

Ashesi-ETH Master in Mechatronics Engineering

A joint project between Ashesi University
and ETH Zurich



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Thank you!

The jointly developed Master's degree programme at Ashesi University is forging the way for top-level education in Africa for talented young African students. At the same time, this collaborative initiative offers those involved – ETH Zurich, Ashesi University and industry partners in sub-Saharan Africa – a chance to learn from each other as they foster higher education and promote the leaders of tomorrow for Africa.

Over the last year, the ETH Zurich and Ashesi University teams have been working flat out to set up the curriculum, obtain the necessary accreditations, find funding and publicise the programme. Despite the challenges presented by the COVID pandemic, the Master's programme kicked off on 17 January 2022, with 26 highly motivated students from seven African countries.

None of this would have been possible without your generous support, dear partners. On behalf of all the beneficiaries, thank you very much!

On the next pages, we give you an insight into the preparation and activities so far, and present some of the people behind this amazing initiative.



Professor Joël Mesot
President of ETH Zurich

Background

Given that the world is becoming increasingly interconnected and the population in sub-Saharan Africa set to more than double by 2050, the challenges affecting this region will certainly have a global impact. The best way of addressing them is through global, collaborative efforts. Industrial innovation, competent leadership and talent development will be crucial for ensuring the sustainable development of the African continent.

An important contribution can be made by promoting high-quality tertiary education and instilling leadership capabilities. This is what has inspired ETH, with its long tradition of training highly skilled engineers and active exchange with partners in Africa, to launch the ETH for Development (ETH4D) initiative in 2019.

One part of this broader initiative is the Ashesi Master's in Mechatronics Engineering – a joint project driven by ETH Zurich, Ashesi University in Ghana and industrial partners in sub-Saharan Africa. The new degree programme will provide a top-level engineering education to highly skilled and talented African students, empowering them to shape sustainable development in the region.

The close interaction between members of ETH Zurich, the university in Africa and industrial partners will provide unique opportunities for scientific collaboration and technical innovation, as well as being socially and culturally enriching.



"The vision of Ashesi University is to spark a renaissance in Africa by educating a new generation of young Africans to be ethical, entrepreneurial, and innovative."

Patrick Awuah, President of Ashesi University

Patrick Awuah founded Ashesi University after returning from the United States, where he had lived for 15 years as a student at Swarthmore College and then an employee of Microsoft

Ashesi University

An amazing place to study


Although a relatively young institution, Ashesi University is widely recognised as a rising star in Africa's tertiary education landscape and rated as one of Ghana's top universities. The institution pioneered the combination of an education in sciences and liberal arts in Africa, and it focuses on developing leaders to spearhead Africa's development. The 2021 Times Higher Education University Impact Rankings rated Ashesi among the top 400 universities, recognising its commitment to addressing the United Nations Sustainable Development Goals through various programmes.

