the past four years, ACEIoT has been offering short courses to national and regional professionals with background in ICT. These short courses include LoRa technologies where the focus has been on the development of sophisticated platforms architectures for smart objects, embedded intelligence and smart networks. The short course is the second following the one which was held in 2015.

This kind of trainings also focus on IoT technology and present case studies on applications in Rwanda and other Eastern African Countries.

Researchers at ACEIoT argue that research driven by ambitious use cases and benefiting from innovation areas in components, systems, networking and web technologies needs to be carried out to respond to the ever-increasing needs of future IoT systems in terms of scalability, heterogeneity,

complexity and dynamicity.

These trainings cover components like LoRa and LoRaWAN protocols; Prototyping of sensor boards; Coding of LoRa sensors; Planning and deployment of a LoRa network; Collection, analysis and the visualization of the data among other topics.

“ We figured out the types of sensus that will be useful for our project and how these can be implemented and put our project on the market as final product.”

On the other side, ACEIoT has been providing short courses on ‘Multi Sensor Deployment Drone’.

This course which mainly attract professionals in Computer Science, Information Technology/Systems, Engineering disciplines, Geospatial Technology/Geography from Rwanda and the East African region is very useful given that the demand for connectivity is driving the IoT for drones/UAVs, better and cheaper micro-electromechanical systems sensors – accelerometers,gyros, magnetometers and often pressure sensors – small GPS modules, powerful processors and a number of digital radios have pushed the controversial devices into the mainstream market.

During such trainings, participants go through different concepts regarding the function of the drones, Aerodynamics, how a drone is built and necessary parts to build one, GPS and how accurate position is calculated using various constellations, the latest laws and regulations pertaining UAV, with a particular focus on Rwanda, how UAVs can be used to gather data coming from IoT nodes on the ground, among others.

“We are developing a project about crop diseases detection, with the case of maize crop. From this short course, we figured out the types of sensus that will be useful for our project and how these can be implemented and put our project on the market as final product”, one participant said after completing a one week short course.

www.aceiot.ur.ac.rw

African Centre of Excellence for Innovative Teaching and Learning Mathematics and Science built capacity of regional in-service secondary school mathematics and science teachers



Demonstrations during the training of in-service secondary school mathematics teachers

Apart from training Msc and PhD students, ACEITLMS has been training Secondary School Mathematics and Science teachers from Rwanda and the region equipping them with pedagogical content knowledge (PCK).

These trainings have the main objective of equipping in - service teachers with necessary competencies, tools, and resources to enable them to adapt, utilize and contextualize the Competence Based Curriculum (CBC) for improved student learning outcomes. During these trainings, in-service teachers are introduced to some concepts like innovative teaching/learning methodologies, Resources and technologies in

teaching and learning Mathematics and science, Relation between content and pedagogy in teaching mathematics and sciences, Applications of content construction in teaching, Problem solving engagement activities among other concepts.

“ These trainings have the main objective of equipping in - service teachers with necessary competencies, tools, and resources to enable them adapt, utilize and contextualize the Competence Based Curriculum (CBC) for improved student learning outcomes.”

Participants also are being introduced to ICT tools to support teaching and learning Mathematics/ Science; conduct assessment and build a collaborative classroom; Use of simulations; Improvisation among others.

These trainings use integrated approach combining plenary sessions, lectures, group work sessions and reviews, practical and simulation sessions. This approach ensured the training took place in an environment that mimic the real classroom.

This kind of training attracts most of the Secondary School Mathematics and Science Teachers from the region.

African Centre of Excellence in Energy for Sustainable Development acquires the first of its kind regional High E-Tech Smart Grid Laboratory, establishes Grid Innovation and Incubation Hub (GIH)



A Student showing how the High E-Tech Smart Grid Lab operates

Professionals in renewable energy have appreciated the newly established Hi-E Tech Smartgrid Laboratory that is being used for practical experiment at African Center of Excellence in Energy for Sustainable Development, a lab that will boost energy skills to regional energy professionals.

The Lab is being used while experimenting theories behind small wind turbines (off-grid system), high voltage direct current technology (HVDC), wind power plant with (DFIG), hydropower with pumping and classical power generation, power transmission and protection technology, industrial photovoltaic system among others.

The facility worth 800,000 USD is helping national and regional students and professionals in energy

having hands on practice in order to better understand different theories behind renewable energy to address regional challenge.

