

**SUSTAINABLE DEVELOPMENT:
EDUCATING WITH PURPOSE**

2018

**SUSTAINABLE CAMPUS BEST PRACTICES
FROM ISCN AND GULF UNIVERSITIES**



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FOREWORD

Without doubt, the 2018 World Economic Forum's theme of creating a shared future in a fractured world is a timely and emphatic call to action. If we hope to alter the current trajectory, it has become even more imperative to reshape our conversations and our actions. Through cohesive and thoughtful approaches, universities can meaningfully contribute to global challenges through teaching, research, practice, and service.

Representing over 80 universities from 30 countries, International Sustainable Campus Network (ISCN) members have the shared capacity, passion, and intellectual capital to re-envision the future. Our diverse and collective voice is strong and wide reaching. Together, our enduring commitment to sustainability and our leadership in research, operational best practices, and knowledge mobilization inevitably influences the regions and communities in which we serve.

Not only do universities have the capacity to seek solutions to today's global challenges, we share a responsibility to seek out seemingly unanswerable questions. As institutions committed to learning and teaching, we can test new ideas and technologies and measure change and impacts. As we do so, we recognize the imperative to connect students—future professionals, constituents, parents, leaders—with these pressing issues, and the value in having a shared vision of the future. We do this individually through creating campus cultures that exemplify responsible living, as well as integrated academic programming that reflects human health, planetary health, and economic vitality. Through ISCN we compare and collaborate to leverage a whole that is far greater than the sum of its parts.

As institutions with shared commitments to addressing global challenges, we can also lead as conveners and neutral fora. We are forming new and important collaborations to develop solutions to urgent issues such as the causes and impacts of climate change, urban resilience, and human health and wellbeing. Our universities are working to bring the discourse to the mainstream by engaging with our cities, communities, citizens, governments, intergovernmental agencies, and civil society in pursuit of these aspirations. This reflects the value of service that is intrinsically embedded in higher education.

ISCN members are increasingly integrating the Sustainable Development Goals (SDGs) into governance, operations, teaching, learning, research, and engagement. Not only do the case studies in this report offer evidence of the remarkable scope and breadth of the work being done by ISCN members, they will inevitably inspire others to forge new paths and challenge the status quo. Building on significant momentum from recent network activities, in 2018 we will update the ISCN Charter to better reflect emerging priorities and global instruments such as the SDGs. Not only will the new charter map the course for future dialogue, it will set the stage for the network as a group to move beyond best practices to transformative change.

On behalf of the ISCN Advisory Committee

Victoria Smith
University of British Columbia

Melissa Goodall
Yale University



EXECUTIVE SUMMARY

“Sustainable Development: Educating with Purpose” is the focus of this year’s ISCN-GULF report. In an increasingly fractured world, the Sustainable Development Goals are an instrument for solidarity. Their interconnectedness and focus on critical issues related to humanity and the planet provide a framework and call-to-action for institutions and society.

Higher education institutions serve as a catalyst for change and the collection of case studies herein by members of the International Sustainable Campus Network (ISCN) and the World Economic Forum’s Global University Leader’s Forum (GULF) reflect the sophistication of sustainability in higher education institutions and purposeful contribution to the Sustainable Development Goals to enhance the surrounding community and world. Cases are highlighted in chapters on living lab approach, equality and wellbeing for all, sustainability on campus, and education as a catalyst.

Living Lab Approach

Higher education institutions are providing opportunities for students to engage with hands-on experience both on campus and more broadly to learn and solve critical issues of our society.

At **Ball State University** students are turning brownfields to bright fields by analyzing the solar potential through a community-based course built around the theme of promoting a more sustainable community through analysis of the solar energy potential of existing brownfields in Delaware County, Indiana.

Addressing poverty and access to food is the focus for the student-initiated drive at **De La Salle University – Dasmariñas** to educate the community on the value of proper waste segregation, composting, vertical-drip gardens and the advantages of maintaining a backyard garden.

Hong Kong University of Science and Technology is providing community-engaged experiential learning programs for sustainable development where students gain immersive experiences of real world challenges, furthering their understanding of sustainability issues locally and globally.

At **Indian Institute of Technology Madras**, various approaches are employed to develop and evaluate sustainable pathways for watershed/water resources development for the Chennai Basin.

The Global Development Hub (GDH) at **KTH Royal Institute of Technology** was developed to implement partnerships for a challenge-driven education (CDE) model where students and teachers work with real-world societal challenges in a mutual learning setting.

Campus climate resiliency education is a focus at the **Massachusetts Institute of Technology (MIT)**, whereby education and research are used to grow a campus-wide platform of climate resiliency education that will enable MIT to fulfill its mission in the face of intensifying climate risks.

McGill University is using the Gault Nature Reserve, a Canadian Biosphere Reserve under UNESCO and with a worldwide reputation for the diversity of its minerals as well as its flora and fauna as the setting for their living laboratory for sustainability education.

The **Swiss Federal Institute of Technology (ETH Zurich)** hosted a summer school where students from 14 academic disciplines and 17 nations got the opportunity to understand and experience mountain forests as environmental systems from an inter- and transdisciplinary perspective in a nine-day course in the Swiss Tamina Valley.

Refugee camps are getting aid from a multi-stakeholder partnership spearheaded by **Technical University of Madrid** to improve access to energy for refugees and it was institutionalized as a platform (not as a project) aimed at offering innovation and knowledge services to the humanitarian community.

#cocreateMYCITY is an example of the international collaborative program that **TU Delft** partakes in directly, through the cross-faculty TU Delft Global Initiative to find tangible, innovative and sustainable solutions to urban challenges in the sectors of Water, Transport & Logistics, Energy, Agriculture and Healthcare, closely related to several UN SDG’s.

The **University of Alberta** has initiated a Sustainability Scholars Program, whereby graduate students work on applied, sustainability-focused research projects with partner organizations from the community.

On campus programs and community service are ways in which students are receiving hands-on experience and skills to take on challenges of the 21st century.

Equality and Wellbeing for All

Higher education institutions are embracing the social aspects of sustainable development in creative and impactful ways.

At **Ozyegin University** free legal clinics are provided to the disadvantaged to provide legal guidance and remove the financial barrier to accessing the legal system.

Wellbeing is foundational at the **University of British Columbia (UBC)**, and is increasingly being featured in strategic plans, course curriculum, research (across diverse disciplines), and a range of programs, services, and initiatives. SDG 3 promotion of mental and physical health and wellbeing is essential to achieving sustainable development. UBC recognizes this as a call to equip students with the wellbeing knowledge and practical experience required to drive this Sustainable Development Goal forward.



At **Universita Ca'Foscari Venezia** art and sustainability are key themes for student projects, and to some of the University's main areas of study and research. The University hosted 'Fifteen percent: Dialogue on Disability in the World' in collaboration with the artist Christian Tasso and the cultural association Equality. This project was designed to raise public awareness about the rights of people with disabilities, highlighting the importance of the concept of inclusion as a driver for sustainable development in society.

The Critical Refugee Studies Collective (CRSC) was founded by **University of California** faculty from **Berkeley** and four other campuses whose pioneering scholarship laid the foundation for the field of critical refugee studies, as a response to the need to re-conceptualize the refugee not as a problem to be solved but as a site of social and political critiques of the processes of colonization, war, and displacement.

The **University of Minho** has created a Social Emergency Fund that has demonstrated to be an example of the University, through its Services of Social Action and the Academic Association, to address economic inequalities on access and attendance in Higher Education.

Justice, health, equality, access to education are facets of wellbeing that contribute to a more inclusive and thriving society.

Sustainability on Campus

Higher education institutions are increasingly and consistently integrating sustainability into campus infrastructure and operations so that it may be considered normal, "*the way we do things.*"

At **Chulalongkorn University (CU)** their zero-waste project is part of a five-year action plan to reduce consumption and waste in university.

Keio University has increased the visibility and awareness of the SDGs and associated campus projects by making stickers of the 169 targets and sticking them around the campus.

The EcoCampus at **Nanyang Technology University (NTU)** is a novel campus-wide sustainability framework with demonstration sites to achieve 35% reduction in energy, water and waste intensity by 2020 (baseline 2011), making it one of the world's most eco-friendly campuses in the world.

Communication is key at **Politecnico di Torino** as demonstrated by a prosumer strategy put in place by the Green Team communication manager in the co-creation of a student engagement campaign.

The Engineering Center at **Shandong Jiaotong University** is a green complex of seven buildings for students designed for comprehensive quality, innovation, and an open, practical teaching environment.

Smart mobility, governance, community, buildings and environments are areas of focus for **Thammasat University** in their "Smart Model" concept to integrate sustainability on campus.

The Smart Energy Building (SEB), or zero emission building, in operation since 2017 at **Savona University Campus of the University of Genoa**, has been funded by the Italian Ministry for the Environment and the Protection of Land and Sea.

Whether it be through infrastructure, communications or mobility, these cases show sustainability can become the fabric of the institution and the lens through which students see the world.

Education as a Catalyst

Individual courses and full programs are used as a catalyst for solutions-oriented approaches to global challenges.

The master's program at **Aalto University** is a multidisciplinary learning platform with students of business, design and engineering background that integrates a systems-thinking approach in teaching to overcome the dichotomy of production vs consumption. It employs a challenge-based learning approach to promote entrepreneurial spirits and flexible minds.

Similarly, the MSc Sustainability at **Anglia Ruskin University** is an interdisciplinary Masters course which takes students from a wide range of disciplinary backgrounds with the aim of facilitating their transformation as catalysts of change for sustainability.

Carnegie Mellon University hosted an Energy Week that included three synergistic initiatives focused on Energy, Science, Technology and Policy Energy Symposium, experiential field trips, and the opportunity to reflect on personal impacts in sustainability.

The Challenge Lab (C-Lab) at **Chalmers University of Technology** is a strategic approach for higher education institutions to be relevant for the 17 UN Sustainable Development Goals. C-Lab is part of Chalmers University of Technology's whole-of-university approach seeking to make the university even more relevant for society.

As a UNESCO Chair in Technologies for Development, the Cooperation & Development Center (CODEV) at **Ecole Polytechnique Fédérale de Lausanne (EPFL)** develops formal academic courses and training in technologies for development. The goal of their Development Engineering (DE) curriculum is to train future professionals capable of developing technologies that are appropriate, affordable, robust, and that can be brought to scale to help achieve the Sustainable Development Goals (SDGs).

Freie Universität Berlin (FUB) has been actively participating in the scientific discourse on the SDGs and about 25 % of FUB's research projects and 14 % of the over 4000 courses offered per semester focus on sustainability issues, and plans are to impart social and communication competences as they relate to the Education for Sustainable Development (ESD) teaching and learning concept, which places great value on interdisciplinary and transdisciplinary teaching.

Georgetown University launched the Core Pathways Initiative, the most ambitious core curriculum experiment



ever developed at the University, in which students navigate their core requirements through sustained, interdisciplinary engagement with a “wicked” global problem. Further Georgetown as created the India Innovation Studio, a year-long studio-based course taught through a multidisciplinary lens in Georgetown’s Walsh School of Foreign Service.

The **National University of Singapore (NUS)**, endeavors to provide students with the opportunity to learn and practice sustainability not just from the formal and informal curriculum, but also in student life and activities. NUS shares this approach through its Annual Asia Environment Lecture, sustainABLE NUS Showcase, and NUS Goes Lite projects.

The Honours Programme, “Engineering for Sustainable Development” is a parallel training programme at **Politecnico di Milano** alongside the Laurea Magistrale programmes (equivalent to Masters of Science) of the School of Industrial and Information Engineering, of the School of Civil, Environmental and Land Management Engineering and of Building Systems Engineering, Building and Architectural Engineering and of Building Engineering/Architecture of the School of Architecture Urban Planning Construction Engineering.

The LEED LAB course at **Pontifical Catholic University of Peru** is a multidisciplinary immersion course that utilizes the built environment to educate and prepare students to become green building leaders and sustainability-focused citizens.

Università degli Studi di Torino (UNITO) is taking a new approach to linking education for sustainable development with an open innovation process, tested during a two-phases workshop, entitled “Education for Sustainable Development: Leadership Training.”

Expanding the boundaries, The **University of Cambridge** has created a MPhil in Engineering for Sustainable Development to educate engineers who have post-graduate experience, to meet the challenges posed by the Sustainable Development Goals.

As a response to the major environmental crises and changing life conditions for humans as well as other species, an interdisciplinary ESD Master’s Programme at **University of Gothenburg** brings together four departments at the University of Gothenburg and one at Chalmers University of Technology in a pioneering curriculum at the forefront of the international research debate on education and sustainability.

The **University of Luxembourg** has developed a Certificate in Sustainable Development and Social Innovation open to Bachelor-, Master-, Ph.D.-students and professionals to provide a better understanding of and an enhanced repertoire of action on the complex challenges that societies, organizations and individuals face as we approach the limits of the biophysical carrying capacity of our planet.

The **University of Oxford** engages students through a variety of courses that integrate sustainable development for example, the Department of Continuing Education in the form of a Masters course and the School of Geography and the Environment with a three-day workshop.

The **University of Pennsylvania** focuses on a strategy for Integrating Sustainability across the Curriculum (ISAC). In concert with other Penn initiatives (a course inventory, faculty discussion groups and a research network), ISAC increases Penn’s sustainability-related courses and creates dialogue regarding how various disciplines contribute to sustainability.

The **University of São Paulo** has instituted an Environmental Policy on campus to encourage environmental education at the university, protect health and the environment and adopt sustainable patterns. The policy promotes integrated environmental management at the university to improve the quality of life of its members and society in general.

To harmonize teaching and research within an innovative hub, the **University of Siena** created the SANTA CHIARA LAB, a centre where different cultures, disciplines and approaches merge to explore new perspective of knowledge.

Yale University is taking stock of scholarship and the Sustainable Development Goals through a project aimed at helping understand how Yale teaching and research aligns with the 17 United Nations Sustainable Development Goals (SDGs). Integrating the SDGs into research and teaching through masters’ programs, certificates, and institutional programs provides a pathway for reaching all students.

The ISCN

Recognizing the value that higher education institutions provide to society, the ISCN was founded in 2007 on the premise that diversity of ideas, knowledge sharing, excellence in teaching and research and accountability through campus planning and practice will advance the integration of sustainability on campus and serve as a model for others.

The ISCN-GULF Sustainable Campus Charter was ratified in 2010 at the GULF meeting at the WEF and ISCN has been contributing exceptional case studies to this group since 2011 as part of our mission to provide a global forum for the exchange of information, ideas, and best practices for achieving sustainable campus operations and integrating sustainability into research and teaching. In 2018 we will update the Charter to reflect the evolution of our network and global priorities on sustainable development. The ISCN will continue this knowledge exchange and engagement on the Charter update at our annual meeting, ISCN 2018 Sustainable Development: Acting with Purpose, hosted by KTH Royal Institute of Technology in Stockholm, Sweden, June 11-13, 2018.



ISCN AND GULF MEMBER CASE STUDY CONTRIBUTORS

Asia:

Chulalongkorn University
De La Salle University - Dasmariñas
Hong Kong University of Science and Technology
Indian Institute of Technology Madras
Keio University
Nanyang Technological University
Shandong Jiaotong University
Thammasat University
University of Singapore

Europe:

Aalto University
Anglia Ruskin University
Chalmers University of Technology
Ecole Polytechnique Federale de Lausanne (EPFL)
Freie Universität Berlin
KTH Royal Institute of Technology
Ozyegin University
Politecnico di Milano
Politecnico di Torino
Swiss Federal Institute of Technology (ETH Zurich)
Technical University of Madrid
TU Delft
Universita Ca' Foscari Venezia
Universita degli Studi di Torino (UNITO)
University of Cambridge
University of Genova
University of Gothenburg
University of Luxembourg
University of Minho
University of Oxford
University of Siena

Americas:

Ball State University
Carnegie Mellon University
Georgetown University
Massachusetts Institute of Technology
McGill University
Pontifical Catholic University of Peru
The University of British Columbia
University of Alberta
University of California, Berkeley
University of Pennsylvania
University of Sao Paulo
Yale University

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COUNTRIES

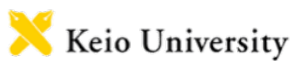
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CASE STUDIES





PARTICIPATING SCHOOLS





THE SUSTAINABLE DEVELOPMENT GOALS

The Sustainable Development Goals (SDGs), also known as Global Goals, build on the success of the Millennium Development Goals (MDGs) and aim to end all forms of poverty. The new Goals call for action by all countries, poor, rich and middle-income to promote prosperity while protecting the planet. They recognize that ending poverty must go hand-in-hand with strategies that build economic growth and addresses a range of social needs including education, health, social protection, and job opportunities, while tackling climate change and environmental protection.