Ashesi Campus



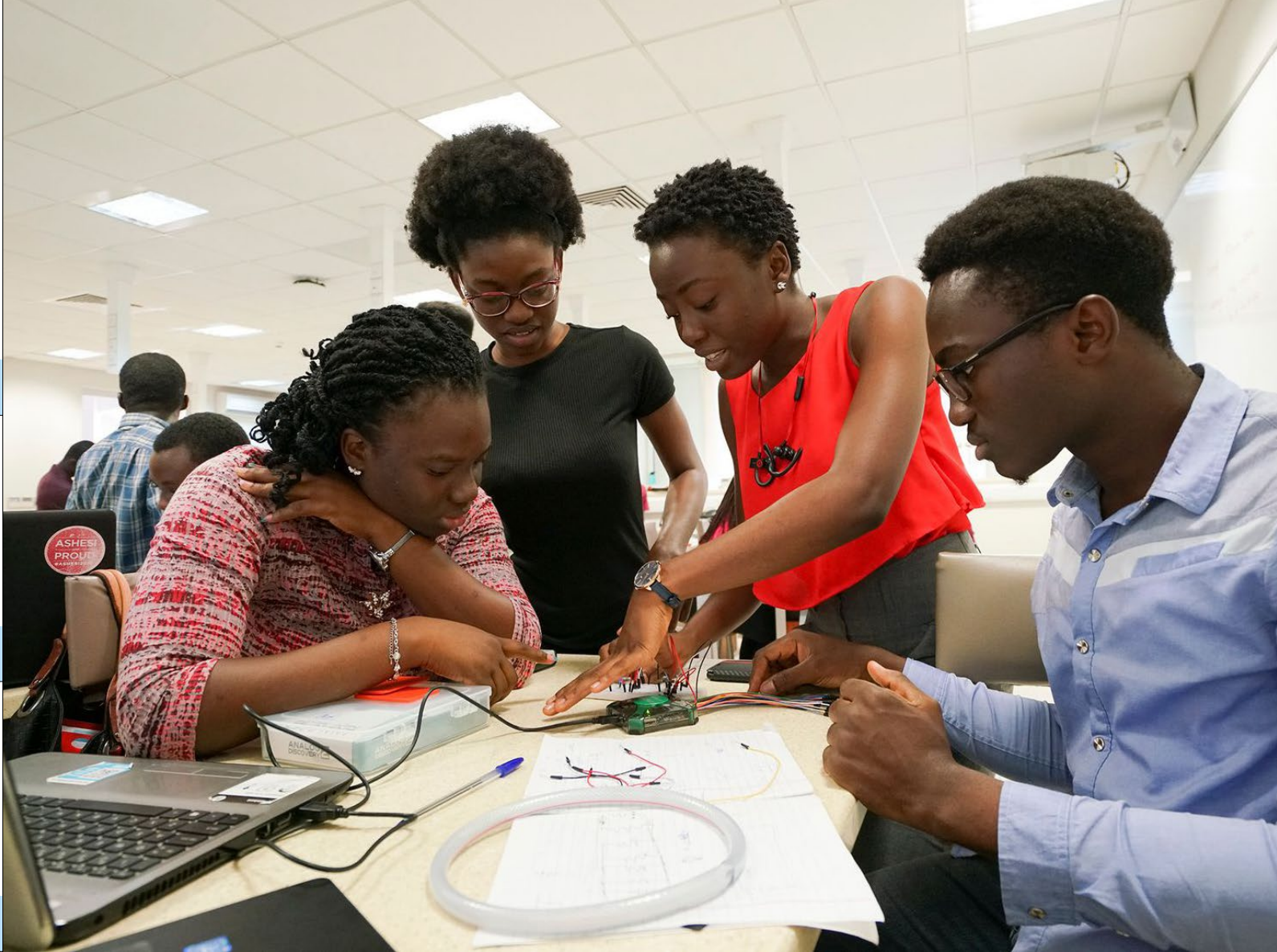
Activities so far

Preparation phase
In the course of 2021, important milestones were achieved:

<div>Programme accreditation</div> <p>Once accreditation was awarded by the Ghana Tertiary Education Commission (GTEC) for the MAS, MSc and MPhil degree, the programme teams plunged into marketing and recruitment for the first cohort. Despite the challenges of the pandemic, the target was set to start teaching in January 2022.</p>  <p>Dr. Patrick Awuah talking about the vision and mission of Ashesi University and the initiative. 13.10.2020</p>	<div>Marketing and recruitment</div> <p>It was the first time either of the institutions had jointly conducted a marketing and recruitment cycle. They decided on a multilayer marketing approach: Part of the team carried out targeted recruitment – obtaining contact details of prospective students through ETH4D’s extensive network and sending out personalised emails to these talented individuals. Key persons in technical universities across six focus countries were contacted. The other part of the team took care of general marketing – conducting interviews on the radio in Ghana, publishing posts on online and social media, and reaching out to relevant organisations and groups across various countries. A number of industry and supporting partners helped increase visibility by reposting and sharing customised content on their channels and within their networks. The strategy proved successful: 250 high-quality applications were received by the end of September 2021 deadline.</p>	<div>Student selection</div> <p>Ashesi University and ETH Zurich worked together to develop a recruitment and selection process geared to selecting the most talented young individuals for the programme. Reaching a diverse cohort and exceptional female students was important here. The team evaluated each application in terms of skills and academic performance in key mecha- tronics areas, as well as for motivation, work experience and extracurricular activities demonstrating leadership potential. A rating was given for various categories and highly ranked students were invited for interview. An intense interview process followed in October, where 80 candidates were interviewed for an hour by a panel comprising representatives from Ashesi and ETH, and from industry partners, if the applicant chose to apply for an industry scholarship. In the interview, technical, social and management skills were assessed. Of the 80 interview applicants, 40 made it onto a shortlist. Ultimately, 26 students were enrolled in the first cohort of this unique programme.</p>
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<div>Fundraising activities</div> <p>Alongside the intensive marketing and recruitment process, the fundraising activity won a number of additional parties and industry partners to back the setting up of the joint Master’s degree programme.</p>  <p>Prof. Nathan Amanquah teaching</p>	<div>Strengthening ties between Ghana and ETH Zurich</div> <p>Over the past year, the cooperation between Ashesi University and ETH Zurich has intensified – particularly at the programme manage- ment level, where basic processes had to be jointly developed and installed, and continuously improved. In preparation for the start of teaching in 2022 and ETH faculty travelling frequently to Ghana, the programme management made a courtesy visit to the Ghanaian Mission in Geneva, to give updates on the activities of the joint programme. The team was received warmly, had fruitful discussions and laid the groundwork for an official visit of the Ambassador of Ghana to ETH Zurich.</p>	<div>Curriculum development</div> <p>Lastly, the course preparation for the tandem teaching and content of the first courses in 2022 made significant progress. Tandem partners were brought together to develop remotely the content of their courses for the first year. In January, the programme was ready to kick off. Discussions are on-going for further development of the curriculum and inclusion of elective courses, such as agriculture and automation, in the next years.</p>  <p>Ashesi students (Picture: Ebenezer Buckman)</p>
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→ 2021 / Q2 → 2021 / Q3 → 2021 / Q4 → 2022 / Q1				
Legal and organisational aspects				
- Full accreditation received in Ghana	- Visit of Ghanaian Embassy in Switzerland to strengthen collaboration	- Visit of the Ghanaian Ambassador and staff to ETH Zurich		
Programme funding				
	- Acquired new industry and supporting partners		- Reached funding target	
Programme development				
	- Continued course preparation	- Assigned Ashesi and ETH lecturers for all MAS courses in 2022	- Successful start of teaching on 17 January 2022	
Recruitment and selection				
- Joint development of recruitment and selection strategy	- Opened applications until end of September 2021	- Evaluated applications and selected interview candidates - Conducted 80 interviews and made final selection of 26 students		



“Contributions from two universities, industrial partners and generous donors make this programme unique. After a complex development phase, we are glad that we now started with lectures. It was very exciting to see the first cohort of students joining the Ashesi campus. I am sure it will be a great enrichment, not only for students but also for everyone contributing to this programme.”