On the other side, ACEESD has established the Grid Innovation and Incubation Hub (GIH), which is meant to accommodate young entrepreneurs with innovative business ideas.

“ The Hub’s main mission is to discover, nurture, and potentially fund exceptional youth’s business ideas which are innovative, scalable, and have huge transformational potential.”

making them financially viable, freestanding and competitive at the open market. So far 15 young entrepreneurs drawn from 45 applications were retained to benefit from the Hub services.

Philbert Dusenge, one of the finalists, whose project is to find an alternative solution, which can use wastes (rice husks, sawdust and other wastes from industries) to clean cooking energy, using a gasifier stove said the Hub came at right time since his idea is likely to become a reality through the Hub support.

The services that the Hub is supposed to provide include Assistance with prototyping, Patent drafting and IP, Mentoring, Coaching and Access to Capital.

www.aceesd.ur.ac.rw

What is our first students' 'take home'?

The first cohort of Msc students have completed their courses and are ready to graduate. Here, they share their views on their expectations, skills they got and way forward.

"My studies enabled me to explore how vital is data and how it can be manipulated with the use of adequate technologies such as artificial intelligence and Big data technologies for more business solutions. These skills will expose me to advanced data driven decision-making opportunities and allow me to find more solutions for the community.

The skills I got have given me an opportunity to work as a data scientist and I am able to contribute to data driven insights on my current position because of what I learned. In the future, these skills will expose me to advanced data driven decision-making opportunities and allow me to find more solutions to existing."

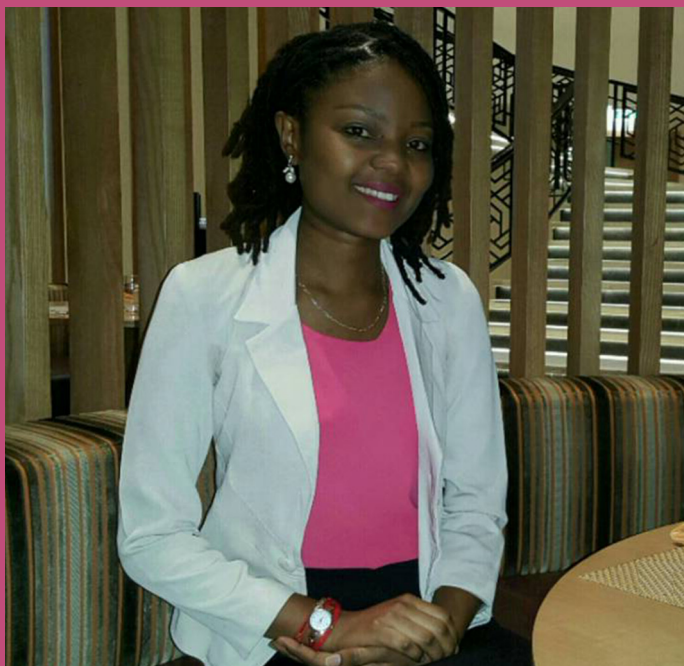
Olivia RUTAYISIRE, Student in Master of Data Science in Data Mining at ACEDS



I'm very appreciative to the skills I got from the African Centre of Excellence in data science, University of Rwanda. Through my training, I got a solid knowledge and skills in data processing and analysis. I also obtained marketable skills in Artificial Intelligence and Big data analytics techniques and algorithms to predict events.

With these skills, I even was immediately hired by the Rwanda Meteorology Agency where I was admitted for internship. I'm currently happily using my programming skills in Python, R and using Packages to provide insight from weather data after predicting the effect of weather variation on agriculture, health and other important country development features.

Valens Rwakageyo NIZEYIMANA, Master student in Biostatistics at ACEDS



“During my studies at ACEIoT, my main focus was Wireless Sensor Networking. Having an attitude of there is more to learn and improve in both my skills and experience has proven a warrior in my studies.. I gained knowledge and practical skills related to the enrolled program and on top I also acquired professional knowledge in terms of problem solving, critical analysis, team working and independent research activities.

I believe that the acquired knowledge from ACEIoT will help me to design solutions to challenges faced by the community, evaluate existing and come up with innovative ideas”.

Marie Grace MUJAWAMARIYA, Master student in Wireless Sensor at ACEIoT

“All the expectations I had before joining the Centre were met. I have already secured my job at Rwanda Military Hospital where I conducted my industrial attachment.

Therefore, I am making use of skills in the workplace. Data Science is actually the hottest and upward career today and tomorrow. Much appreciation to ACEDS team and partners”.