On 1 January 2016, the 17 SDGs of the 2030 Agenda for Sustainable Development — adopted by world leaders in September 2015 at an historic UN Summit — officially came into force. Associated with the goals are 169 specific targets. Over the next fifteen years, countries will mobilize efforts to end all forms of poverty, fight inequalities and tackle climate change, while ensuring that no one is left behind¹.



End poverty in all its forms everywhere



End hunger, achieve food security and improved nutrition and promote sustainable agriculture



Ensure healthy lives and promote well-being for all at all ages



Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all



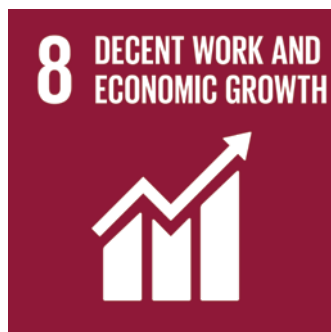
Achieve gender equality and empower all women and girls



Ensure availability and sustainable management of water and sanitation for all



Ensure access to affordable, reliable, sustainable and modern energy for all



Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all



Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation



The new Goals call for action by all countries



Reduce inequality within and among countries



Make cities and human settlements inclusive, safe, resilient and sustainable



Ensure sustainable consumption and production patterns



Take urgent action to combat climate change and its impacts



Conserve and sustainably use the oceans, seas and marine resources for sustainable development



Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss



Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels



Strengthen the means of implementation and revitalize the global partnership for sustainable development

¹ Sustainable Development Goals. United Nations, United Nations, www.un.org/sustainabledevelopment/sustainable-development-goals/



CHAPTER 1

LIVING LAB APPROACH



DE LA SALLE UNIVERSITY DASMARINAS, PHILIPPINES

Agri-Tulong Drive 2017: A Backyard Gardening Advocacy for Food Sustainability of the Council of Student Organizations



In the Philippines, 1 out of 5 families live below the poverty line. Food security, economic empowerment and environmental sustainability remain a significant and challenging concern in the country. In response to this, the Council of Student Organizations (CSO) – the umbrella organization of all bona fide student organizations of De La Salle University – Dasmaringas - launched its Agri-Tulong (“Agriculture-support”) Drive 2017 project for the residents of Sta. Mercedesville, Brgy. Pinagsanhan, Maragondon in the Province of Cavite. Agri-Tulong is a backyard gardening advocacy of the students which aims to train residents on proper solid waste management vis-à-vis using low technology-based, do-it-yourself urban gardening.

With the assistance from the University’s Lasallian Community Development Center, the faculty of the Biological Sciences Department and the College of Engineering, Architecture and Technology, the students oriented the members of various households on proper waste segregation, composting, putting up of vertical-drip gardens using reusable and recycled materials and showed the advantages of maintaining a backyard garden. After a month, the students returned to the community to monitor the latter’s outputs and gathered data on its impact to the household.

Results from the monitoring conducted by the students showed that a significant number of households have established their composting areas and backyard gardens.

Project Objectives:

- Increase student-initiated community immersion program that promotes environmental sustainability.
- Train community partners on the advantages on waste management and urban gardening

Learning Outcomes:

1. Students will be able to conduct trainings to the community on waste management and backyard gardening
2. Households will be able to put up small backyard gardens

Success:

Success will be based on the output of the community a month after the training was conducted and based on the after-activity report submitted by the student organization.

Contact:

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Others involved with the project:

Lasallian Community Development Centre, Biological Sciences Department, College of Engineering, Architecture and Technology



BALL STATE
UNIVERSITY.

7 AFFORDABLE AND
CLEAN ENERGY



BALL STATE UNIVERSITY, UNITED STATES

Brownfields to Brightfields: Analyzing Solar Potential of Brownfields in Delaware County, Indiana

The Brownfields to Brightfields project was implemented in Fall 2017 as Ball State University's (BSU) Regional Analysis and Design Studio (PLAN203). This community-based course was built around the theme of promoting a more sustainable community through analysis of the solar energy potential of existing brownfields of Delaware County, Indiana. It was comprised of nine urban planning students interested in regional planning, brownfield redevelopment, application of computer-based planning techniques to regional scale, and sustainable community-building. This project was funded by a BSU Provost's Immersive Learning grant due to its focus on community-based learning.

Background. The US Environmental Protection Agency (EPA) defines a brownfield as a site or "real property for which the expansion, redevelopment, or reuse may be complicated by the presence or potential presence of a hazardous substance, pollutant or contaminant." Due to its hazardous nature, the concentration of such sites in urban areas or industrial towns makes economic development more challenging. The Midwest Rust Belt is characterized by the shrinking of its once-powerful industrial sector, and brownfield sites remain as industrial scars.

However, beginning in early 2000s, developers and communities slowly began to view brownfields in the Rust Belt Midwest as an opportunity, and now they are starting to attract significant funding and subsidies from private investors, non-profits, and government agencies. The US EPA identifies the redevelopment of brownfields into solar generators as one of the most adaptive reuses of such sites, providing multiple benefits. Also, to promote renewable energy production, the State of Indiana provide incentives to utility companies to voluntarily increase the amount of clean energy resources in their electricity portfolios.

The Project. Using a long list of Delaware County's brownfield sites identified by the US EPA and the Indiana Department of Environmental Management (IDEM), students assessed each brownfield site to document its physical characteristics



(e.g. acreage), proximity to electrical infrastructure, zoning ordinances, and current land uses, narrowing the list down to 19 sites. Students visited these 19 sites to conduct on-site observations to verify and update the data, then created an interactive GIS map describing each site's physical characteristics, potential capacity for solar generation, suitability as a large-scale or the utility-scale solar PV installation. They also calculated greenhouse gas equivalency. The students also developed a dissemination strategy which includes a publicly available ArcGIS Story Map Journal website describing the project's cumulative progress, students' learning outcomes, and an interactive GIS map. Students also produced a detailed replication guideline describing data sources and methodology to assist other Indiana communities in replicating this analytical survey.

Representatives of the Sierra Club Hoosier Chapter, the project partner, requested that participating students present the project's findings to leaders and stakeholders of Indiana Michigan Power, the local utility provider, at a meeting in February 2018 to demonstrate Delaware County's potential as a possible future site for anticipated large-scale solar development.



BALL STATE
UNIVERSITY.

Project Objectives:

- Promote sustainability and sustainable development to freshman and sophomore urban planning major students.
- Promote Delaware County, Indiana to Indiana Michigan Power (local utility provider) as a leading candidate for additional large scale and/or utility-scale solar PV installation.
- Encourage residents and local decision-makers to see solar energy generation as an opportunity for sustainable economic development.
- Educate students in physical planning skills such as GIS and land use analysis as well as soft skills such as public presentations and data visualization (the ability use real data to tell a community story in a compelling and visual way).

Learning Outcomes:

As learning outcomes, students will:

1. Acquire introductory-level skills in GIS and GIS-based land use analysis and suitability analysis.
2. Investigate brownfields redevelopment processes at the federal and state levels.
3. Investigate solar resources availability and solar productivity of Delaware County, Indiana.
4. Survey brownfield sites in Delaware County, Indiana, to assess their site-specific characteristics and create an in-depth analysis report.
5. Develop, design, write, and create graphics for a detailed guide to enable other Indiana communities to replicate the Brownfields to Brightfields project.
6. Work with CERES to build a website hosting all BBP analyses and deliverables (project narrative, complete inventory of the brownfields of Delaware County, and replication guide).
7. Develop and deliver public presentations (Indiana Michigan Power stakeholders' meeting, American Planning Association Indiana Chapter, and local government and economic development officials).

Success:

- This project introduced the idea of community-based immersive learning to urban planning major students from the early stage of their education
- Final interview of participating students showed deeper understanding of sustainability and sustainable development.
- This project is a successful case showing partnership between educational institution, research center, and NGO.

Contact:

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Others involved with the project:

Sierra Club Hoosier Chapter, Indianapolis, Indiana, USA
Center for Energy Research/Education/Service (CERES), Ball State University, Muncie, Indiana, USA
Office of Entrepreneurial Learning, Ball State University, Muncie, Indiana, USA

[More information](#)



HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY, HONG KONG

Community-Engaged Experiential Learning Programs for Sustainable Development



Community-engaged experiential learning includes elements of service learning, action research, and execution of innovative, culturally-relevant solutions that contribute to the sustainability of local communities. Experiential learning is a valuable vehicle for furthering sustainability education.

HKUST Connect (Connect) is a community engagement program with a public commitment to sustainable development by aligning its initiatives with six of the UN Sustainable Development Goals (Goals 1, 2, 3, 4, 10, and 13). Through multiple credit and non-credit bearing activities that cross multiple sectors, students gain immersive experiences of real world challenges, furthering their understanding of sustainability issues locally and globally.

One key initiative is its ongoing partnership with Wat Opot Children's Community orphanage in Cambodia. The Connect team has been taking students on service learning trips to Wat Opot and other Cambodian NGOs since 2011. Previous work at Wat Opot has generally been education focused, such as English language teaching, information regarding diet and hygiene, and creative arts activities. After multiple visits to Wat Opot, it became evident that the orphanage would benefit greatly from affordable and reliable electricity

supply. During 2016, students traveled to Wat Opot to measure the solar intensity, calculate the land area, and study the land use to see if solar PV panels would be feasible. Meanwhile, the Connect staff reached out to Alice Tai, Global Business Sales Director of 3ree Environment Pte, Ltd., who generously agreed to support the project by donating the solar equipment, as long as students were willing to fundraise for the remaining installation and ancillary costs.

In Summer 2017, after a year of successful fundraising, cultural training workshops, and technical training, a team of 24 students, staff, and faculty travelled to Cambodia to install 60 solar PV panels, with the potential to generate 22,000kWh/year, for the Wat Opot Children's Community. However, the positive experience does not end there. The collaboration between HKUST and Wat Opot has developed into an ongoing experiential "learning lab" for students to identify sustainability opportunities, engage stakeholders, gain new skills, and develop positive SD solutions. Building on the success of the solar project, this year's project is developing a working aquaponics facility, where children and staff of the orphanage can raise fish and vegetables in combined systems that utilize waste water from the fish as fertilizer for the vegetables.



Project Objectives:

Connect's ongoing work at Wat Opot is underpinned by SDG 4 (Quality Education); SDG 7 (Affordable and Clean Energy); and SDG 13 (Climate Action). The provision of ongoing education workshops at the orphanage supports the goal of basic literacy and an introduction to sustainable development. The installation of the solar panels reduces the Community's reliance on fossil-fuel based energy as well as its contribution to climate action. Our objectives were to translate knowledge into application by connecting students to tangible issues and community partners; foster interdisciplinary collaboration between students; apply student expertise and innovation to benefit local communities; and, nurture global leaders who are visionary, empathic, socially responsible, and collaborative.

Learning Outcomes:

Upon completion of an experiential learning program, students should gain a deeper understanding of global challenges, and an understanding of how to address them using key skills and competencies; and exhibit an orientation towards action, problem solving, and leadership.

Success:

Success is measured in two ways – firstly, by implementing a human-centered, system-based solution that endures and contributes to sustainability of the local community. Secondly, we hope that during their reflection, students are able to identify the value of experiential learning, can connect the experience back to their academic studies, and develop a stronger sense of their role and contribution to global sustainability.

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[More information](#)



INDIAN INSTITUTE OF TECHNOLOGY MADRAS, INDIA

Sustainable Water Resources Management of Chennai Basin Under Changing Climate and Land Use



Multi-criteria approaches are employed to develop and evaluate various sustainable pathways for watershed/water resources development for the study area. Soil and Water Assessment Tool (SWAT), a comprehensive watershed model is used for hydrological modelling. The data requirements of terrain/land use/soil and meteorological parameters are obtained and serve as input to the SWAT.

Courtesy of IIT Madras

Project Objectives:

The objectives of this project are to consider two different watersheds for the climate change and land use change studies, and assess their impact.

Success:

Success was defined by identification of various sustainable pathways for watershed/water resources development for the Study Area. Other Institutions will find our model of forming an interdisciplinary research Centre with international collaboration to be one worth emulating. It brings about a “meeting of unlike minds” that breeds creative thinking and innovative solutions.

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[More information](#)



MCGILL UNIVERSITY, CANADA

McGill University's Gault Nature Reserve: A Living Laboratory for Sustainability Education

Teaching and research are essential activities at McGill University's Gault Nature Reserve, a private reserve situated at Mont-Saint-Hilaire that protects nearly 1000 hectares of land and water in the Saint Lawrence Valley, 40 kilometers from Montreal. Situated within an old growth forest, the Gault Nature Reserve is recognized as the first Canadian Biosphere Reserve under UNESCO and has a worldwide reputation for the diversity of its minerals as well as its flora and fauna. McGill students use this rich setting as a living laboratory to acquire a deeper understanding of ecosystem function and management essential to building a more sustainable world.

Affiliated with the Faculty of Science at McGill, the Gault Nature Reserve hosted 12 undergraduate courses in 2017. About 400 students acquired practical and theoretical skills in ecology, physical geography, limnology (the study of inland waters) local flora and biodiversity science, among others. Students gained hands-on experience studying the environment using weather stations, a hydrology lab, experimental water enclosures used for the study of phytoplankton communities, and experimental ponds. The Reserve will soon see the development of three new labs and the installation of a network of state-of-the-art meteorological technologies, including drones that will allow for the intensive study of the Saint Lawrence Valley ecosystem.

The management of the Reserve itself models the best practices in environmental stewardship that are taught to undergraduate students. At the heart of its management is the balance of human use and ecosystem preservation. The Reserve provides a secure refuge for animals and serves as a reservoir of biodiversity. Simultaneously, the Mont-Saint-Hilaire Nature Centre, a non-profit organization founded by McGill, ensures public access to the mountain through its system of trails 365 days a year.

Project Objectives:

- Provide cutting-edge research and education opportunities that allows students to gain hands-on experience in the natural sciences.
- Preserve Mont-Saint-Hilaire as a reservoir of biotic diversity for future generations.
- Provide the public with access to nature through its network of trails.



Learning Outcomes:

While the learning outcomes for each course and educational opportunity are different, the Gault Nature Reserve strives to offer field study experiences that allow students to build knowledge and develop research skills needed to understand environmental changes and protect the natural world.

Success:

As John Gyakum, Chair of Atmospheric and Oceanic Sciences describes, "[At the Gault Nature Reserve,] McGill aims to provide the scientific community with a model for studying the local ecosystem, and the Earth ecosystem." Indeed, the Reserve has proven to be fruitful ground for researching and learning. There have been over 400 scientific articles, nearly 100 graduate and postgraduate theses, more than 50 reports and approximately 30 chapters or books published on Mont-Saint-Hilaire. While McGill has research stations in such places as Barbados and East Africa, providing field studies in a dynamic environment so close to Montreal has created more accessible educational opportunities for McGill students, while also strengthening the University's ties to the local community.