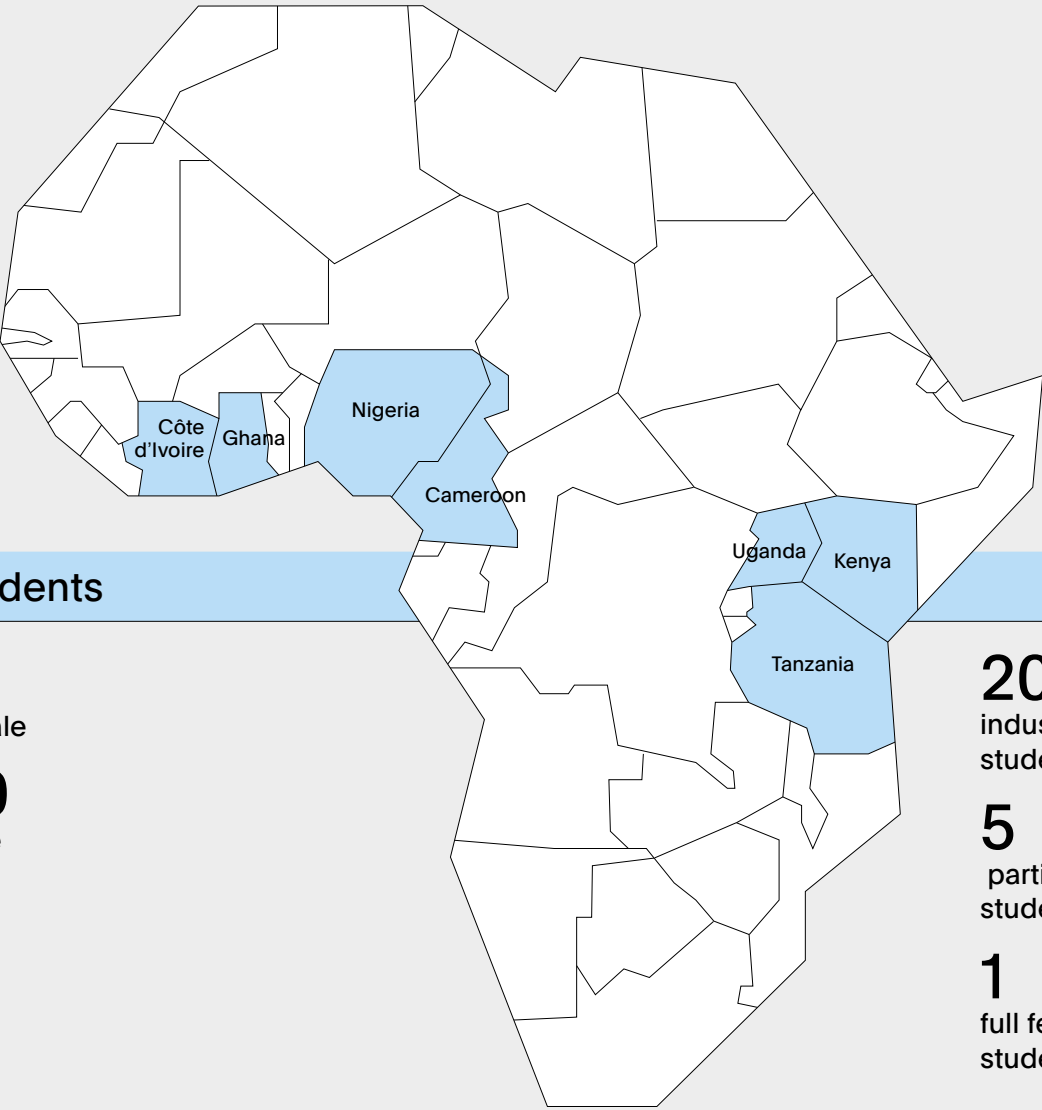
Prof. Edoardo Mazza



Start of first cohort 2022

As a result of the preparation activities described above, the Master’s degree programme started on 17 January 2022, with 26 students on board:

Nationalities



Students

6
female

20
male

20
industry scholarship students

5
partially fee-paying students

1
full fee-paying student

Background

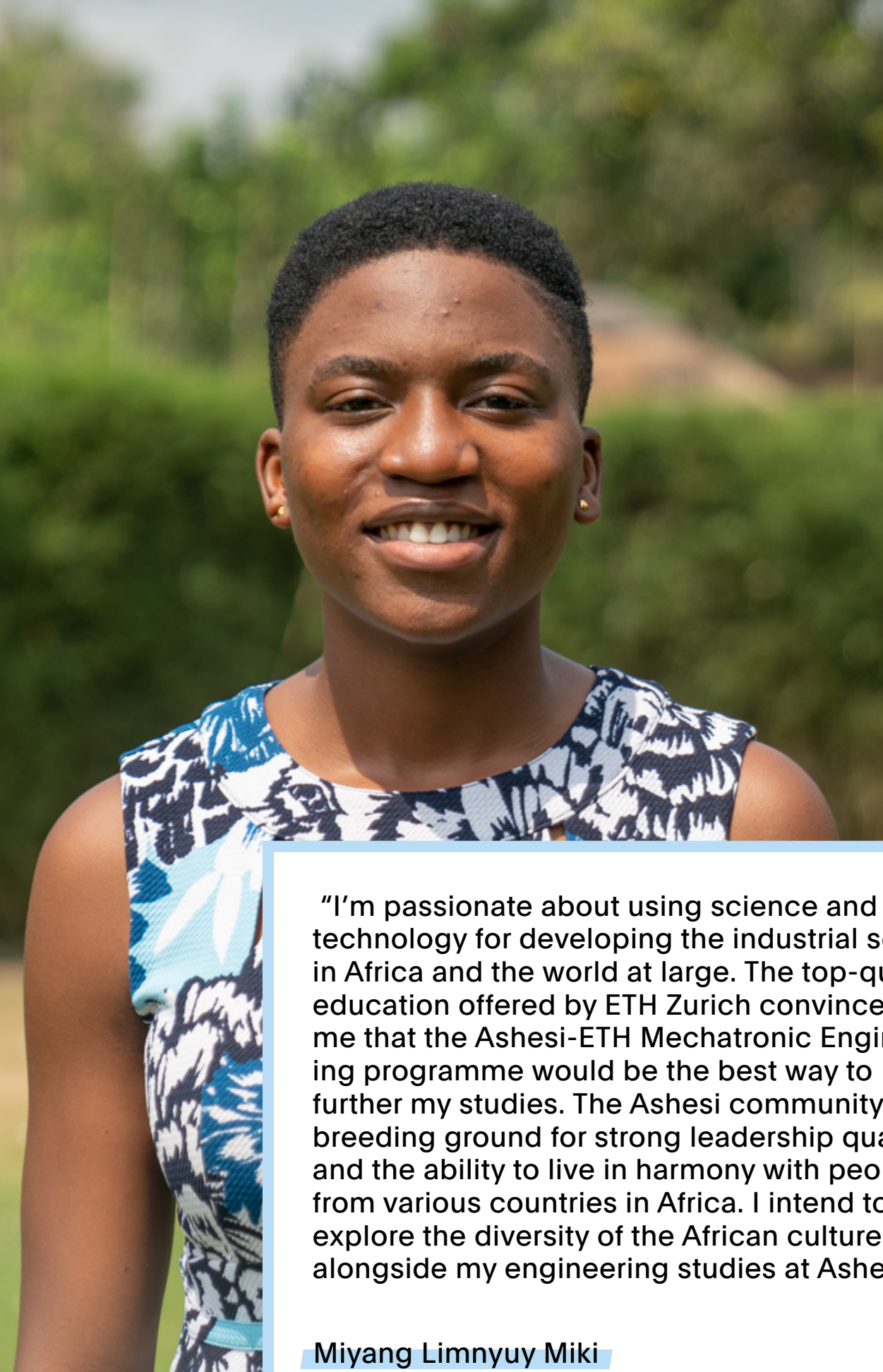
Bachelor of Science in Mechanical Engineering, Electrical Engineering, Agricultural Engineering, Mechatronics Engineering, Petroleum Engineering, Automotive Mechatronics, Production of Systems, Computer Science



“Supported by the combined strength of the faculty at ETH Zurich, Ashesi and my industrial sponsor, Bühler, I’m looking forward to growing personally, academically, and professionally. I want to be an ethical engineer equipped with excellent technical and soft skills, to contribute to Africa’s development and industrialisation.”

