Applied Curricula in Technology for East Africa

Belgium - Germany - Greece
Ethiopia - Uganda - Tanzania
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Antwerp - Kortrijk - Dortmund - Chania
Mekelle - Jimma - Kampala - Mbarara - Arua
Dar Es Salaam - Morogoro
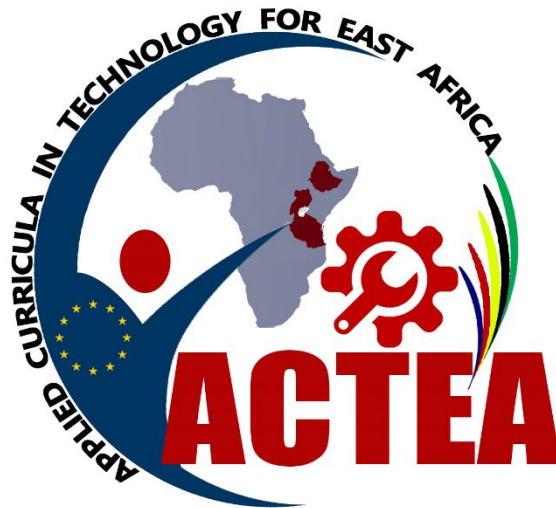
Training Dates

21th – 31th August 2022

Place

Ardhi University – Dar Es Salaam - Tanzania

About ACTEA

Problem Statement

STEM-education is very relevant for East-African countries, as producing added value is a way of improving life standard in these developing countries. Moreover, there is a high demand for technicians from investors, NGOs and the emerging mid-class in Ethiopia, Uganda and Tanzania, supported by legislative attempts to increase local employment. To cope with this demand, there is a need for skilled people, trained in relevant engineering trades, but they are hard to find, due to the strong theoretical approach in universities instead of practice-oriented competence-based teaching. This is directly related to the lack of modern curricula in engineering and industry-grade equipment.

Goal of the project

The ACTEA project aims to fulfil the specific needs in engineering, provide better skills matching, deliver course material in 2 specializations, Computer Aided Manufacturing Technology and Electrical Engineering & Automation and, establish technologic laboratories, with virtual and remote accessibility, establish learning tools, give academic staff additional training on technology and in developing technologic course material according to EU standards.

Labor market skills training

Labor market skills are identified as being valuable skills for engineers in addition to the specific engineering skills and knowledge.

In ACTEA we developed courses on:

- Project Management & Strategy
- Economics
- Soft Skills for Engineers
- Quality Control

Generic skills, soft skills, 21st century skills are often interchanged and they comprise skills, abilities, and learning dispositions that have been identified as being required for success in 21st century society and workplaces by educators, business leaders, academics, and governmental agencies. This is part of a growing international movement focusing on the skills required for students to master in preparation for success in a rapidly changing, digital society. Many of these skills are also associated with deeper learning, which is based on mastering skills such as analytic reasoning, complex problem solving, and teamwork. These skills differ from traditional academic skills in that they are not primarily content knowledge-based.

Master Class Project Management & Quality Control – Prof. Dr. Carsten Wolff & Ms. Bertha J. Ngereja

Content
Content

Expected audience
Audi.

Prerequisites
- One
- Two

Master Class Soft Skills for Engineers – Dr. Konstantinos Petridis

Content
In this session an overview of selected soft skills essential for the collaboration among Engineers will be presented. The soft skills will be discussed with the participants will be:

1. Oral Presentation Skills.
2. Active Listening Skills.

3. Time Management Skills.
4. Cultural Intelligence Skills.

Expected audience
Undergraduate, postgraduate students, Scholars and Administrators.

Prerequisites
- Knowledge of English (with a Greek accent)
- Internet connection.
- Access to the internet either with mobile phones or PCs (I am using Mentimeter a lot during my lectures)
- Curiosity!!

Master Class Sustainable Business Management – Ms. Karolien Van Riel MSc

Content
Content

Expected audience
Audi.

Prerequisites
- One
- Two

Master Class Educational games & low fidelity prototyping – Mr. Abid Weere Businge

Content
Content

Expected audience
Audi.

Prerequisites
- One
- Two

Automation training

Automation describes a wide range of technologies which reduce human intervention in processes. Human intervention is reduced by predetermining decision criteria, subprocess relationships, and related actions — and embodying those predeterminations in machines.

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Automation, or automatic control, includes the use of various control systems for operating equipment such as machinery, processes in factories, boilers, and heat-treating ovens, switching on telephone networks, steering, and stabilization of ships, aircraft, and other applications and vehicles with reduced human intervention.

Automation covers applications ranging from a household thermostat controlling a boiler, to a large industrial control system with tens of thousands of input measurements and output control signals. In control complexity, it can range from simple on-off control to multi-variable high-level algorithms.

Master Class Integrated Project: PLCs – Motors & Drives – Embedded Measurement and Control – Ing. Geert Van Grieken, Ing. Bart Van Mol, Ing. Maarten Luyts

Content
With the integrated project we are going to bring the next step in STEM education. To combine knowledge and skills gathered over different courses in a situation that approaches reality.