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[More information](#)



KTH ROYAL INSTITUTE OF TECHNOLOGY, SWEDEN

Turning SDG challenges into actionable tasks through Challenge Driven Education at KTH Global Development Hub

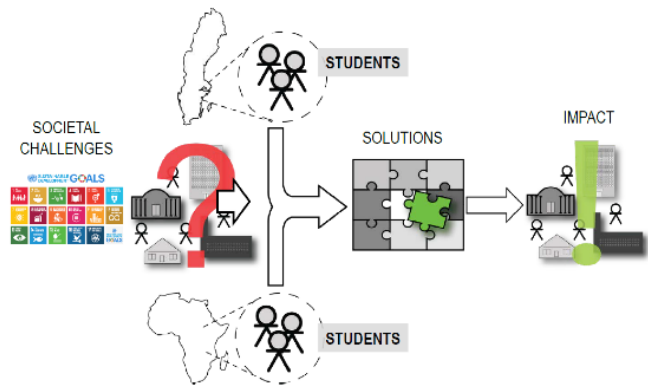
Inspired by agenda 2030 and the sustainable development goals (SDG), there is an increased commitment among universities to play an important and systemic role in enabling transitions towards a sustainable society. This involves both the creation of knowledge and the development of skills that guides and enables these transitions. KTH Global Development Hub (GDH) is an initiative to implement partnerships for a challenge driven education (CDE) model where students and teachers work with real-world societal challenges in a mutual learning setting. KTH GDH has established partnership with at present five universities in sub-Saharan countries in Africa. Students and teachers work in joint teams with students and teachers from KTH on challenges with specified relation to one or several of the SDGs.

KTH organized the first GDH teacher training program for CDE in August 21-25 with teachers from KTH and the five selected partner universities. We define CDE as a framework for project courses in higher education taking their basis in real-world multidisciplinary challenges, defined in collaboration with society (public authorities, civil society and private sector).

The program introduced the basis for CDE and provided practical methods how to establish courses preparing students for addressing challenges related to the SDGs. The program was highly interactive with a lot of team activities in the different modules – with the purpose to ‘put the teachers in the shoes of their students’. Modules in the program covered elements of CDE, curricula development, sustainability, design thinking methodology, and multi-cultural teamwork.



Workshop on challenge driven education at Botho University





Project Objectives:

KTH Global Development Hub was launched January 2017 initiating a new partnership model with selected universities in sub Saharan Africa. The partnership aims at establishing long term development of mutual innovation capacity towards SDGs advancing societies, universities and inclusive business opportunities. GDH is built upon three pillars:

- Mutual interaction and learning with external stakeholders to formulate local societal challenges related to the SDG. The challenges can relate to clean water supply, transport services, access to electricity e.g. Stakeholders engagement and building trust between parties is fundamental for this pillar.
- Turning challenges into actionable tasks where multi-disciplinary teams of students from KTH with students from the local partner university develop proposals and solutions in regular project courses – to address the challenge and selected SDGs. Learning outcomes are knowledge and skills in analysis, synthesis, problem solving in team, design thinking, innovation competence, multicultural learning – all of which relevant to further work for the SDGs
- Teacher training and pedagogical development is key – the role for the academic teacher in the challenge driven education (CDE) setting has to be specifically considered, going from lecturing to coaching. Trustful interaction with external stakeholders and coaching the student teams in their efforts poses new demands on the academic staff

Learning Outcomes:

The program introduced the basis for CDE and provided practical methods how to establish courses preparing students for addressing challenges related to the SDGs. The program was highly interactive with a lot of team activities in the different modules – with the purpose to ‘put the teachers in the shoes of their students’. Modules in the program covered elements of CDE, curricula development, sustainability, design thinking methodology, and multi-cultural teamwork.

Success:

GDH emphasizes the particular role universities can play via teachers, students and external stakeholders, jointly engaging in projects aiming to bring forward solutions to the SDG. It emphasizes the importance to provide our graduates with the skills that can turn global challenges into opportunities for business and society.

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MASSACHUSETTS INSTITUTE OF TECHNOLOGY (MIT), UNITED STATES

Campus Climate Resiliency Education

This case study outlines how MIT is using education and research to grow a campus-wide platform of climate resiliency education that will enable MIT to fulfill its mission in the face of intensifying climate risks. Addressing Sustainable Development Goal 13 for Climate Action recognizes the dual challenge of both mitigating contributions of greenhouse gas emissions (GHGs) and preparing physical and social systems to adapt to climate impacts such as more frequent flooding, extreme precipitation, heat events and rising sea levels. MIT is taking action on both fronts:

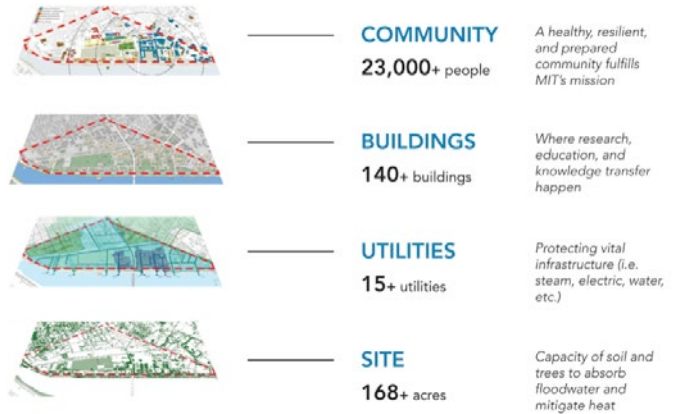
- In October 2015, MIT launched the five-year Plan for Action on Climate Change to leverage MIT's operational, research education and institutional partnerships for reducing generation of greenhouse gas (GHG) emissions.
- At the same time, MIT's Climate Resiliency Committee is assessing potential climate risks, prioritizing challenges and exploring opportunities for adapting campus systems through development of a campus climate resiliency strategy.

Using the campus as a test bed for climate resiliency, the MIT Office of Sustainability (MITOS) is grounding campus climate resiliency planning in a framework of research and education that engages the entire MIT community of staff, faculty and students. Pathways toward a climate resilient campus are channeled through a feedback loop that leverages research to understand local climate risks; educates the community about climate risks and probabilities; and, integrates emerging knowledge into science-based operational and strategic decision-making.

Since climate changes are not bound by campus borders, MIT is also integrating city representatives, local businesses and regional technical experts in collective education on the challenges and opportunities of climate resiliency through a collaboration called the Cambridge Compact for a Sustainable Future.

Layers of Resilience

Our resiliency education and planning approach is organized by four Layers of Resiliency that guide the translation of climate impacts onto the complexity of MIT's campus. Healthy and comprehensive functioning of each layer of resiliency is critical to supporting MIT's purpose. At the same time, each layer is mutually inter-dependent upon every other layer. A resilient MIT depends upon understanding and solving interdependent challenges across all four systems.



Partnerships for Campus Resiliency

The MIT Office of Sustainability is leading these complementary and parallel partnerships for projecting future climate impacts and translating climate uncertainties into strategic decision-making:

Research + Data

The MIT Flood Vulnerability Study led by MITOS in partnership with the Joint Program on the Science and Policy of Global Change is engaging world class climate modelers, scientists and engineers at MIT and in the greater Boston region to model campus flood probabilities and exposures to current and future rain and storm surge. The Study is downscaling global MIT climate models to the campus scale for translating climate science and uncertainties into operational and strategic adaptation guidance.

Operations + Governance

We are also convening MIT campus operational experts, through the MIT Climate Resiliency Committee and its technical resiliency sub-groups, who are identifying campus climate challenges, prioritizing needs and defining planning opportunities for enhancing resiliency and preparedness. The campus resiliency sub-groups are grappling with emerging research findings and raising additional questions that are feeding back to the climate researchers for more targeted climate risk analysis.



Applied Education Experiments

Building on this community-wide education and research platform, MIT is using the campus as a test bed to engage students and staff in real-time resiliency research and in campus operational assessments. A team from MITOS collaborated with academic, operational and external partners to develop a series of hands-on learning activities, called “Lablets,” deployed in both formal and informal educational venues:

1. A Field Study Program, the “Campus Resiliency Crawl,” featured dynamic classroom discussions, live campus tours, regional data resources and student reflection activities. Freshman enrolled in 4 credit course participated in themed campus tours corresponding to layers of campus resiliency and designed to expose students to real-world risks and opportunities. A capstone challenged students to develop MIT resiliency plans and share their findings in public venues.
2. A Resiliency-themed Tour and Discussion Forum was created for a half-day seminar providing visiting international MBA students with the opportunity to learn about one of MIT’s climate mitigation actions; a power purchase agreement (PPA), that resulted with the largest renewable energy project built in the US through an alliance of diverse buyers. Discussion topics included carbon reduction strategies, the PPA business model, carbon offsets, the importance of de-risking renewable energy technologies and challenges of campus climate action planning.
3. Campus Resiliency Literacy Workshops were conducted for design teams involved with the construction and renovation of new and existing dorms, in an effort to increase the literacy of staff, students, faculty, senior leaders, planners, landscape architects, architects, construction managers, engineers and external consultants involved with implementing high performance building standards and long-term resiliency planning on the MIT campus.

Moving forward, MIT is continuing to advance resiliency education and research, evolve operational assessment and decision-making processes and test formal and informal engagement strategies across campus and city scales.

Learning Outcomes:

The learning objective is to increase the understanding of climate resiliency across staff, faculty and student population; to engage the MIT community in an understanding of interdependencies among layers of resilience (community, buildings, utilities and site)

Success:

We see success as defined by the integration of climate resiliency considerations into research, curriculum and campus capital improvements and operational decision-making. Other campuses can draw from a) the approach - MIT is seeking to grow a culture of preparedness throughout the MIT community - b) the framework - by integrating resiliency across 4 layers of resilience such as community, building, utilities and site) c) the scales - campus, city and global scales d) the pathways - research, operations and educational lenses.

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SWISS FEDERAL INSTITUTE OF TECHNOLOGY (ETH ZURICH), SWITZERLAND

ETH Sustainability Summer School 2017 “Mountain Forests & Risk Management”



In July 2017, 32 students from 14 academic disciplines and 17 nations got the opportunity to understand and experience mountain forests as environmental systems from an inter- and transdisciplinary perspective in a nine-day course in the Swiss Tamina Valley. The students received theoretical inputs by key scientific experts and debated hot questions on the management of mountain forests and risk management from the point of view of sustainability. This theoretical part was complemented by a three-day practical experience where the students got to grips with the mountain forest itself – building paths and protective structures for saplings on a steep slope that had been devastated by hurricane Vivian in 1990. Furthermore, eight interdisciplinary student teams worked on four case study topics that are highly relevant in mountain forest management, in and beyond Switzerland:

1. What should future natural hazard mitigation look like: natural mountain forests vs. artificial structures?
2. What is the future of economically marginal mountain settlements? How can the cost of maintaining human livelihoods in the mountains be reduced?
3. Will we need “climate-smart” forest management that adapts to a changing climate and to changing demands for ecosystem services by humans, or will current practices suffice?
4. What will be the role of hunting to manage game populations in order to protect mountain forests against game damage, and is the re-immigration of carnivores like wolves and lynx a sustainable way to handle tree-herbivore interactions?



Learning Outcomes:

Scientific competence:

- Students gain knowledge in a range of scientific disciplines that goes beyond their own study discipline to extend their understanding of mountain regions and mountain forests.
- They are able to connect theoretical knowledge gained via the scientific presentations and the group work, addressing the practical dimensions of mountain forest management.

Methodological competence:

- Participants gain skills in scientific methods that go beyond their study discipline.
- They are able to assess the basic ecological, economic and engineering challenges in the context of mountain forest management.
- Through the case study work, they apply the newly gained knowledge to critically assess practically relevant issues that will shape the future of mountain forests.

Reflection competence:

- Students learn to work in interdisciplinary and intercultural teams to critically reflect their own way of thinking, their own research approaches, and how the academic world influences society.
- Students will be able to critically reflect on the economic, ecological and societal relevance of mountain forests.

Practical skills:

- Through practical work on steep slopes in the forest, participants experience what daily forestry work means in a real-world context, often taking place in harsh terrain under difficult conditions.
- They are thus able to better understand and appreciate forest management aspects in their case study work.

Success:

Successful course participation was defined by a final presentation of the case study topic in front of a jury. Each case study assignment was characterized by two contrasting views for which the students should make the best possible case why their point of view should be guiding actual management and planning decisions. The presentations were evaluated regarding the scientific basis for the point of view and the consideration of technical and socio-economic factors. These final presentations showed that the participants, who came from a broad range of study fields, were able to connect the newly gained theoretical knowledge and the practical experiences in mountain forest management and were able to come up with well-reflected arguments. The group work processes and the course evaluation by the students showed that the students learned a lot about interdisciplinary group work. Moreover, the hands-on sessions in the forest were highly appreciated by the students. The students reflected that the practical part was indeed important for the learning effect about the importance of mountain forests and the difficulties of mountain forest management. The organizers strongly recommend such a heterogeneous mix of students, and the balance of theoretical input, case study work and hands-on experience.

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[More information](#)



TECHNICAL UNIVERSITY OF MADRID, SPAIN

Alianza Shire: Learning by Doing on Energy Access in Refugee Camps



Alianza Shire is a multi-actor partnership and unites the efforts of three private companies leading the energy sector (Iberdrola, Fundación Acciona Microenergía and Philips Lighting Spain), a governmental agency (AECID), a multilateral agency specialized in working with refugees (UNCHR) and an international NGO (Norwegian Refugee Council). The Innovation and Technology for Development Centre at the Universidad Politécnica de Madrid (itdUPM) is the institution in charge of fostering, designing, managing and monitoring the process of collaborative work, enabling consensus to continue building on and integrating different points of view. The partnership was created in 2014 to

improve access to energy for refugees and displaced and it was institutionalized as a platform (not as a project) aimed at offering innovation and knowledge services to the humanitarian community.

This document provides a brief outline on Alianza Shire, first pilot project that was deployed in Shire, in the Northern region of Ethiopia and was conceived as a demonstrator designed to be scaled-up. Refugees' participation was crucial in the project implementation and it was mainly possible because of the provision of theoretical and practical training focused on the results of the needs assessment.



Project Objectives:

The partnership aimed to integrate complementary capabilities to cope with technical and economic dimensions of the problem (lack of energy access and poor delivery of basic services in refugee camps) and complex cultural, social, institutional and political dimensions through the transfer of knowledge and training of people from refugees and host community.

The pilot project covered the improvement and extension of the electricity grid in this camp and included the installation of protection devices at the communal services, rehabilitation of equipment and connection to new services, such as the primary school, two communal kitchens or markets hosting 36 small businesses. Furthermore, 63 LED luminaries were installed as public street lighting covering a distance of more than 4 km. Refugees' participation was crucial throughout the whole process; from training to equipment installation. Moreover, with the aim of generating some livelihood opportunities and facilitating sustainability, a group of refugees were trained to become the technicians in charge of the functioning and maintenance of the installations.

The partnership members designed this training process following three principles:

- Focusing in practical training (learning by doing)
- Using camp infrastructure as a lab
- Creating a test-bed of innovations that can be exported to other areas

A training toolkit was developed and included in the general training program of the implementing partner. The purpose of it is to ensure that the group of technicians in charge of maintaining the facilities gain the required skills and knowledge.

Learning Outcomes:

In Adi-Harush there are enthusiastic students that had an incredible motivation, and an innovative and entrepreneurial spirit. Some of them were trained to become technicians, who have deployed the infrastructure and have been hired later to assure systems' maintenance. Almost without being conscious of it, during this journey we have learnt to reframe our way of thinking about refugee camps:

- What if we could extend our university campus living lab to extreme contexts like refugee camps?
- What if we could co-create hubs of knowledge and innovation that could spread sustainable solutions to host communities?
- And what if we connect these hubs in camps, with our living labs in campuses?

Success:

The estimated impact of the intervention is very positive, since it is not only improving life and security conditions in the camp, but also avoiding collection of around 1,500 tonnes of firewood and emissions of 2,000 tonnes of CO₂ per year. In economic terms, a saving of 30,000 EUR in diesel consumption is calculated

Refugee camps, in some cases, are becoming like the camps of Eritrean refugees, long term settlements. Refugees' livelihoods should enable them to at least cover their basic needs. Mentoring during training and creation of employment opportunities should be provided. Integration of livelihood strategies and promotion of income generating activities are now prioritized by the humanitarian community operating in this type of contexts and education is called to play a crucial role in this new agenda.