Theophilus Acheampong Wereko

Age: 25
Nationality: Ghana
Background: BSc Electrical and Electronic Engineering













"I'm passionate about using science and technology for developing the industrial sector in Africa and the world at large. The top-quality education offered by ETH Zurich convinced me that the Ashesi-ETH Mechatronic Engineering programme would be the best way to further my studies. The Ashesi community is a breeding ground for strong leadership qualities and the ability to live in harmony with people from various countries in Africa. I intend to explore the diversity of the African culture alongside my engineering studies at Ashesi."

Miyang Limnyuy Miki

Age: 24
Nationality: Cameroon
Background: BSc Mechanical Engineering

Programme management

The programme is managed by dedicated teams from ETH Zurich and Ashesi University.

ETH Zurich			Ashesi University	
Programme directorate				
				
Prof. Edoardo Mazza	Prof. Melanie Zeilinger	Prof. Isabel Günther	Prof. Angela Owusu-Ansah	Prof. Nathan Amanquah
Curriculum coordinator				
				
Dr. Andrea Carron			Prof. Nathan Amanquah	
Programme managers				
				
Maximilian Grau (60%)		Dr. Marriette Mertens (40%)	Dr. Wilfred Elegba (50%)	

Programme Directorate team

The Programme Directors at Ashesi University and ETH Zurich oversee the programme's development and implementation during its whole lifetime.

Programme Management team

The Programme Managers at both universities coordinate activities such as logistical matters, marketing, the admission process, and managing relationships with the various stakeholders. In addition, they support the Curriculum Coordinators with course development and the Directorate with the strategic management of the overall initiative.

Curriculum Coordinators

The Curriculum Coordinators at both institutions are in charge of designing the programme curriculum and recruiting faculty for the initiative. They work closely together to ensure that a true collaboration is maintained.



"Across Africa, many organisations and industries are expanding into automation and production, with recruiters looking for local talent to lead in-continent operations. This Master's programme prepares students for successful careers in these emerging fields, equips them with in-demand specialist competencies and a wide range of skills to pursue a career in Mechatronics Engineering."

Prof. Angela Owusu Ansah

Lecturers

This programme would not be possible were it not for the range of ETH faculty members from various departments who participate and are willing to spend some weeks a year teaching at Ashesi without remuneration. Up to now, about 90% of ETH faculty members have committed to teaching in Ghana; they all share an interest in research issues concerning Africa.

The first block course was taught in tandem by Dr Ayawoa Dagbovie from Ashesi University and Dr Alexander Caspar from ETH Zurich, with Robert Crowell from ETH Zurich as teaching assistant.

Unfortunately, Ayawoa had to teach remotely due to Covid-19 implications. Both lecturers guided the students through the 'Mathematical Tools I' course, which lays the theoretical basis for the courses that follow.

Dr. Alexander Caspar teaching the first cohort of the Ashesi-ETH Master's Programme at Ashesi University
(Picture: Ebenezer Buckman)



Budget

Industry partners have contributed CHF 1,775,000 mostly for student scholarships, while donations of CHF 3,499,000 from external partners are used to cover initial costs, running costs and tandem teaching at Ashesi University, and management costs at ETH Zurich.

Income		Expenses	Budgeted: 2018–2028	So far: 2018–31.12.2021
Industry	1,775,000	Student scholarships	1,575,000	
Donations	3,499,000	Initial costs	405,800	379,100
		Running costs at Ashesi	1,482,700	7,000
		Tandem teaching at Ashesi by ETH faculty	512,000	
		Management costs at ETH	986,700	424,700
Total	5,274,000		4,962,200	810,800

In addition, Ashesi University and ETH Zurich are contributing more than CHF 4.5m in-kind (mostly faculty engagement, management and block course teaching) and industry partners almost CHF 1.5m (mostly for support during marketing and recruitment, mentoring and internship support).