James MUCYO, Master student in Data Science in Actuarial Sciences at ACEDS



“The knowledge and skills I gained during my MEd in Biology Education program will help me to serve our community since I was equipped with a strong package to become more competent and productive.

The support I got from the Centre opened my mind to different opportunities and I will do my best to get another opportunity to go on with PhD program. Before taking this masters’ program I was only thinking as a Rwandan citizen but now I am using more effort for becoming competent at global market and become a global citizen.”

Jeannette MUTERAMPUNDU, Student in Master of Education in Biology Education at ACEITLMS

ACEs in numbers

517

Number of students enrolled in Msc programs

517

171

Number of students enrolled in PhD programs

171

1042

Number of private/public professionals who got professional courses

1042

167

number of research papers from students that were published in international journals.

167

Our respective programs

African Centre of Excellence in Data Science (ACEDS) based at UR-College of Business and Economics, Gikondo



We have Day and evening Programs:

- Master/PhD of Science in Data Science in Data Mining
- Master/PhD of Science in Data Science in Econometrics
- Master/PhD of Science in Data Science in Biostatistics
- Master/PhD of Science in Data Science in Demography
- Master/PhD of Science in Data Science in Actuarial Sciences

N.B: All PhD programs are by research.



In partnership with Data Science Council of America (DASCA), we also offer certified professional Short courses:

- Associate Big Data Engineer (ABDE)
- Senior Big Data Engineer (SBDE)
- Associate Big Data Analyst (ABDA)
- Senior Big Data Analyst (SBDA)
- Senior Big Data Analyst (SBDA)

More details: www.aceds.ur.ac.rw

African Centre of Excellence for Innovative Teaching and Learning Mathematics and Sciences (ACEITLMS) based at UR-College of Education, Rukara



We have Day and Weekend Programs:

- Master/PhD of Education in Biology Education
- Master/PhD of Education in Chemistry Education
- Master/PhD of Education in Physics Education
- Master/PhD of Education in Mathematics Education

N.B: All PhD programs are by research.

More details: www.aceitlms.ur.ac.rw

African Centre of Excellence in Internet of Things (ACEIoT) based at UR-College of Science and Technology, Nyarugenge



We have the following Programs:

- Master/PhD of Science in Embedded Computing Systems (ECS)
- Master/PhD of Science in Wireless Sensor Computing (WSC)

N.B: All PhD programs are by research.

Short courses:

- a. Rapid Prototyping
- b. Blockchain Fundamentals and Applications
- c. Drone fundamentals and applications
- d. LoRA technologies
- e. IEEE GRSS Drone Sensor Deployment

More Details: www.aceiot.ur.ac.rw

African Centre of Excellence in Energy for Sustainable Development (ACEESD) based at UR-College of Science and Technology, Nyarugenge



We have the following Programs:

- Master/PhD of Science in Energy Economics
- Master/PhD of Science in Renewable Energy
- Master/PhD of Science in Electrical Power Systems

N.B: All PhD programs are by research.

Short courses:

Power Engineering, Smartgrid, Microgrid

More Details: www.aceesd.ur.ac.rw

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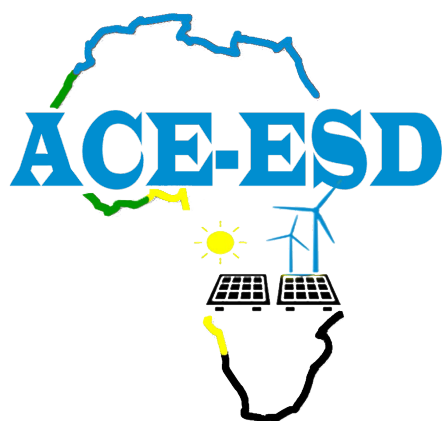
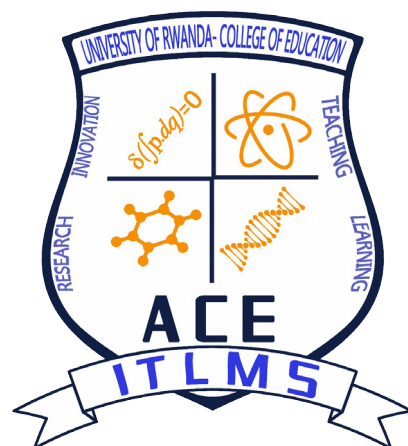
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