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[More information](#)



TU DELFT, NETHERLANDS

#cocreateMYCITY Durban



TU Delft's mission is to contribute to solving the global challenges by educating new generations of responsible engineers and by advancing the technical sciences. TU Delft is active in research through eight faculties. The case study here described, #cocreateMYCITY, is an example of the international collaborative program that TU Delft partakes in directly, through the cross-faculty TU Delft | Global Initiative. In collaboration with the city of Durban the aim was to find tangible, innovative and sustainable solutions to urban challenges in the sectors of Water, Transport & Logistics, Energy, Agriculture and Healthcare, closely related to several UN SDG's.

In multidisciplinary and multicultural teams, twenty Dutch and twenty South African students teaming up for 10 days, worked together in small groups on challenges identified by the city of Durban under the guidance of a select group of experts and mentors. All groups came up with concrete solutions to these challenges. On the last day, they presented these solutions in the form of business cases to local business, start-ups and government. Two examples of their concrete solutions: Plastic bags to grow vegetables above the ground and provide public secondary schools in townships with fresh vegetables and Using UV light, which is the weakness of tuberculosis, to stop the spread of this disease in overcrowded waiting rooms of Durban hospitals.



Project Objectives:

1. Find tangible, innovative and sustainable solutions to urban challenges in the city Durban in the sectors of Water, Transport & Logistics, Energy, Agriculture and Healthcare.
2. To teach students to work in multidisciplinary and multicultural teams on sustainable solutions for urgent challenges (contribute to sustainable development goals in low- and middle-income countries).
3. To create a vibrant network consisting of innovative post-graduate students from engineering and/or business faculties from both South African and Dutch Universities and Universities of Technology with a keen interest in entrepreneurship, local government and corporates.
4. Establish contacts for possible future partnerships with the involved universities, governments and companies.

Learning Outcomes:

- All students have learned how to work in multidisciplinary and multicultural teams, think in an entrepreneurial way and how to come from a large problem/challenge to a first step feasible and sustainable solution. The Dutch student learned to work on projects in a complete different context.
- The TU Delft | Global Initiative has used this experience to improve its multi-cultural multi-disciplinary co-creation process, and follows through with future similar projects in Africa (Nigeria, South Africa, Uganda). Furthermore, this type of project is a seedbed for future cooperation's with the involved partners (universities, government and companies).

Success:

The project is a success if three goals are achieved. The #CoCreateMyCity is a format which may replicated by other universities collaborations in the future.

- The students have the opportunity to really work in a co-creative way on real-life challenges (mixed teams in terms of cultural background and expertise, the opportunity to visit places and talk to stakeholders, mentors from involved government/companies/universities, trainers from NL and SA, highly involved partners, well-defined challenges and involved problem holder).
- The projects solutions are concrete, sustainable and have a viable business model (no rough ideas, but concrete ideas with concrete partners and ideas on how to finance it and/or which stakeholders should be involved and clear ownership of the students and/or a partner that they found).
- A solid follow-up (think beforehand on a solid follow-up in terms of a) Internship of student with partners (company/government), b) In-kind support of possible start-ups, c) Follow-up of the concrete solutions (government / company as partners, further research at university, how to keep students in NL/SA involved in this).

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#cocreateMYCITY Durban is initiated by the Embassy of the Kingdom of the Netherlands. Other partners: Universities: Durban University of Technology, Kwazulu Natal University, Erasmus University. Governmental: Ethekwini (Durban) municipality, Trade&Investment Kwazulu Natal, Companies: Unilever, Vopak and RoyalHaskoning DHV, Business Incubator 2i3t (www.2i3t.it), ECO-Unesco (www.ecounesco.ie), Fondazione Italiana Accenture (<http://fondazioneaccenture.it/>)

[More information](#)



UNIVERSITY OF ALBERTA, CANADA

Sustainability Scholars Program



The Sustainability Scholars Program is an innovative paid summer internship program that sponsors graduate students to work on applied, sustainability-focused research projects with partner organizations from our community. The Scholars program meets the goal of equipping our students with knowledge of, and practical experience with, working towards sustainable development, while also providing organizations in our community with valuable resources and research to improve the sustainability of their operations, or our community as a whole.

Our graduate student scholars come from all disciplines, and are placed with a mentor from one of our community partners to do a 250-hour research project throughout the summer. The research questions that our scholars examine come from our community partners and the outcomes they receive help them to improve their sustainable operations. The scholar-mentor relationship also encourages our participants to get involved in work environment of their host and gain valuable soft skills and experiences not available in an academic setting. These placements also allow students to experience how sustainability is applied outside of the classroom in practical situations. The scholars apply their research skills

to help answer sustainability related questions that our community partner sometimes lack the person-power and resources to delve into.

The scholars program was modelled after a similar program at the University of British Columbia, and began in 2014 with an initial cohort of six graduate students. Every year since the program has grown, with over thirty positions being advertised for the summer of 2018. We have placed graduate students with the City of Edmonton, the University of Alberta, and other partners including local industry, NGO's and nearby municipalities.

The Sustainability Scholars program was built and is supported by a collaborative effort that brings together the University of Alberta Office of the Provost, Office of Sustainability, Faculty of Graduate Students and Research, Facilities and Operations, the City of Edmonton, and various community partner organizations. This experience helps graduate students secure employment in their respective fields of study, while also giving them coveted work experience that employers are looking for.



Project Objectives:

Our primary objectives for the project are twofold:

- Firstly, we want to create opportunities for University of Alberta graduate students to gain professional work experience and increase their capacity to work in the Sustainability field, with the ultimate goal of the scholars gaining employment after their degree is complete.
- The second goal is to provide community partners with opportunities and resources to answer research questions which are relevant to their organization, and which will improve sustainability in their organizations or within society as a whole.

Learning Outcomes:

- Professional development growth for graduate students
- Engaging/networking with others in sustainability
- Practical deliverables/applications of research products

Success:

Our measures of success include aiding our scholars to gain employment in their chosen sustainability related field, and the outcomes of their research being used to advance the sustainability goals of our community partners. Other indicators of success are continuing to increase the number of projects, community partners and mentors, and increased media exposure.

The success of the scholars program is only possible because of the partnerships which allow us to execute it. Graduate students consistently request more professional development and work experience, and we've been able to build a successful program by connecting their wants to the needs of community partners.

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[More information](#)



CHAPTER 2

EQUALITY AND WELLBEING FOR ALL



OZYEGIN UNIVERSITY, TURKEY

Free Legal Clinics for the Disadvantaged

Providing free legal aid for those who do not have the means to access justice by a legal clinic run by law students who have been previously endorsed with specific skills for this type of responsibility.

Project Objectives

There are two main objectives to the legal clinics of Ozyegin University. The most prominent one is helping those people who are lost in how to access justice or do not have the financial means to access it, by providing pro bono legal guidance. Starting with its own suburban neighborhood Cekmekoy, in the recent years there have been a drastic increase in disadvantaged groups especially with many Syrian immigrants deciding to settle down in the area.

This is supported by the second objective which is providing law students with the unique opportunity

to equip themselves with the practical experience they will need in their future careers and help them acquire the fundamental values that each legal professional must possess, while strengthening access to justice for those in need of legal advice and support.

In these clinics, students meet applicants and listen to their issues under the supervision of the Legal Clinics Coordinator. Students then write a legal opinion on the respective legal issue in consultation with their professors, and share it with the applicants. Confidentiality and volunteering are two key principles of these real case clinics.

Learning Outcomes:

There are other examples of Legal Clinics at universities in Turkey and Ozyegin University's is not the first. However, OzU strongly believes that such clinics should be more widespread, cooperate with and be acknowledged by the authorities and relevant NGOs, share various experiences with each other to get the most from lessons learned and in this way, access to a large section of society consisted of all those disadvantaged whether they are immigrants, prison inmates or purely lacking the financial means for legal assistance.



Success:

Success is basically even one disadvantaged person in need finding a way to address his/her problem through law and reaching a possible solution. Success in this case can never be quantified. However, success also is having the idea of legal clinics spread wide in the society with legal institutions and also local authorities backing them up. Success additionally is establishing a model from lessons learned and sharing this model with other universities all for the goal of free access to justice for the most disadvantaged sections of the society. To achieve this, OzU Legal Clinic has already signed a protocol with the Istanbul Bar Association and is working in being acknowledged by the Cekmekoy District's Governorship to enhance awareness raising and accessing the disadvantaged groups.

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[More information](#)



a place of mind



THE UNIVERSITY OF BRITISH COLUMBIA, CANADA

Promoting Health and Wellbeing through Sustainability Education at the University of British Columbia

The United Nations Sustainable Development Goals seek to transform the world by 2030, aiming to eradicate poverty and ensure that all human beings can fulfil their potential in dignity and equality, and in a healthy environment. Sustainable Development Goal 3, “ensure healthy lives and promote wellbeing for all at all ages,” recognizes that the promotion of mental and physical health and wellbeing is essential to achieving sustainable development.

At the University of British Columbia (UBC), we recognize this as a call to equip our students with the wellbeing knowledge and practical experience required to drive this Sustainable Development Goal forward. Wellbeing is foundational at UBC and is increasingly being featured in strategic plans, course curriculum, research (across diverse disciplines), and a range of programs, services, and initiatives.

THE OKANAGAN CHARTER: A GUIDING FRAMEWORK FOR WELLBEING AT UBC

In June 2015, UBC co-hosted the 2015 International Conference on Health Promoting Universities and Colleges at the Okanagan campus. The conference’s key outcome was the Okanagan Charter: An International Charter for Health Promoting Universities and Colleges, which was developed in collaboration with delegates from 45 countries representing educational institutions and health organizations including the World Health Organization and UNESCO.

UBC was the first university to adopt the charter and now leads efforts to activate it and develop mechanisms to track institution-wide implementation.

Wellbeing at UBC

- Wellbeing at UBC is overseen by a high-level steering committee of dedicated academic leaders, senior administrators, and student executives representing different facets of the university across both the Okanagan and Vancouver campuses. Members include the Vice-Presidents for Students and Human Resources, an Associate Provost for Health, undergraduate and graduate student society executives, senior academic staff, and administrators of core services such as Student Development & Services and Campus Planning.
- Working groups comprising student, faculty, staff, and community stakeholders support each UBC Wellbeing priority area (built and natural environments, inclusion and connection, food and nutrition, mental health and

resilience, and physical activity and sedentary behaviour). Each working group has developed a framework for action to guide goal-setting and facilitate cross-cutting initiatives to align with health promotion principles.

Wellbeing Education in Action

- As a result of UBC’s institutional commitment, wellbeing has rapidly become a deeply held educational value supported throughout the campus. A number of wellbeing educational priorities and programs have emerged in the past three years. Examples of these initiatives include:
- Strategic support for faculties: A number of faculties, including Law, Science, Forestry, and Graduate and Postdoctoral Studies are working with the Strategic Support Team to integrate wellbeing into their strategic planning and unit cultures.
- Student internship program: The Wellbeing Scholars Program immerses UBC graduate students in paid internships where they can apply their research skills and contribute to the advancement of UBC’s wellbeing and sustainability goals. Projects have spanned all wellbeing priority areas and have produced tangible results.
- Health promotion and education: In 2016, UBC established a Health Promotion and Education unit, which works with faculty to explore ways of integrating wellbeing into classrooms and to provide leadership on health promotion strategies and programs for students on the Vancouver campus. This unit complements existing structures within the human resources portfolio that focus on faculty and staff health and wellbeing.
- Framework for Senate consideration: A Senate Ad-Hoc Committee on Student Mental Health and Wellbeing formally developed a Framework for Senate Consideration of Student Mental Health and Wellbeing to provide support for an integrated approach to enhancing the mental health and wellbeing of students in the academic environment.
- Leadership seminars: In 2016, 120 senior faculty members, staff, and student leaders on each campus came together to discuss how to incorporate wellbeing into the strategic plan, academic work, and operations for the whole university community.



Project Objectives:

At the University of British Columbia (UBC), we recognize this as a call to equip our students with the wellbeing knowledge and practical experience required to drive this Sustainable Development Goal forward. Wellbeing is foundational at UBC and is increasingly being featured in strategic plans, course curriculum, research (across diverse disciplines), and a range of programs, services, and initiatives.

Learning Outcomes:

Strategic support for faculties: A number of faculties, including Law, Science, Forestry, and Graduate and Postdoctoral Studies are working with the Strategic Support Team to integrate wellbeing into their strategic planning and unit cultures.

Student internship program: The Wellbeing Scholars Program immerses UBC graduate students in paid internships where they can apply their research skills and contribute to the advancement of UBC's wellbeing and sustainability goals. Projects have spanned all wellbeing priority areas and have produced tangible results.

Health promotion and education: In 2016, UBC established a Health Promotion and Education unit, which works with faculty to explore ways of integrating wellbeing into classrooms and to provide leadership on health promotion strategies and programs for students on the Vancouver campus. This unit complements existing structures within the human resources portfolio that focus on faculty and staff health and wellbeing.

Framework for Senate consideration: A Senate Ad-Hoc Committee on Student Mental Health and Wellbeing formally developed a Framework for Senate Consideration of Student Mental Health and Wellbeing to provide support for an integrated approach to enhancing the mental health and wellbeing of students in the academic environment.

Leadership seminars: In 2016, 120 senior faculty members, staff, and student leaders on each campus came together to discuss how to incorporate wellbeing into the strategic plan, academic work, and operations for the whole university community.



Success:

In June 2015, UBC co-hosted the 2015 International Conference on Health Promoting Universities and Colleges at the Okanagan campus. The conference's key outcome was the Okanagan Charter: An International Charter for Health Promoting Universities and Colleges, which was developed in collaboration with delegates from 45 countries representing educational institutions and health organizations including the World Health Organization and UNESCO.

UBC was the first university to adopt the charter and now leads efforts to activate it and develop mechanisms to track institution-wide implementation.

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 Victoria Smith



Università
Ca' Foscari
Venezia

10 REDUCED
INEQUALITIES



UNIVERSITA CA'FOSCARI VENEZIA, ITALY

Art & Sustainability at Ca' Foscari. The Exhibition "Fifteen percent: Dialogue on Disability in the World"

Sustainable development and its SDGs are promoted to our students through a range of extra-curricular learning activities covering a wide range of topics and using interactive methods.

Participants play an active role in developing these projects, which bring together diverse groups of people from different areas of university study, helping them to develop cross-disciplinary competencies and discover new applications in their own fields. The projects also involve researchers and lecturers from different disciplinary areas, giving them the opportunity to enhance their research and share it with students. They often involve a public output giving students the chance to present their work and transforming them into sustainability promoters within the community and among their peers.

This kind of activities can fall within the Sustainability competencies, a project launched by Sustainable Ca' Foscari in 2012 that aims to include sustainability as a subject in its own right in the various study paths undertaken by Ca' Foscari students. The project, developed in collaboration with the various Departments and Schools of the University, provides for voluntary activities to be included in students' study plans. In 2016 112 students acquired sustainability competencies (an increase of 24.4% on 2015); 74 were BA students and 38 MA students.

Since 2013, Ca' Foscari has promoted the theme of Art & Sustainability by developing projects involving students and underlining the links between sustainability and art, a sphere of activity with extremely close ties to both the City of Venice and to some of the University's main areas of study and research. In 2016, under the umbrella of Art & Sustainability,

the University hosted 'Fifteen percent: Dialogue on Disability in the World' in collaboration with the artist Christian Tasso and the cultural association Equality. The project took place from October 2016 to January 2017 and was designed to raise public awareness about the rights of people with disabilities, transmitting the importance of the concept of inclusion as a driver for sustainable development in society.

The project included an exhibition showcasing a selection of photographs and videos from Christian Tasso's 'Fifteen percent' series on the lives of people with disabilities in various parts of the world. 37 students took part in the project, flanking the curator, Diego Mantoan (a research fellow of Ca' Foscari) during every stage and working with him to select the works and develop the exhibition design and catalogue. The students also organized and carried out guided visits for local groups and schools as well as developing audio files for QR codes. Another group of students carried out thematic research, which was presented during the finissage. The theme of disability has been analyzed from several points of view, investigating the cultural, social, scientific and economic aspects that characterize it, through participation in various activities. The project included three public seminars examining topics related to disability with contributions by 15 internal and external speakers and a public of 100 participants. All of the seminars were held in Italian and Italian Sign Language (LIS). The exhibition ended in January 2017 with the finissage "Beyond the art: inclusion and sustainability at Ca' Foscari". During this event students involved presented results of the project and explained how University can be a lab where art becomes the field in which students, researchers and artists meet to create, learn and experience the sustainability.