Any surplus income will be used for building capacity at Ashesi University, since this is a clear need.

Outlook

The project team is delighted to share with you all that has been achieved during 2021 and the start of teaching in January 2022. The first cycle of marketing and recruitment was successful and many lessons were learnt. This year’s goal is to refine the process between Ashesi University and ETH Zurich. It is planned to reach more universities and prospective students, so as to grow the number of students enrolling for the second cohort starting in January 2023. Ongoing engagement with new, prospective industry partners will increase opportunities for internships and potential job placements for the graduates.





ETH for Development (ETH4D)

An initiative with global reach

The Master's degree programme in engineering in Africa is part of the ETH for Development initiative. Drawing on 40 ETH Zurich research groups from 11 departments and five administrative units, the initiative seeks to provide innovative, effective solutions to global challenges and to train future leaders of sustainable development in Europe and Africa. ETH4D brings together researchers with decision-makers from the political arena, industry, and civil society, in the quest for a more inclusive, sustainable world as expressed in the United Nations Sustainable Development Goals (SDGs).

The activities of ETH4D focus on three pillars:

1. Enabling Research and Innovation for Global Impact
2. Educating Future Leaders of Global Sustainable Development
3. Facilitating Exchange Locally and Globally

1. Enabling Research and Innovation for Global Impact

Research Grants and Doctoral Scholarships for Global Development and Humanitarian Action

Research projects
ETH4D promotes inter- and transdisciplinary research to develop innovative technologies that improve the lives of people in low-income communities. Since it was launched in 2019, ETH4D has supported nine collaborative research projects with non-academic partners and partners from lower-income countries. These range from ensuring a safe water supply and food security to effective immunisation and sustainable reforestation.¹

Engineering for Humanitarian Action
ETH4D also supports six collaborative projects between ETH Zurich, EPFL and practitioners from the International Committee of the Red Cross as part of “Engineering for Humanitarian Action”, an initiative that develops and deploys technology to protect and assist people affected by conflict.²

Research to Action
To ensure that research results are channelled into practice, ETH4D supports ETH students and researchers in developing prototypes and discussing their work with practitioners by means of the Research to Action funding scheme. Projects here range from stakeholder workshops on dynamic agroforestry systems for sustainable cocoa in West Africa to the development of a smartphone app that teaches young people across Africa how to code.³

Doctoral scholarships
In addition, ETH4D awards two to three doctoral scholarships per year for research that advances global sustainable development. Since 2019, nine scholarships have been awarded to students from Colombia, Ethiopia, Kenya, Nepal, Uganda, Peru and Sweden working on projects that span education, combating the effects of natural disasters, and sustainable food production.⁴

New Professorship in Global Health Engineering
To strengthen the new field of global engineering science, Elizabeth Tilley was appointed as Associate Professor of Global Health Engineering in the Department of Mechanical and Process Engineering in December 2020. Previously Senior Lecturer at the University of Malawi, Elizabeth Tilley’s research is geared to finding technical, yet socially workable, solutions to the complex challenges faced daily by marginalised people in the southern hemisphere. She focuses on sanitation management, which hinders sustainable development in many poorer countries. Professor Tilley will also teach at Ashesi University.

1 More examples can be found here: eth4d.ethz.ch/research-projects/eth4d-challenges/research-challenges.html
2 Examples can be found here: eth4d.ethz.ch/research-projects/eth4d-challenges/humanitarian-action-challenges.html
3 Examples can be found here: eth4d.ethz.ch/news-and-events/eth4d-news/2021/07/first-eth4d-research-to-action-grantees.html
4 All E4D Fellows are listed here: eth4d.ethz.ch/people/Doctoral-Students.html



Modular Humanitarian Sanitation Solution (Picture: ETH4D)



Prof. Dr. Elizabeth Tilley (Picture: ETH4D)