This will be done with the working form project where teams are created who will work out project solutions.

But how do you this and how do you evaluate team members?

Expected audience
Teachers, lecturers and trainers in the field of Automation which already had followed previous ACTEA automation master classes.

Prerequisites – Individually foreseeable
- Laptop with Siemens TIA Portal V16 and RJ45 network port
- Laptop with Nidec Connect software and USB-C port

Prerequisites – To be provided by host university
- 6x ASTI PLC motor control training panel & cables
- 6x NIDEC frequency controller training box & cables
- 6x Real Games Factory IO USB Dongle
- Projector and projection area
- Whiteboard and markers

Master Class Process Simulation and Control – Dr. George Fouskitakis

Content
The Master Class will provide the basic concepts and ideas on how to effectively and efficiently teach students in the concepts of Process Simulation and Control. The MC will cover the following major thematic areas:

- Modeling of dynamic systems
- Analysis of dynamic systems in the time and the frequency domain
- PID control design
- The pole-placement control system design

Expected audience

Teachers, lecturers, trainers in the field of Automation with interest in Control System Design.

Prerequisites

- Projector and projection area
- Wi-fi
- Whiteboard and markers

Master Class Renewable Energy - Dr. Ioannis Katsigiannis

Content

This Master Class aims to provide the main concepts that are related to the operation and design of renewable energy systems. Moreover, a simulation of such a system will be presented using a specialized software tool. The basic structure of this Master Class will be:

- Introduction to renewable energy systems
- Operational analysis of a real renewable energy system that operates in Crete Island
- Free software tools that can be used for the analysis and simulation of renewable energy systems
- Presentation of a case study using HOMER Legacy software tool

Expected audience

Teachers, lecturers, and trainers in the field of Automation with an interest in Renewable Energy Technologies.

Prerequisites

- Internet connection
- Video conferencing software tool (e.g., Microsoft Teams)
- Access to the internet with Windows-operating desktop or laptop equipped with microphone
- Installation of HOMER software that will be sent to participants (Optional)

Round table sustained cooperation – operation

The round table serves as a Master Class for the Development of Research & Internationalization Policy and Strategy, while at the same time it is the opportunity to investigate the cooperation possibilities and draft a 5-year follow plan after the ACTEA project.

The round table members also discuss the setting up meaningful cooperation with the local labor market, through the Business Integration Bureau, through shared experience in this matter.

The round table discussion gives the hosting university the opportunity to present itself to the EU partners, to highlight their departments and to investigate the cooperation possibilities, both locally as internationally. The visiting EU universities in turn can present themselves and showcase their internationalization policy and strategy, and funding opportunities.

The final goal is to find synergies between the partners and mutual ambitions for student and staff exchange, internships and mutual beneficial project work.

Agenda

The agenda has two tracks. One on entrepreneurship, project management and soft skills, one on integrated automation.

Track one

Monday 22/08/2022 **09h00-12h00**	MC - project management, business administration and quality management – FH Dortmund & Mzumbe University
Monday 22/08/2022 **13h00-16h00**	MC - project management, business administration and quality management – FH Dortmund
Tuesday 23/01/2022 **09h00-12h00**	MC - Sustainable entrepreneurship - AP Karolien Van Riel
Tuesday 23/01/2022 **13h00-16h00**	MC - Sustainable entrepreneurship - AP Karolien Van Riel
Wednesday 24/01/2022 **09h00-12h00**	MC - Educational games & low fidelity prototyping - MUST - Abid Businge Weere
Wednesday 24/01/2022 **13h00-16h00**	MC - Soft Skills for Engineers – HMU - Kostas
Thursday 25/01/2022 **09h00-12h00**	MC - Process simulation & control - HMU - George Fouskitakis

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Thursday 25/01/2022 13h00-16h00	MC - Renewable Energy - HMU - Yiannis Katsigiannis
Friday 26/01/2022 09h00-12h00	TBD
Friday 26/01/2022 13h00-16h00	Final presentations Discussing Peer evaluation results track 2

Track two

Monday 22/08/2022 09h00-12h00	
Monday 22/08/2022 13h00-16h00	Integrated Project Presentation Project Startup
Tuesday 23/01/2022 09h00-12h00	Short course "Integration PLC - Node Red" Project work "Up to Milestone 1"
Tuesday 23/01/2022 13h00-16h00	Project work "Up to Milestone 1"
Wednesday 24/01/2022 09h00-12h00	Short course "Integration PLC – Drive" Project work "Up to Milestone 2"

Wednesday 24/01/2022 **13h00-16h00**	Project work "Up to Milestone 2"
Thursday 25/01/2022 **09h00-12h00**	Project work "Up to Milestone 3"
Thursday 25/01/2022 **13h00-16h00**	Project work "Up to Milestone 4" Peer evaluation introduction
Friday 26/01/2022 **09h00-12h00**	Project work "Up to Milestone 4" Project work "Up to Milestone 5"
Friday 26/01/2022 **13h00-16h00**	Final presentations Discussing Peer evaluation results