Università
Ca' Foscari
Venezia



Project Objectives:

- Raising public awareness on rights of people with disabilities.
- Transmitting the importance of the inclusion as a lever for sustainable development of society.
- Developing cross skills of students

Learning Outcomes:

- Students were given the opportunity not only to get to know an artist first-hand, but also to put in practice their own cross competencies and to give free reign to their own creativity, by actively working on the project.
- After joining the project, students have been more motivated also to promote peer engagement on other initiative of Sustainable Ca' Foscari related to sustainable development such as recycling, bike sharing, energy and water saving in the University buildings.
- The exhibition has been set up in a public place, well seen by Venetian, tourists, University staff. The artworks have aroused people's curiosity, and this made people stop and want to know more, increasing awareness of problems related to human's behaviours and allowing the diffusion of sustainable solutions among citizens and the international community.

Success:

This project is an example of how a University can be a laboratory where students and researchers experience transdisciplinary activities and initiatives to enhance the awareness of issues about sustainable development.

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Others involved with the project:

Ca' Foscari students, community of the city, external speakers and experts, cultural association "Equality", photographer Christian Tasso

[More information](#)



UNIVERSITY OF CALIFORNIA, BERKELEY, UNITED STATES

The University of California Critical Refugee Studies Collective: An Innovative and Critical Intervention in Refugee Studies

Currently at 65.6 million, the number of the forcibly displaced worldwide is at a historic high. Of those, 22.5 million are recognized refugees, and another 10 million as stateless individuals who have been denied a nationality and basic rights such as education, employment, and freedom of movement. While they have long been the subject of academic and policy inquiry, refugees are rarely the subject of their own narrations. Regarded simply as an object of rescue, they are often discussed in ahistorical and de-contextualized terms despite the fact that forced migration is deeply historicized and rooted in systems of inequity and exclusion, environmental degradation, and other catalysts and forms of human insecurity.

The Critical Refugee Studies Collective (CRSC) was founded by University of California faculty from Berkeley and 4 other campuses whose pioneering scholarship laid the foundation for the field of critical refugee studies, as a response to the need to re-conceptualize the refugee not as a problem to be solved but as a site of social and political critiques of the processes of colonization, war, and displacement.

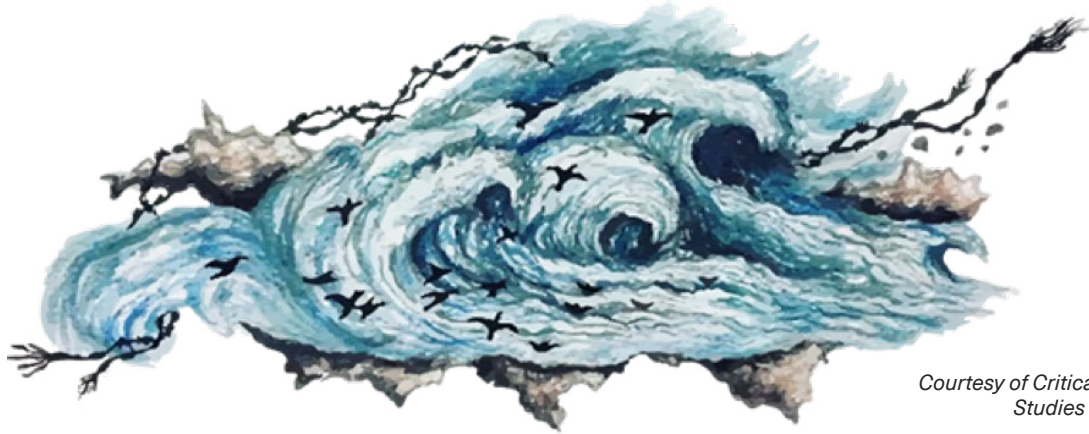
Guided by the commitment to an equitable, inclusive and just world, ethical and socially responsible research and other forms of knowledge production, and accountability to the communities that it engages, CRSC promotes critical research, teaching, publication, and public engagement that privilege and address the concerns, perspectives, epistemologies, and global imaginings of refugees, asylum seekers, and internally displaced and stateless human beings. Through grants, symposia, curriculum, community

based and oriented initiatives, and partnership with communities, movements, networks, other collectives, and academic institutions, it responds to the often troubling data by reasserting the humanity, agency, voices, and presence of refugees.

As an insurgent intellectual space not found elsewhere, it aims to forge new and humane paradigms, dialogues, visuals and technologies that replace and reverse the dehumanization of refugees. With California the destination and the adopted home of many refugee communities, CRSC is not only anchored in Berkeley institutionally but also in its principles as a public institution committed to contributing to a better world by “sustaining a safe, caring and humane environment” that is equitable, inclusive and just.

Mapping the CRSC to the Sustainable Development Goals:

- Refugee conditions and discourse are rooted in systems of inequity and exclusion (SDG 10, 16) and linked to fundamental concerns of human insecurity in multiple contexts including the environment (SDG 1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 13, 14, & 15) that are found in both the perspectives of displacement and resettlement.
- As a political project, CRSC is committed to the promotion of social justice and enduring peace (SDG 10, 16) and to the achievement of these goals through partnerships (SDG 17).



Courtesy of Critical Refugee Studies Collective

Project Objectives:

"We envision a world where all refugees are treated and embraced as fellow human beings with all fundamental rights and privileges" CRSC

Success:

Success is measured by the number of faculty, student, and community projects and publications sponsored and mentored by CSRC, by the proliferation of critical refugee studies curricula and teaching, and by the expanded network of individuals, groups and institutions committed to the mission of the Collective.

Learning Outcomes:

1. Increased critical awareness of conditions facing refugees
2. Enhanced understanding of the importance of re-humanizing discourse and knowledge production on refugees, and of centering refugees and refugee agency in research, teaching, community engagement, and policy formulations
3. Enhanced understanding of the importance of partnership among individuals, groups, and institutions in this critical intervention

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[More information](#)



Universidade do Minho



UNIVERSITY OF MINHO, PORTUGAL

Social Emergency Fund

Resulting of the mission of a Higher Education Institution, the University of Minho (UMinho) began in 2009 to implement the Institution's Sustainability Policies, where the public report of sustainability indicators is included, and, since 2015, its contribution to the Sustainable Development Goals (SDG) launched by the United Nations.

The University of Minho Sustainability Report, prepared in accordance with the guidelines of the Global Reporting Initiative, aggregates the results of an active Academic ecosystem that, in the fulfilment of its mission, contributes directly or indirectly to the SDGs. In particular, the Goal 4: Ensuring inclusive, equitable and quality education, and promoting lifelong learning opportunities for all, is of major importance in Higher Education Institutions.

For this Goal, the aim is until 2030 to ensure inclusive and equitable quality education and to promote lifelong learning opportunities for all, including higher education. To ensure the fulfilment of this mission, UMinho has set different programs that contribute to this common goal, but where the creation of a Social Emergency Fund has particular relevance. This fund is a pecuniary fund allocated to cover specific situations arising from contingencies or economic and social difficulties, with a negative impact on the student's normal academic performance, and which cannot be adequately resolved under the system of Social Action for Higher Education.

In the order RT 20/2013, which approves the first regulation of the Fund in February 2013, the then Rector of the University of Minho, Prof. António M. Cunha states that:

“These other forms of support are even more important at a time such as the present, where families and students have increasingly deep and serious difficulties in ensuring the continuation of higher education, which is reflected in the increase in the number of students dropping out for the same reason. For this reason, it is imperative to develop mechanisms of social solidarity that prevent the higher drop out by students of higher education.”

In this sense, the Council of Rectors of Portuguese Universities (CRUP) also recommended universities to create and promote a Social Support Fund to combat the abandonment of higher education studies by students with special economic difficulties.

This fund is managed by the Social Action Council, chaired by the Rector and includes the administrator of UMinho, the president of the Academic Association and a student scholarship, being extended to the Student Provider.

The application to the Emergency Social Fund can be submitted, through an application addressed to the Rector of the University of Minho, between October and June of each academic year.

These forms of support have proved even more important given the economic crisis that Portugal has overcome and where some families and students have experienced serious difficulties in securing higher education, as evidenced by the increase in the number of students who drop out for this reason.



Universidade do Minho



Project Objectives:

One of the mechanisms is to provide aid and support to students whose socio-economic situation is particularly serious and who is not wholly or partly dependent on the provision of support under the higher education scholarship system.

Learning Outcomes:

After its creation date the fund received more than 600 applications, in which 447 were granted. In the academic year 2016/17, 144 applications were submitted, and 98 grants were approved. The University of Minho investment in this area has already exceeded 450 thousand euros, with an average annual amount of 95 thousand euros. The average annual value attributed by this fund to each student is in the order of 1000 euros, registering in the last year an average value of 1428,40 €.

Success:

The Social Emergency Fund has demonstrated to be an example of the University of Minho, through its Services of Social Action and the Academic Association, to address economic inequalities on access and attendance in Higher Education. In the 5 years of this programme, it was possible to help 447 students. Thus, the University contributes positively to guarantee the permanence of its students on their studies, in times of higher financial stress.

Likewise, within the scope of this Fund, there has been a particular interest of the society to contribute to the financing, registering the donation of thousands of euros over the last years, namely the "Mission Lions" promoted by the Lions Club of Braga that annually has contributed with 50 thousand euros.

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[More information](#)



CHAPTER 3

SUSTAINABILITY

ON CAMPUS



CHULALONGKORN UNIVERSITY, THAILAND

Chulalongkorn University (CU) Zero Waste Project



Waste is one of the biggest problems facing universities nowadays. Although it is a by-product of activities on campus, it also the main contributor to pollution on ecosystems of university and surrounding communities. In recent years, Chulalongkorn University have seen increasing amounts of both organic waste and hazardous substance. The amount and type of waste grow with the type of activities and the number of students on campus. Prior to 2017, neither policy on waste management nor responsible person existed. Waste management practice had been set as a low priority issue and the awareness of sustainability issues on campus had not been systematically promoted. It is apparent that issues surrounding consumption and waste are complex and need immediate response. Therefore, Chulalongkorn University (CU) has set up the CU Zero Waste project which includes a five-year action plan to reduce consumption and waste in university. The CU Zero Waste project consists of six programs that correspond to the consumption and waste life-cycle including: 1) Development of strategic action plan and establishment of existing waste management practice baseline data; 2) Waste minimization at point of origin; 3) Waste sorting and separation; 4) Enhancement of campus' waste management practice and related facilities; 5) Development of organic waste management recycling technology and management and 6) Integration of waste management theory and practice with education and academic activities. The project engages all campus-related stakeholders which includes the administrative staffs, academic staffs, students as well as residents in surrounding communities. Both the top-down and bottom-up approaches are initiated. Firstly, the sustainable campus committee was formed, and the CU Zero waste policy was set in 2017. Each unit in the university has set up its own CU Green Team as the responsible unit that take part in the waste management promotion operation. Staff and students have been encouraged to initiate and take action on the projects that are related to waste management on campus. Partnership with private companies has been established to develop to innovative waste elimination practice. Lastly, students from various fields had been given opportunities to put theory into practice.

Project Objectives:

The objectives of CU Zero Waste project are:

1. To develop waste and hazardous waste management system for Chulalongkorn University which can be further developed into a prototype system for university in urban setting.
2. To develop and integrate waste management theory and practice into education and academic activities.
3. To raise awareness of university stakeholders on waste management practice with the ultimate goal to establish waste management as organization culture.

Learning Outcomes:

Efficient and effective waste management process and practice that are suitable for university context.

Success:

During the first 9-month period, the most visible outcome is the reduction of plastic bag use on campus. The amount of plastic bag used in convenient stores was reduced by 90% (approximately 1 million plastic bags). We have seen an increasing number of staffs and students took part in the waste management promotional schemes as well as sustainability practice.

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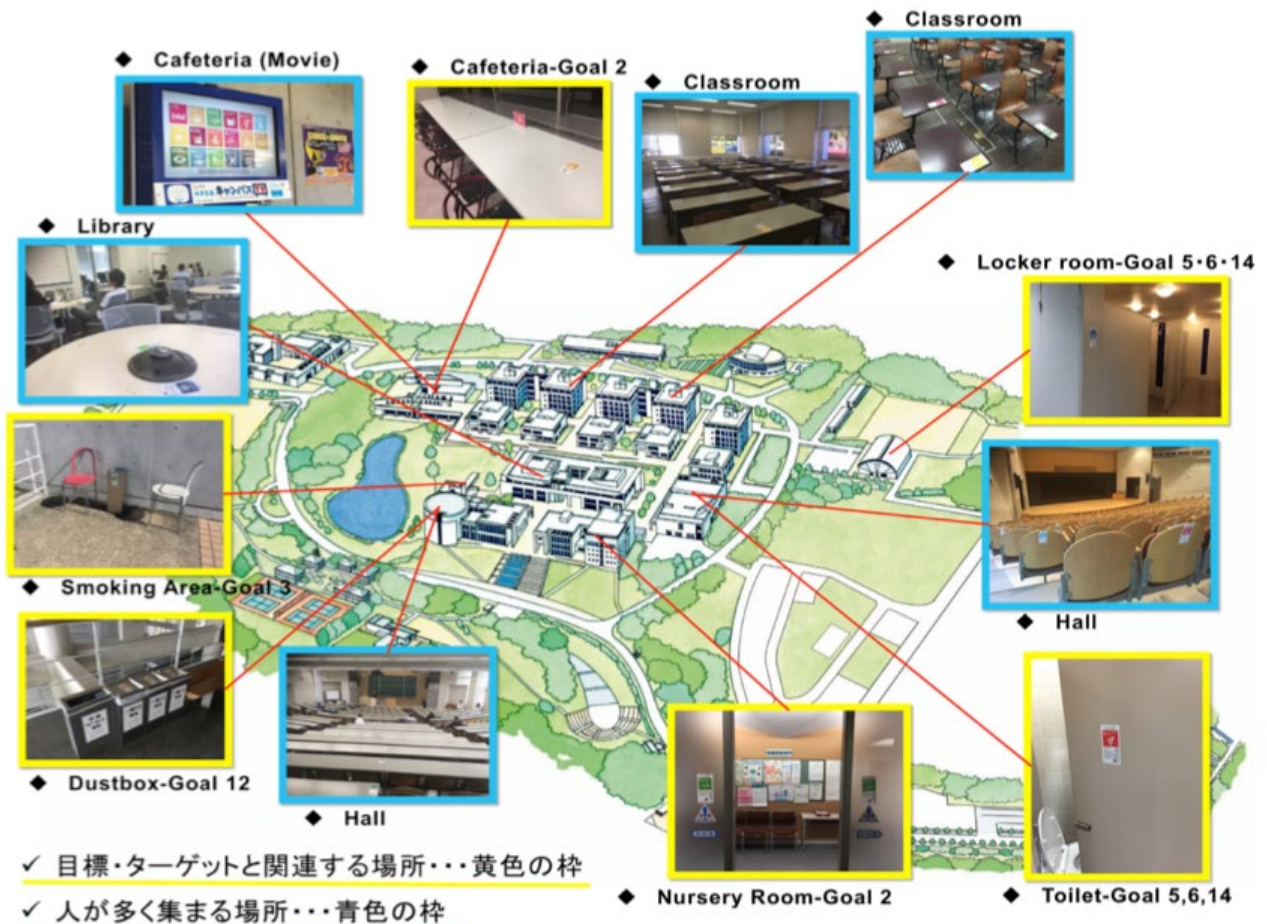
Others involved with the project:
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 Dr. Sujitra Vassanadumrongdee

[More information](#)



KEIO UNIVERSITY, JAPAN

Campus SDGs





Since many university students at Keio University's Shonan Fujisawa Campus were not familiar with the SDGs, we aimed to increase their awareness. Therefore, we embedded SDGs into their campus life by making stickers from the 169 targets and sticking them around the campus. We especially took care to place them based on the goals, for example, stickers about Goal 6: Clean Water and Sanitation were put in the restroom. Other stickers were placed based on places where many students can see, for example; in classrooms and halls.