2. Educating Future Leaders of Global Sustainable Development

ETH Zurich Courses on Global Sustainable Development
At ETH Zurich, ETH4D supports lectures and seminars on global sustainable development for students trained in Switzerland to gain insight into what type of innovation is required in low-resource settings, and how international organisations work. Courses range from a public lecture series on the Sustainable Development Goals to a course on how to apply machine learning to global development challenges.⁵

Summer Schools with Kwame Nkrumah University of Science and Technology
ETH4D has partnered with Kwame Nkrumah University of Science and Technology (KNUST) in Ghana to offer a joint summer school dealing with sustainable development issues. The first edition was on “Rethinking Waste” and took place from 4–17 September 2021 in hybrid format. 54 students worked together on innovative solutions for solid waste management. Summer schools with KNUST are planned for 2022 and the coming years, with students meeting alternately in Switzerland and Ghana.

Autumn School with IDEA League and Five African Universities
Between 21 October and 12 November 2021, ETH4D participated in an Autumn School on the “Water-Energy-Food-Environment Nexus”, co-organised by the five European technical universities that make up the IDEA League (ETH Zurich, TU Delft, RWTH Aachen, Chalmers University of Technology, Politecnico di Milano) and five African universities (Addis Ababa University, Eduardo Mondlane University, Stellenbosch University, University of Ghana, and University of Johannesburg). More than 40 students from Africa and Europe participated in the fully virtual school and explored the WEFE Nexus in different geographic contexts.

5 Find the current ETH4D courses here: eth4d.ethz.ch/Learning/courses-and-programmes/eth4d-courses.html



Summer School (Picture: Nicola Pitaro)

3. Facilitating Exchange Locally and Globally

Student and Faculty Exchange & Internships

Through various academic exchange programmes, ETH4D supports students and researchers in teaching, learning and working together around the globe. Since 2019, 16 scientists and six students have been awarded funding to visit labs at ETH Zurich for up to three months, and two researchers from ETH have received funding to teach at universities in Colombia and Jordan. In 2021, ETH4D launched a Doctoral Mentorship Programme for doctoral students enrolled at universities in lower-income countries; this includes a stay at the mentor’s research group at ETH Zurich and support for attending conferences. So far, four doctoral students from universities in Afghanistan, Cameroon, Kenya and Zimbabwe have been accepted into the mentorship programme. Currently an internship programme where ETH students assist an industry partner in Kenya is being piloted.

Exchange with Practitioners and Public Outreach

ETH4D strengthens the exchange with industry, policy makers and civil society through regular meetings where researchers and practitioners explore opportunities for collaboration. In 2020 and 2021, ETH4D organised several online matchmaking meetings focusing on COVID-19 response technologies, humanitarian action, sustainable food systems and sustainable construction. To foster the dialogue with society, ETH4D participates each year in over a dozen outreach events focusing on the role of science and technology to advance sustainable development. These include public events held at ETH, such as Scientifica and Treffpunkt Science City, as well as an exhibition and event programme on the UN Sustainable Development Goals.

For more information on ETH4D, please contact:

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Media coverage:

- Ashesi news article:
www.ashesi.edu.gh/stories-and-events/stories/3988-mechatronics-pioneer-welcome.html
- Ashesi programme website:
www.ashesi.edu.gh/admissions/masters-in-mechatronics-engineering/ashesi-eth-welcome.html
- ETH Zurich news article:
ethz.ch/de/news-und-veranstaltungen/eth-news/news/2022/01/gemeinsamer-masterstudiengang-in-ghana-gestartet.html
- ETH4D programme website:
eth4d.ethz.ch/Learning/AshesiETH-Master.html

Contact Funding partnership:



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Photography:
Unless otherwise stated: Ashesi University


Thank you!

Without the generous support of numerous partners – individuals, foundations, industry partners, and a governmental organisation – the Ashesi Master in Mechatronics Engineering would not be possible.

On behalf of all the beneficiaries, a heartfelt thank you!

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