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Trainers

Carsten Wolff

Carsten Wolff is Professor for Computer Science at Dortmund University of Applied Sciences and Arts (FH Dortmund) since 2007. He studied electrical engineering and economics and received a PhD in electrical engineering from the Heinz Nixdorf Institute at Paderborn University. In his industrial career, Dr. Wolff was in the semiconductor industry (Infineon AG), working in Germany, P.R. China and Taiwan. He worked as project manager, head of department and program manager on the development of ASICs and processors. He also contributed to the development of a new research centre in P.R. China. At FH Dortmund, he is the spokesman of the DAAD strategic partnership „EuroPIM – European Partnership for Project and Innovation Management". From 2011-2015 he was the vice rector for study, teaching and international relations. From 2016-2018 he was the spokesman of the industry-university cluster ruhrvalley. Carsten Wolff is a founding member and director of the "Institute for the Digitalisation of Application and Living Domains (IDiAL)". He is co-founder of smart mechatronics GmbH, a spin off of FH Dortmund and Heinz Nixdorf Institute (Paderborn University) for Systems Engineering. He was the provost and vice rector for digitalization and internationalization of the newly founded Astana IT University, Kazakhstan, from 2019-2021.

His research interests and fields of expertise are: Embedded Systems & Software Engineering, Project Management, Digital Electronics

Bertha J. Ngereja

Georgios Fouskitakis

Dr. George Fouskitakis holds a PhD degree in Mechanical Engineering since 2001. After his studies, he worked as a post-doctoral researcher at the Stochastic Mechanical Systems Laboratory at the University of Patras/Greece. In 2008 he was hired as an Assistant Professor at the Department of Electronics of the Technological Educational Institute of Crete/Greece. He is currently an Associate Professor at the same Department.

His fields of expertise are: Stochastic signals and systems, stochastic fault detections and isolation, precision and intelligent agriculture. He was partner and coordinator of numerous national and international projects. He was guest professor and advisor in numerous European Universities.

Konstantinos Petridis

Ioannis Katsigiannis

Yiannis A. Katsigiannis is Assistant Professor in the Department of Electrical and Computer Engineering of the Hellenic Mediterranean University (HMU) in the field of renewable energy systems optimization. He received the Diploma in Production

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Engineering and Management, the Diploma in Environmental Engineering, the M.Sc. degree, and the Ph.D. degree from the Technical University of Crete.

His research areas are related to renewable energy sources and their integration to power systems, autonomous power systems, small and large scale energy storage, smart grids, energy saving, and artificial intelligence. He has large experience in European and National projects for renewable energy sources and autonomous power systems.

Karolien Van Riel

Maarten Luyts

Bart Van Mol

Geert Van Grieken

Geert Van Grieken holds Bsc. Electrical engineering has finished his engineering studies in Electromechanics in 1997. The first 12 year of his career he build-up practical and applied knowledge as industrial engineer. He automated industrial warehouses, distribution centrums, production processes and cooling water facilities within Europe.

His educational experience started in 2009 where he teaches industrial automation to the Electromechanics Bsc students at the AP University of Applied Sciences. Since 2017 he his active as researcher for the AP University of Applied Sciences in the field of industrial automation.

Geert is specialized in PLC and HMI programming on Siemens PLC.

Yves Masset

Head of department Bachelor Electronics-ICT, Associate program Computer Network and System Administration and Associate program Internet of Things

Lecturer at Electronics-ICT, specialized in computer networks and network security

Responsible for operational deployment and support of 45 staff members and 600 IT students, quality, curriculum development, cooperation with labor market, alumni and organizations, international networks and companies and coordination of R&D at the department.

Expertise: Computer networks, CCNA, CCNP switching and routing, server technology, wireless technology, network security.

Research experience in TETRA and Interreg projects.

Dirk Van Merode

Ing. Dirk Van Merode MSc finished his engineering studies in Electronics back in 2002. After his studies, he found his passion in learning, developing, teaching and

preaching technology, as a researcher, lecturer and international projects coordinator. Having worked in several other higher educational institutes, Dirk now works as a lecturer and research engineer at AP University College in Antwerp.

His field of expertise is in Internet-of-Things, digital systems design, printed circuit board design and production, embedded systems and audio-video production. Research topics are mainly in European projects, both on curriculum development and student and staff mobility with countries outside the EU. He did research in space applications and satellite development for a couple of years.

He was partner and coordinator of numerous international projects.

He was guest professor and advisor in numerous European, Asian and African universities.

Dirk is currently coordinator of ACTEA: Applied Curricula in Technology for East Africa (www.actea.net).

Dirk is also partner in in Erasmus+ KA2 SPACECOM: New study program in space systems and communications engineering (https://spacecom.uz/en).