Project Objectives:

The aim of this project is to increase the recognition of SDGs: bringing a global goal, to a more local level and invite people to make actions based on the thought of SDGs. At this time, since many students did not know about the SDGs, we focused on the recognition phase.

Learning Outcomes:

Before the Campus SDGs Project, we took a survey on the students' recognition of SDGs, and resulted in 18%. However, we once again took a survey after the project, and resulted with 83% of the students knowing something about SDGs, which is 65% higher than before the project.

Success:

We defined the success by taking a survey from the students before and after the project. There was great increase in the percentage of the students who know something about SDGs, but failed in having them think of SDGs in a more local level, and many students did not have as much understanding in SDGs as we thought they did. We found out that there is a big gap between the recognition and action phase, and we must focus on how to have people think of what they can do to achieve the goals. Also, this project catches significant attention. We shared our outcomes in some symposiums and The Asahi Shimbun newspaper also took up our activities. Now this "Campus SDGs" project is spreading to universities in Shiga prefecture in Japan, to NGOs, and high schools are also holding workshops influenced by our project.

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[More information](#)



NANYANG TECHNOLOGICAL UNIVERSITY, SINGAPORE

Green Buildings for a Sustainable Campus

The EcoCampus NTU (Nanyang Technology University, Singapore) initiative aims to develop a novel campus-wide sustainability framework with demonstration sites to achieve 35% reduction in energy, water and waste intensity by 2020 (baseline 2011), making it one of the world's most eco-friendly campuses in the world. The initiative has transformed the campus into a test bed for research projects in cutting-edge green technologies. The EcoCampus initiative is conducted in two phases: Phase One is about development of innovative demonstration projects that are then benchmarked and analyzed. Technologies that are found to be both highly energy efficient and sustainable are being implemented in Phase Two. The initiative is now in the midst of Phase Two, where technology implementation and deployment has taken the front-seat role. With collaboration from more than 20 industries and as many testbed technologies the challenge of deciding the highly energy efficient and their optimum location for full scale deployment was foreseen. To aid this decision-making challenge, EcoCampus collaborated with Integrated Environment Solutions (IES) early on during the initiative. The objective of this collaboration project is to develop a MultiPhysics 3D Virtual Model of NTU Campus with capability of virtually simulating technologies on it. The results from simulated model highlights quantified benefits of simulated technologies while precisely identifying the location to exploit highest energy saving potential. The project has developed a 3D virtual model of the campus with MultiPhysics Simulation capabilities. The students from NTU as well as outside of NTU are engaged with internship opportunities where they get hands-on experience of building the model. The involved students learn the details of how buildings work and carbon emissions related to building operation. With a combined effort from research staff, students and IES consultants, we could achieve an accuracy of 91% of model accuracy. For single building models we aim for an accuracy of more than 95% but for a 200-hectare campus wide simulation, an accuracy of more than 90% is promising and can give a fair idea on resource saving predictions. The project has also developed a web based app to visualize input and results data in an intuitive format on a spatial map. The data visualization is not limited to only energy but rather allows visualization of varied Key Performance Indicators (KPIs).



The project plans to showcase the data visualization and live data collected from Building Management System (BMS) on a dashboard like platform where students and university community can actively engage and visualize the sustainability features in the campus. Along with wide scaled simulations, the project has delved into detailed building simulation for academic buildings in the campus. University campuses equipped with state-of-art laboratories often observe erratic energy behaviors that do not follow a fixed pattern. This adds to the challenges of virtual model development. The challenge was overcome by collecting highly granular buildings data from BMS. MultiPhysics modelling complimented with granular data analytics could provide an accuracy of up to 98% accuracy for academic buildings simulated until now in the project. The results provide interesting insights. Along with identifying technologies, the results have also identified solutions that require minimum investments. The solutions are shared with facility managers and university energy officers. Such engagement from every side of the university is a step towards making our buildings greener and NTU a highly sustainable campus.



Project Objectives:

The objective of this collaboration project is to develop a MultiPhysics 3D Virtual Model of NTU Campus with capability of virtually simulating technologies on it. The results from simulated model highlights quantified benefits of simulated technologies while precisely identifying the location to exploit highest energy saving potential.

Learning Outcomes:

The project has provided an opportunity for students to get hands-on experience on developing a 3D MultiPhysics Building model. The learning helps them understand the carbon emissions related to building operations and become keener towards urban sustainability. The project also engaged facility managers and energy officers while sharing insights on the detailed on-goings of the buildings in the campus and recommended ideas that could further help save energy.

Success:

University campuses build a community around itself where the learning experience for youth is a lot more than textbook education. An environment that promotes sustainability at this stage is highly likely to ensure a population enlightened with idea of a sustainable community around them. The students involved in this project learnt virtual building modelling skill and a very different perspective towards a sustainable campus. Projects like these are easily scalable and other institutes can also implement such virtual building modelling projects. We could achieve an accuracy of 98% for detailed building models, making technology predictions highly reliable for us. The recommended changes through the project has a potential of saving immense amount of electricity and hence carbon emissions associated with building's use. By implementing a project like this, universities can gain knowledge about their current building operation on-goings, optimizing techniques and the methods to reduce their emissions in best possible way.

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[Find more information on EcoCampus.](#)
[View the virtual model](#)



POLITECNICO DI TORINO, ITALY

A Self-Tailor-Made Sustainability Communication Strategy

The Polito Green Team conducts an extensive program of environmental and energy actions, but it hasn't had a great deal of success in engaging students and staff over its first year of activity. This case study shows the result of the prosumer strategy put in place by the Green Team communication manager in the co-creation of a student engagement campaign via in-house resources at Politecnico di Torino (PoliTO). Students and professors at the "Communication Design Course" have been asked to create a joined-up vision for future sustainability and energy communications at PoliTO contributing to delivering specific objectives:

Photoboard - n°1



01 0:01
Situazione iniziale
Azione: donna che sbatte gli occhi sorpresa
Indicazione: macro sugli occhi



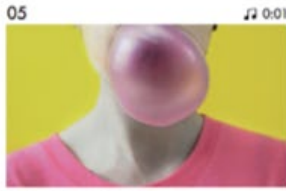
02 0:01
Situazione iniziale
Azione: comparsa esclamazione "OH"
Indicazione: infografica



03 0:01
Situazione iniziale
Azione: donna che esclama
Indicazione: macro sulla bocca



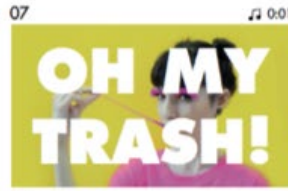
04 0:01
Situazione iniziale
Azione: comparsa parola "MY"
Indicazione: infografica



05 0:01
Situazione iniziale
Azione: donna che fa una bolla
Indicazione: macro sulla bolla



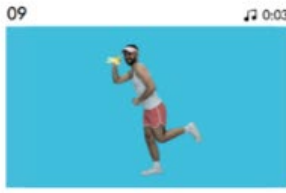
06 0:01
Situazione iniziale
Azione: comparsa della parola "TRASH"
Indicazione: infografica



07 0:01
Slogan
Azione: donna che gioca con il cicles
Indicazione: primo piano e infografica



08 0:03
Sviluppo tematica
Azione: studente fa stretching
Indicazione: ripresa figura intera e infografica



09 0:03
Sviluppo tematica
Azione: studente inizia a correre con il rifiuto
Indicazione: ripresa figura intera



10 0:03
Sviluppo tematica
Azione: studente getta il rifiuto
Indicazione: ripresa figura intera e infografica



11 0:04
Payoff
Azione: studente getta il rifiuto
Indicazione: payoff sovrapposto alla scena



12 0:03
Conclusione
Azione: comparsa di logo, infografica e consiglio
Indicazione: infografica animata



Project Objectives:

- Identify key field of action where PoliTO can to improve its environmental footprint, both in campus operations (estate management, procurement, etc.), and in teaching, research, and public impact.
- Identify key target audiences.
- Identify methods to communicate objectives to target audiences
- Enable individual communications projects to contribute towards a coordinated student engagement campaign

Learning Outcomes:

The objective of this self-tailor-made communication strategy is to take ownership of the campus, encouraging environmentally / energy responsible behaviors to reduce energy consumption, waste, etc., whilst highlighting the power of the single action in the overall impact. The project outputs have indeed highlighted the following learning outcomes:

- PoliTO's environmental performance is everyone's responsibility.
- Each member of the PoliTO's community plays their part through a number of key actions: switching off lights and appliances when not in use, disposing of waste correctly, closing the tap when not needed, etc.
- the availability of 'green' campus facilities – bike storage, water fountains, etc. can be enhanced with further request when a "critical mass" may its voice be heard
- campus experience can be improved with useful services (i.e. welcoming service around sites for new students) and this will eventually be translated in a more solid community, making easier to leverage on single's action for improving the PoliTO's environmental performance.

Success:

This strategy is linked to GOAL 4 - Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all since it promotes active student and staff participation in sustainability / energy projects in order to improve PoliTO's environmental impacts. The success of this student / staff experience can be find in having:

1. Built rapport and buy-in through active two-way dialogue with stakeholders.
2. Identified student priorities.
3. Identified opportunities for improvement by taking on board feedback into the Green Team 2018 plan.
4. Learned about possible developments in sustainability in the higher institution sector by networking with external colleagues aware of business practice and current strategies in green marketing campaigns.

This strategy is easily scalable and transferrable to other HEI having design courses in their educational offers, but it is not hard to imagine a great participation of students from all degree courses if they are given the opportunity to produce an impact (via call, competition, awards, economic rewards, institutional support, visibility) in their own campus life.

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[More Information](#)



SHANDONG JIAOTONG UNIVERSITY, CHINA

Engineering Center of Shandong Jiaotong University



Courtesy of Shandong Jiaotong University

The Engineering center of Shandong Jiaotong University is the architectural complex mainly serving students on practical teaching, engineering cognition, skill training, innovation and entrepreneurship education etc. With the capacity of accepting more than 10000 students to complete tasks on experiment, internship, training, curriculum design and graduation project, the Engineering center aims to improve students' comprehensive quality, cultivate them to

have spirit and ability of innovation, and create an opening practical teaching environment with characteristics of comprehensiveness, design ability and innovation. It includes large laboratories, practical and detection & maintenance classrooms for major development on machinery, automobile, shipping, transportation & logistics, railway transportation and aviation etc.



Invested by 180 million RMB and using reinforced concrete frame structure, the engineering center is completed with the floor space of 63328 m², the building area of 26065.24 m², the total construction area of 70984.02 m² and total height 20 meters. The center is divided into seven individual buildings (A ~ G) from south to north, and between each building there has a road for the traffic of vehicles and the loading and unloading of equipment. On the east side, by the connection of cognitive center corridor, the individual buildings formed to be one integral unite. With the highest floor of 5 and lowest floor of 1, the parts of division of buildings have their own basement.

The exterior of the building is designed by using brick and glass curtain wall with decoration of red, white and grey color, to achieve an optical illusion. The east facade side of the building is equipped with three steel ladders to be used as evacuation.

In accordance with the construction standard of Green two stars, combined with the climate characteristic and resource system, through comprehensive balance among several aspects of "construction quality," "environmental load" and "costs," the design with the characteristics of passive, appropriate technology, combining with climate strategy localization "green building" is finally accepted.

The engineering center was evaluated and approved at the end of 2014 and was awarded the eighth national green building evaluation and identification project (two-star green building) in 2015.

Project Objectives:

The engineering center aims to improve students' comprehensive quality, cultivate them to have spirit and ability of innovation, and create an open, practical teaching environment. The aim is to enable students to meet the needs of all kinds of posts in the society.

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THAMMASAT UNIVERSITY, THAILAND

Thammasat @ Rangsit Campus: A Leading Model of Smart Campus

Last year, Thammasat University presented a key successful attempt in reducing greenhouse gas at Rangsit Campus. This was in our "Climate Action" program whereby we successfully installed more than 4 MW solar panels on the top of our buildings, before transferring these panels to install on the roof of six electric service buses in Rangsit Campus. This program was implemented in parallel with our attempts to promote awareness of our staff, students, and visitors about the need for energy saving and alternative way of energy consumption.

At the same time, we aim to reduce CO2 by addressing the problem of environmental pollution in the campus generated

from cars and motorcycles. Motorcycle taxis are our main key to address the problem. They are a popular mode of transportation because they are fast, affordable, and can best avoid the heavy traffic. However, motorcycle taxis are much less safe, compared to cars, and their large usage generate a lot of pollution. While there are many motorcycle taxis in Rangsit Campus, the choice of free bicycles for staff, students and visitors of Thammasat University is available and now becoming increasingly popular. Thammasat University has been providing 4000 free bicycles for this purpose, in parallel with an improved motorcycle service which may be called "SMART MODEL" which consists of two main implementations.





Project Objectives:

The first is called “Smart Meter.” It is based on Internet of Things (IoT) and runs by smartphone application. Registered riders of Motorcycle taxis will have their QR codes on the back of their jackets. Customers use their smartphone to scan these codes to activate the meter. Smart Meter will then record the data of registered rider and calculate the service fee of each trip based on actual distance using Global Positioning System. The second implementation is called “Electric Bike.” This is where electric motorcycles are arranged and serviced by private operators who will also provide battery charging stations, and will charge appropriate fees to the riders. Speed of the Electric Bike will be set and kept under control for the safety of customers. Therefore, electric bike is safer and more environmentally friendly.

SMART ENERGY: Smart Energy is related to a variety of renewable energy generated and used in the campus. First, Thammasat has a capacity to generate renewable energy from organic waste by using fermentation process to change organic waste to biogas and use it for electrical generator. Second, we use low speed wind turbine to generate electrical power. Our proposal to acquire seven wind turbine generators of the first phase is under consideration of Thailand’s Ministry of Energy. Third, hydro-generators are going to be installed for generating hydropower from the different of water level in Rangsit Center canal. Electricity generated and collected during the daytime can be used during the night time. Moreover, we replace the analog electricity data collecting system with digital system in every area, and use the efficiency software to manage the whole electrical production system including energy storage system. These should enable Rangsit Campus to reach the target of 60 - 70 percent renewable energy usage, and 30 - 40 percent of electricity from fossil usage within year 2030.

SMART MOBILITY: Smart Mobility is the use of internet of things for controlling and monitoring all facilities in the campus. This also includes the efficient transportation system. This Smart Mobility will be an important part in supporting all administration and service system, such as financial management system, in the campus. This system is part of SMART GOVERNANCE.

SMART COMMUNITY: Key idea is that no one will be left behind. Our community is inclusive, and will take account of all stakeholders including disabled people, workers, staffs, students, as well as people from community near the campus. The opinion and welfare of these groups will be taken into account, especially their safety and security.

SMART BUILDINGS and SMART ENVIRONMENTS: Physical surroundings in the Campus is designed to be environmentally responsible. Priority is given to the ratio of green area per head of the city members. New buildings are also in line with accepted standards of energy saving. These are to make sure that quality of life of the members are of high importance.

Learning Outcomes:

Our commitment to improve Thammasat’s Campus is strong. Thammasat University has joined the Supporting Design Smart City Program “SMART CITIES – CLEAN ENERGY” organized by Thai Green Building Institute (TGBI) and supported by Ministry of Energy. After a year of joining this program, our project “Thammasat @ Rangsit: A Leading Model of Smart Campus” was selected to be one of the six projects from 36 organizations throughout the country, which receive financial support to undertake their plans to develop their Smart City Models. For Thammasat, this is both an encouragement and support for our program to advance to become even more effective and further develop our management of Energy, Mobility, Building, Environment, Community, and Governance. It will also enable Thammasat to contribute more actively the Sustainable Development Goals within 2030, particularly under the “Climate Action.”

Success:

It is clear that our plans in the targeted smart campus are to be a cleaner, safer and more efficient campus. These are all in line with SDG’s “Climate Action” (Goal 13) whereby we believe Thammasat can and must take action to address the problem of rising world temperature. Other goals under SDGs that we are also answering to including Goal 3 (Good Health and Well-being), Goal 4 (Quality Education), Goal 11 (Sustainable Cities and Communities), Goal 16 (Peace and Justice Strong Institutions), and Goal 17 (Partnerships to Achieve the Goals).

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UNIVERSITÀ DEGLI STUDI
DI GENOVA



UNIVERSITY OF GENOVA, ITALY

Smart Energy Building (SEB)

The Smart Energy Building (SEB), in operation since 2017 at Savona University Campus (University of Genoa), has been funded by the Italian Ministry for the Environment and the Protection of Land and Sea (3 M€). It is a Zero Emissions Building of 1000m² heated and cooled only by geothermal energy and electrically powered by photovoltaics.

This new construction is equipped with a BMS (Building Management System) interacting in real-time with the EMS (Energy Management System) of the SPM (Smart Polygeneration Microgrid) of the Campus, to which is connected as a prosumer. This peculiarity connotes the building as a "Smart City" urban infrastructure of unique valence in Italy.

The SEB is characterized by the presence of:

- High performance thermal insulation materials for building applications
- Geothermal heat pump (45 kWth, 8 probes reaching 125 m depth each)
- Solar Thermal Collectors (for domestic hot water production)
- Air Handling unit and controlled mechanical ventilation plant
- Air Source Heat Pump (back-up unit for domestic hot water production)
- Photovoltaic field (21 kWp)
- Extremely low consumption led lamps
- Rainwater collection system
- Ventilated facades and thermal barrier coatings
- Vertical Garden
- Technological Gym (U-Gym) with bikes, tapis roulant and elliptical machines that convert "human energy" into electrical energy.

Project Objectives:

The SEB project embraces the principles of sustainable energy (renewables, energy saving, low carbon economy), smart working, environmental comfort and well-being.

The SEB project aims to develop the following objectives:

- To make an innovative building available to the community (students, researchers and professors, citizens, public authorities, ...)
- To develop research projects, having the SEB as main topic, in collaboration with Universities and companies
- To study the interaction between a smart building and a smart microgrid
- To define guidelines for construction and operation of buildings in smart cities
- To test innovative solution for home automation
- To experiment the geothermal technology for building heating and cooling
- To test the integration of the geothermal and the solar sources for domestic hot water production
- To show how it is possible to save primary energy in buildings through appropriate devices
- To show how it is possible to reduce carbon dioxide emission of building heating systems
- To show how it is possible to collect and use rainwater inside a building
- To collect thermal and electrical operating data of the devices installed within the SEB in order to evaluate Key Performance Indicators for the building



UNIVERSITÀ DEGLI STUDI
DI GENOVA



Learning Outcomes:

The SEB project is characterized by different stakeholders: people who work in the Campus (students, researchers and professors), citizens and other actors (e.g., public authorities, private companies). For students the SEB represents a pilot facility where they can see the technologies of the smart city with their own eyes. Researchers and professors can use the SEB to develop scientific projects and experimental campaigns regarding different investigation fields: sustainable energy (integration of renewable sources), interaction of buildings with microgrids, home automation, energy efficiency in buildings, sport sciences for health, etc. Finally, public authorities (e.g., municipalities, regulatory agencies) and companies operating in the aforementioned fields can take advantage from the SEB project for instance, the SEB would serve as a very good model to design new smart residential and tertiary districts and private companies, which operate in the energy sector or deal with domotics, could test new innovative devices at the Savona Campus by exploiting the presence of an efficient building connected to a smart microgrid.

Assessment Model:

The benefits of the SEB project, mainly related to the primary energy saving and carbon dioxide emission reduction, will be evaluated by means of scientific methodologies developed by researchers at the Savona Campus. The participation of the community to events (seminars and workshops) and joined projects regarding the SEB will indicate the possibility to extend the project to the city.

Success:

The Smart Energy Building, together with the Smart Polygeneration Microgrid, SPM, are the unique projects of the University of Genoa on Smart City and Sustainable Energy topics aimed at making the Savona Campus a “Living Lab” of the Smart City. Savona Campus, which is comparable to a small city district (previously the area hosted a military compound of the Italian Army), offers a perfect condition to experiment new technologies regarding renewable energy production, energy saving, data flows and cyber security which can be applied to build the City of the Future.

The SEB is the first Italian Zero Emission building able to operate disconnected from the National Electrical Grid, relying only on the supply of renewables (PV panels, geothermal heat pump) and storage systems of the Campus. This project can be used as a model to develop energetically self-sufficient constructions to create a resilient city. Work is in progress, thanks also to a five-years scientific partnership (2017-2021) with the Italian Distribution System Operator (DSO) Enels S.p.A. to reach this goal.

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[More information](#)



CHAPTER 3

EDUCATION AS A CATALYST



POLITECNICO
MILANO 1863



POLITECNICO DI MILANO, ITALY

Honours Programme entitled “Engineering for Sustainable Development”



The Honours Programme entitled “Engineering for Sustainable Development” is a parallel training programme that takes place at the same time as the Laurea Magistrale programmes (equivalent to Masters of Science) of the School of Industrial and Information Engineering, of the School of Civil, Environmental and Land Management Engineering and of Building Systems Engineering, Building and Architectural Engineering and of Building Engineering/Architecture of the School of Architecture Urban Planning Construction Engineering.

Project Objectives:

The aim of the Honours Programme is to enhance and develop the systemic and cross-discipline skills of future engineers, helping them understand and evaluate global challenges so that they may operate effectively in the field of sustainable development, deploying both theoretical and practical technical skills.

Learning Outcomes:

It is a great opportunity for master students to enrich the curriculum, the skills and networking of highly motivated students within their MSc study path, completing their education with sustainability knowledge.

Success:

The HP is a supplementary diploma and represents an effective way to diffuse knowledge on sustainability development without affecting institutional teaching programmes. In fact, it provides extra-credits to highly motivated students. It also enables students to enrich their knowledge through interdisciplinary skills, field work and confrontation to external stakeholders and expert.

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AALTO UNIVERSITY, FINLAND

Educating Game Changers in Sustainability: Aalto University Creative Sustainability Master's Program

Project Objectives:

Project objectives for the Creative Sustainability Master's Program include:

- Multidisciplinary learning platform with students of business, design and engineering background
- Systems thinking approach in teaching to overcome the dichotomy of production vs consumption
- Challenge-based learning to promote entrepreneurial spirits and flexible minds

Educating for sustainability

Complex sustainability challenges, such as climate change, loss of biodiversity or poverty and inequality call for new mindsets. These mindsets should incorporate a system-based view of the world and the ability to work across disciplines and multiple cultures. Therefore, persons in familiar jobs like auditor or engineer need new skills to become more "hybrid" professionals. Leaders are expected to manage teams consisting of engineers, natural scientists or business professionals, being able to understand their different languages and approaches, and to coordinate across them. Sustainability challenges require complex, multi-level solutions that are involving a wide range of stakeholders with often competing interests. So how does one educate a sustainability professional to embrace the complexity, yet stay focused on the tasks at hand without being overwhelmed?

The international Master's Degree Program in Creative Sustainability (CS) at Aalto University is a joint master's degree program of the School of Arts, Design and Architecture, the School of Business and the School of Engineering. CS master's provides a multidisciplinary learning platform with a challenge-based approach to studying sustainability. Working in multidisciplinary teams, students learn to articulate their arguments in a language accessible and relevant to anyone, negotiating together how to create new sustainable solutions for the human, urban, industrial and business environments.

Learning Outcomes:

Educating to overcome the dichotomy of consumption vs. production

Reducing our ecological footprint is one of the most urgent tasks in moving towards more sustainable development. As outlined by SDG #12, it requires making both production and consumption practices in the society more responsible. But explicitly separating these systems from each other only aggravates their problems. Master's in Creative Sustainability purposefully strives to overcome the dichotomy of production vs. consumption by joining forces of the different schools and disciplines, and tackling sustainability problems more systemically.

Offering courses on Systems Thinking approach and on Sustainable Design of Products & Services in the program increases understanding of how production decisions shape consumption patterns from the very outset, and how to nudge more recycling and re-use behavior through design. During the course on Sustainability in Business, students not only get to learn about the business models and strategies that are supportive of circular economy thinking, but also about how sharing economy can enable citizens to act sustainably. In the How to Change the World: Innovating toward Sustainability-course global sustainability challenges, like climate change and poverty, are a starting point for discovering opportunities, innovating sustainable business models and developing inclusive business ideas for poverty alleviation. The teaching at CS links the different actors: businesses, public bodies and citizens as participants of one transformation – the sustainability journey.



Success:

More than a project: making a difference with holistic approaches The CAPSTONE project work is one of the several opportunities for students to get real life experience with sustainability projects, synthesize their knowledge, and practice working with different types of organizations. Engineers, designers and business students work together to find solutions to the challenges put forward by public or private organizations. This interaction also serves as a bridge for the university to extend its sustainability impact. For example, in 2017 different student teams came out with such solutions as fully designed water drinking points for an international start-up event - SLUSH – with thousands of participants. The main motivation was to reduce the use of bottled water and normalize drinking tap water in non-formal settings of a dynamic event. The business dimension of the challenge was about identifying the business model for re-using the drinking points. No doubt universities are at the forefront of educating sustainability professionals. It is therefore important to design systemic opportunities for sustainability students to interact with different organizations, events, and communities to inspire future professionals and let them develop their networks of impact. Creative Sustainability educates sustainability specialists who can work in different organizations, interlinking internal and external stakeholders.

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ANGLIA RUSKIN UNIVERSITY, UNITED KINGDOM

MSc Sustainability



The MSc Sustainability is an interdisciplinary Masters course which takes students from a wide range of disciplinary backgrounds with the aim of facilitating their transformation as catalysts of change for sustainability. Recognizing that complex or 'wicked' sustainability challenges cannot be addressed effectively from a single perspective Anglia Ruskin University partnered with two educational charities (SDG17), the Eden Project (www.edenproject.com) and Change Agents UK (www.changeagents.org.uk) to create and deliver a unique learning experience for its students.

The starting point for this degree was to bring together a course development team with a clear and shared vision of what we wanted to achieve, that is, students who could become catalysts of change for sustainability.

At the core of the course is a learning journey, along which students gain a deep understanding of the complex nature of sustainability challenges and the tools available to address these challenges. In parallel there is a focus on the students own personal development as catalysts of change.

Their learning journey has three developmental stages:

LEARN: This journey begins at Anglia Ruskin University, in the same way as most other postgraduate degrees, with a focus on learning about sustainability. This teaching is led by researchers from Anglia Ruskin's Global Sustainability Institute (GSI) enabling students' access to the latest sustainability thinking, critical in a field where both the latest

challenges and the solutions have yet to find their way into standard academic texts. A systems approach is used to frame their learning, an approach intended to liberate their thinking from the linear, process-response way of thinking which is likely to have dominated their previous formal learning experiences.

EXPERIENCE: Their journey continues at the Eden Project, and takes place in a very different setting; their famous biomes and biomimicry buildings, and in a very different way. The Eden Project site itself is used extensively as a living laboratory, for example, to demonstrate how a building designed on biomimicry principles can be used to create new and more sustainable supply chains or how visitor events can be used to raise awareness and encourage sustainable behavior. Equally there is an emphasis on the experiential exploration of 'narratives' rather than 'information or data' and the subjective, contested and emotional responses they elicit rather than on rational and evidence based justification. The learning activities are intended to create a personal and emotional connection with the possibility of transformation rather than simply the acquisition of sustainability knowledge and skills.

PRACTICE: The final part of the students' journey includes a Work Placement and a Research Project Modules. These have been designed to provide an opportunity for students to apply or 'practice' the knowledge and skills they have gained during the rest of the course. Their reflection on their work and research practice is formally assessed.



Anglia Ruskin
University

Project Objectives:

This course was designed from the outset by a partnership with a clear and shared vision of what we wanted to achieve. That is to support and empower students as catalysts of change for sustainability. It was intended to be a course about sustainability, for sustainability and as sustainability
Invalid Input

Learning Outcomes:

The course has a set of academic learning outcomes which describe what students are expected to achieve at a course level. Since we wanted students to experience the course as a whole rather than a collection of individual modules, we used subsets of the course learning outcomes to describe outcomes at module level. Running in parallel and aligned with these academic learning outcomes we created a set of co-curricular skills and competences we called "Skills for Change" and again these were created at a course level before being mapped against individual modules and assessment tasks. Evidence of attainment of these co-curricular skills feedback into the curriculum as part of a reflective assessment.

Success:

In addition to the levels of academic success, measured in terms of percentage pass rates and distinctions we look for evidence that our students are progressing towards becoming 'catalysts of change'. We monitor this formally, through student feedback, and informally through an analysis of their reflective reports. Student comments such as "I love the authority that doing this MSc has given me ", and "[This course] has been an extremely valuable experience, not only in terms of the development of my skillset, but also in showing me that work can be aligned with your values, have purpose and be a further expression of who you are" indicates this course is achieving its aims.

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CARNEGIE MELLON UNIVERSITY, UNITED STATES

Fostering Inclusive Student Engagement for Environmental Action and Excellence



The Sustainable Development Goal of ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all aligns with our commitment to ensuring that all of our students are stewards of the environment. Across our colleges, faculty members are world leaders in global environmental challenges such as climate change resiliency and adaptation, drinking water treatment and supply, alternative energy, and environmental public policy. Where many of these challenges are led by the Wilton E. Scott Institute for Energy Innovation and the Steinbrenner Institute for Environmental Education and Research, the university also recently opened the new Center for Student Diversity & Inclusion as an integrated space dedicated to fostering a climate for intentional interaction and collaboration between individuals and groups at Carnegie Mellon. The intersection of these three centers provided the platform that resulted in a series of student-led project initiatives during the Spring of 2017.

This case study is based on three synergistic initiatives; all of which occurred during Carnegie Mellon's 2017 Energy Week, sponsored by the Scott Institute:

- **Energy, Science, Technology and Policy Energy Symposium** – The theme of the symposium was 'Low-Carbon Energy' and addressed advancements in both renewable and conventional energy. Students and industry leaders were joined together to discuss the future of energy and promote an affordable, stable and environmentally sensitive energy system for the greatest benefit for all.
- **Experiential Field Trips** – A series of local Pittsburgh-based energy and environmental operations included: Phipps Center for Sustainable Landscapes, East Liberty Electricity Site, GreenStar Recycling Center, Eaton Power Systems, and Chatham University's Eden Hall Campus. The intent was to observe environmentally sustainable practices within local economic and social structure.
- **Sustainability Weekend 'My Impact in Sustainability'** – This second annual conference was organized and executed by undergraduate and graduate students from diverse disciplines within Carnegie Mellon. Weekend activities included speakers and panel discussions covering a wide range of topics such as social injustice, recycling, involvement in the local community, entrepreneurship and food waste.



Project Objectives:

This case study describes intersecting, student-led initiatives that engage a broad and diverse community with the intent to understand, appreciate and internalize an individual's role in a collective society and environment. All 3 initiatives share the common objectives:

- **Convey the message.** The environment is the responsibility of all and the sustainability of the environment requires deliberate and cross-disciplinary conversations.
- **Be inclusive.** The solution must engage a diverse population to the interdisciplinary nature of education and research, such as that performed at Carnegie Mellon.
- **Be open-minded.** The conversation must listen to the voices of groups not typically heard.
- **Demonstrate the transfer of knowledge to action.** Experiential learning can provide a new lens and what the students do outside the classroom represents real learning.

Learning Outcomes:

The three initiatives provided the opportunity for the intersection of many communities, individuals and topics, including: multiple academic institutions from across Pittsburgh, industry representatives, student organizations (such as the Black Graduate Student Organization), eco-artists, nationally recognized leaders on tough topics (such as Majestic Lane speaking to issue gentrification in Pittsburgh), and startup entrepreneurs.

In addition, the initiatives helped to demonstrate the value of university-led events that contribute and support the regional spirit of collaboration and commitment to the environment. The connection of students with the community in which they live can help to make education more relevant.

Success:

All of these initiatives were successful in demonstrating the transfer of leadership from faculty and staff to the students. As an institute of higher education, we consider ourselves successful if our students internalize their formal learning to affect change in their everyday lives; as in the words of Andrew Carnegie, 'My heart is in the work.'

Diverse participation is also another measurement of success. Beginning with the inclusion of more colleges on campus and extending to more universities, as well as engaging a variety of community groups from the Pittsburgh region. This indicates that our students recognize that good solutions will come from collaborations with many.

Our experiences have also taught us that we need to break-out of our own silos and that dismantling the echo chamber (to engage communities of different interests) can help to deliver a message that can inspire action. Many groups share environmental goals and we will get closer to the solution if we can find the intersection.

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CHALMERS UNIVERSITY OF TECHNOLOGY, SWEDEN

Challenge Lab

Challenge Lab (C-Lab) is a strategic approach for higher education institutions to be relevant for the 17 UN Sustainable Development Goals. C-Lab is part of Chalmers University of Technology's whole-of-university approach seeking to make the university even more relevant for society. Chalmers has by tradition engaged in societal challenges and has introduced a matrix organization with eight challenge-driven "areas of advance" crossing all departments at the university. With this new organization Chalmers has a better ability to address complex challenges together with the private and public sector as well as the civil society. In these processes, the experience is that students have a unique role to play in challenging mental models and building trust between actors. C-Lab is the arena where this happens.

C-Lab acknowledges students as leaders for sustainability transitions by supporting and creating space for them to engage with real-world challenges together with stakeholders in society. The students are guided by a sustainability-driven backcasting process as an overarching framework. Teachers guide the students learning of the process and associated theories and tools and then give space to the students to be in charge.

One core idea with C-Lab is that students have unique capabilities to bring multi-stakeholders together, create openness, build trust and guide sustainability-driven innovation processes. Students are provided support and space to explore a challenge from various perspectives, and from this analysis formulate questions. By spending time to formulate questions rather than starting from pre-defined questions, students can play a role in sustainability

transitions: they are perceived as neutral and unthreatening and thereby create openness, making it possible to in dialogue with societal stakeholders address the more fundamental questions and identify leverage points. The students can thereby take ownership of questions that often fall between what the respective individual actors can govern through their own activity. The students are often enthusiastic and curious, which spreads through the group and to the other actors.

C-Lab is divided into a 7.5 ECTS preparatory course "Leadership for sustainability transitions", where the students learn the theories and tools through literature and lectures, through applying them in real-world cases and through reflection upon their experience. The students who are interested can then conduct their master's thesis (30 ECTS), in a master thesis lab, where they bring together researchers with actors from the private and the public sector and civil society, to address society's complex sustainability challenges in thematic areas.

The master thesis lab is divided into two phases: phase 1 and phase 2. During phase 1 the students work together in a group of 15-20 to explore the thematic areas. This is to a large extent done in dialogue with societal actors and lead to the identification of 'leverage points', around which the students form pairs and formulate a research question, brought forward to phase 2.



Project Objectives:

The purpose of Challenge Lab is to: strengthen the educational dimension in the “education-research-outreach” triangle; become an important hub for actors from academia, the public- and the private sector to gather around the students; build trust among stakeholders; give students the opportunity to develop unique capabilities in working across disciplines with a sustainability-driven approach.

Learning Outcomes:

The students develop leadership on three levels: leading oneself, leading together and leading for humanity. The learning outcomes for the course are the following: Learning to:

- Describe critical sustainability challenges and reflect upon necessary paradigm shifts
- Describe how sustainability challenges affect industrial and societal actors and how they are interlinked.
- Reflect upon important “lock-ins” on societal, organizational and individual levels, relevant for sustainability challenges
- Apply a systems perspective to meet sustainability challenges
- Apply relevant sustainability frameworks
- Apply basic theories and tools about transformative leadership in a challenge-driven process
- Apply tools to enable and facilitate dialogue with multiple stakeholders

Success:

Success at Challenge Lab is defined in relation to the 17 SDGs in terms of value creation in society and student learning:

- Transformative value - contribution to transitional processes in society that challenge mental models and go beyond business-as-usual approaches;
- Integrative value - contribution to processes in society seeking to handle the three sustainability dimensions in parallel that also builds trust between actors across sectors, and;
- Student learning - contribution to deep and meaningful learning for the students in their personal development in becoming leaders for sustainability transitions.

We get surprised year after year in what impact the students can have in society, and how they develop as individuals and as a group, when provided the right conditions in terms of space and support to engage with sustainability transitions in society.

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ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE (EPFL), SWITZERLAND

Training Engineers to Become Facilitators of Sustainable Development

The École Polytechnique Fédérale de Lausanne - EPFL develops multidisciplinary pedagogical approaches that are human-centered, combining engineering and social disciplines to address development challenges. Today we need to ask ourselves:

1. what are the main expected learning outcomes for a global engineer?
2. What are the key elements for effectively designing such educational courses?
3. How can we build institutional support for such programs?

Project Objectives:

As a UNESCO Chair in Technologies for Development, the Cooperation & Development Center (CODEV) at EPFL develops formal academic courses and training in technologies for development (see infographics). CODEV believes in offering interdisciplinary, project-based curriculum and education courses designed to meet the needs of EPFL engineers, researchers, and professionals from Switzerland and abroad. Among its courses, CODEV developed the Master Level Course in Development Engineering (“a new interdisciplinary field that we define as creating solutions that improve human development in low-resource setting at a scale for large positive impact.”¹)

The goal of the Development Engineering (DE) curriculum is to train future professionals capable of developing technologies that are appropriate, affordable, robust, and that can be brought to scale to help achieve the Sustainable Development Goals (SDGs).

In what sense is DE particularly suited to addressing the SDGs? DE focuses on key development challenges, ranging from providing drinking water and sustainable access to energy to identifying ways in which to lower consumption patterns and conserve ecosystems. DE recognizes that socioeconomic and environmental insights need to accompany technological development from the start in order to foster sustainable long-term technical and financial solutions. Another key ingredient of DE is the importance given to measuring impacts. Being able to measure the specific impact of a development or technological intervention is key to learning, taking decisions, and making progress, and this holds particularly true for the SDGs

In the case of the DE course, this is done by bringing together faculty with extensive experience in this field with academics (e.g. UC Berkeley) from other institutions in the Global North and the Global South who recognize the value and the urgency of transforming education systems so that students acquire the necessary skills to address the grand challenges humanity is facing today.

To strengthen the education and capacity of its students in real-world contexts, EPFL houses Ingénieurs du Monde (IdM), a student association with 30 years of existence. As its



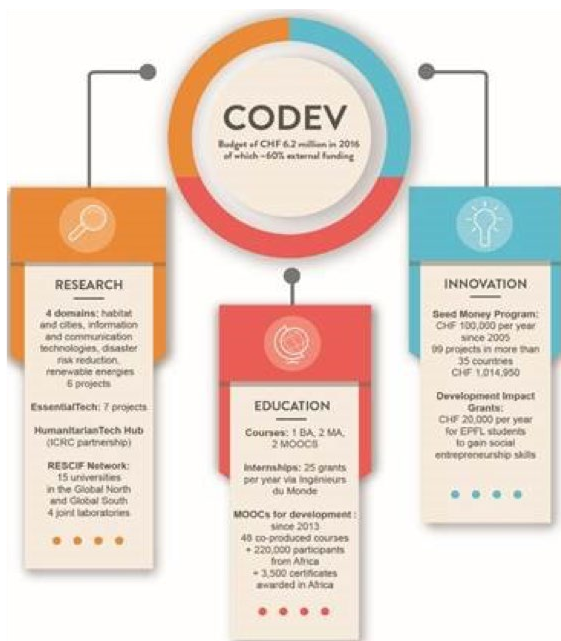
main goals, IdM promotes North-South scientific cooperation and increases awareness of the academic environment about development challenges in the Global South. Its principal activity is to offer internships and credited academic projects to students, in partnership with the Global South. Grants, funded by CODEV, are offered each year.

To serve as a bridge between engineers, economists, and other scientists involved in research on human, social, and economic development, a new, open-access, interdisciplinary, peer-reviewed Journal in Development Engineering² has been launched. This journal presents novel research motivated by a specific global development challenge and the SDGs. The Journal brings together a number of the world's leading universities including EPFL (with Dr. Hostettler in the Editorial Board).

CODEV will launch a pilot Development Impact Grant program for EPFL students. They will get the opportunity to acquire transversal skills by pursuing a social entrepreneurship idea aligned with the SDGs³.

Learning Outcomes:

Trainees master the interdisciplinary skills needed to create actionable and impactful research that is transferable from the lab to the field at scale. Furthermore, these skills are transferable to contexts beyond poverty alleviation and will contribute to 21st-century workforce development, bringing the SDGs forward not only in the Global South but also at the global level.



Success:

The short- and long-term signs of success in contributing to the creation of a new generation of engineers and social entrepreneurs working towards sustainable development include:

- Number of internships and Master projects with a DE objective
- Number of Development Impact Grants requested
- Increase in the number of Faculty hired to teach DE
- Increase in the number of Development Engineer Graduates
- Increase in the number of articles submitted and accepted in the DE Journal

Promoting this curriculum and paradigm shift requires champions at many levels and sectors. To strengthen DE, we are forming an alliance that includes academics, practitioners, and students presenting their perspective on how the next generation of engineers or social entrepreneurs should and could be trained. It also includes representatives from organizations and industry, all key partners in the co-development and use of essential technologies.

The complexity of development calls for a necessary revision of how academia educates and supports future professionals. We need to innovate the education of future engineers who are capable of designing appropriate, affordable and robust technologies to foster local development and to help achieve the SDGs.

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[More information](#)

¹ Levine, D., A. Agogino and M. Lesniewski. 2015. *Design Thinking in Development Engineering*

² <http://www.journals.elsevier.com/development-engineering/>

³ <http://cooperation.epfl.ch>



4 QUALITY EDUCATION



FREIE UNIVERSITÄT BERLIN, GERMANY

Head, Unit for Sustainability and Energy Management



Freie Universität Berlin (FUB) has been actively participating in the scientific discourse on the Sustainable Development Goals (SDGs) adopted by the United Nations in 2015 and is committed to implementing them in teaching, research, and management, throughout the campus as well as in our partnerships with non-university actors.

About 25 % of FUB's research projects are related to the SDGs. Currently, 14 % of the over 4000 courses offered per semester focus on sustainability issues, which FUB intends to further increase. Furthermore, FUB wants to

impart social and communication competences as they relate to the Education for Sustainable Development (ESD) teaching and learning concept, which places great value on interdisciplinary and transdisciplinary teaching. To that end, FUB has developed two measures which set a spotlight on the 17 SDGs of the United Nations – a transdisciplinary lecture series as well as a new skill area “Sustainable Development” in the field of the General Professional Skills courses.



Project Objectives:

Lecture Series “Transforming Our World – Sustainability at Freie Universität Berlin”

The Lecture Series in the summer of 2017 addressed the SDGs and gave scientists of FUB the opportunity to present their research to participants coming from the university as well as the municipality. With the lecture series we followed an innovative approach by combining science and institutional practice at FUB. Each scientific talk was complemented by senior staff from different units presenting their management and operational activities in the field of the SDGs. The key result of the lecture series was that there are interfaces for cooperation between academics and staff, which can be used as role models. For instance, the introduction and discussion of energy efficiency measures on campus, participatory strategies as well as health and wellbeing activities contributed to deepening the guiding principle of sustainable development at FUB.

Interdisciplinary Skill Area “Sustainable Development”

The assessment of sustainability-related courses shows that they cover all issues addressed by the SDGs. In order to increase the collaboration across departments and to expand core themes among all disciplines, we have implemented an interdisciplinary skills area “Sustainable Development” in the General Professional Skills courses. The courses are open to B.A. students from all departments and offer a multi- and interdisciplinary exchange. Students may choose from the following modules:

- Managing Sustainability
- Communicating Sustainability
- Shaping Sustainability
- Researching Sustainability

All courses are designed to prepare students for their professional life by combining a theoretical and practical phase. With input from experts, students develop hands-on projects to be realized in the framework of the course. Students are encouraged to use the university as a living-lab.

Learning Outcomes:

The Lecture Series combined newest research findings on the SDGs with practical inputs from the FUB management. Expected learning outcomes are transferring sustainability issues from the global to the local level and vice versa as well as reflecting on the responsibilities of a major public institution.

The skill area “Sustainable Development” has the following learning objectives:

- Understand the various dimensions and concepts of sustainability
- Become familiar with international agreements and strategies
- Get professional orientation knowledge in sustainability management, communication and research
- Gain competences according to the concept of ESD

Success:

The lecture series proved to be a major outreach instrument for including researchers and senior management personnel from across the university as well as from the public. The sessions brought together 50-80 participants each week over the course of one semester and created new contacts. The participation of FUB's president highlighted the importance of the 17 SDGs in the institutions activities and strengthened the universities commitment.

Outreach is also a major indicator for success regarding the courses in the new skills area “Sustainable Development”. The interdisciplinary and project-based format of the pilot-courses draws an increasing number of B.A. students, who evaluated the concept very positively. This encourages us for the official launch of the skills area in the winter semester 2018/19.

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[More information](#)



GEORGETOWN UNIVERSITY

Core Pathway on Climate Change and India Innovation Studio



India Innovation Studio students in conversation with subsistence farmers in a small village outside of Pune, in a rural watershed, discussing strategies for drought management and climate change adaptation.

Georgetown University is one of the world’s leading academic and research institutions, offering a unique educational experience that prepares the next generation of global citizens to lead and make a difference in the world. We are a vibrant community of exceptional students, faculty, alumni and professionals dedicated to real-world applications of our research, scholarship, faith and service. Established in 1789, Georgetown is the oldest Catholic and Jesuit university in the United States.

Georgetown addresses critical sustainability challenges through our academic mission, our physical footprint and our financial operations. We take an integrated and holistic approach to sustainability, placing value on a “quadruple” bottom line: people, planet, prosperity, and purpose, guided by our Catholic and Jesuit values and our commitment to the common good.

One way Georgetown addresses sustainability in our academic mission is through curricular innovations developed by our Designing the Future(s) Initiative. Designing the Future(s) supports curricular innovation as an inquiry into new ways for Georgetown’s educational practices to align with its institutional identity and values. More information about the Designing the Future(s) Initiative can be found at futures.georgetown.edu.

Of particular relevance to educating on sustainable development, several objectives of this work include educating our students to understand and prepare to solve real-world, complex problems through approaches that are multidisciplinary, experiential and global. Two examples of curricular innovations which map closely to UN Sustainable Development Goals are Georgetown’s Core Pathway on Climate Change, and the India Innovation Studio: Designing for Droughts.



Core Pathway on Climate Change

In Fall 2017, Georgetown launched the Core Pathways Initiative, the most ambitious core curriculum experiment ever developed at the University, in which students navigate their core requirements through sustained, interdisciplinary engagement with a “wicked” global problem. The central purpose of the Core Pathways experiment is to animate students’ experience of the Core Curriculum by leveraging the University’s expertise on “wicked problems,” while at the same time enhancing faculty collaboration and student engagement through dynamic pedagogies and innovative curricular structures. Such an effort raises the prospect of meaningful transformation, empowering students to address complex generational problems in concert with mentors and peers.

The topic of climate change serves as the inaugural theme of the Pathways Initiative. Students participating in the 2017-2018 Core Pathway on Climate Change will:

- Enroll in a series of 7-week course modules of 1.5 credits each, offered in six different disciplines, to gain a multidisciplinary perspective on climate change.
- Bundle any two modules from the same discipline into a 3-credit course to fulfill their core requirements.
- Participate in integrative programming with students and faculty across all courses in the Pathway (such as an interdisciplinary role-playing policy simulation on sea-level rise threatening an island community).
- Interact through resources posted to a Virtual Commons to foster deeper engagement with the Pathway (e.g., resources for how to engage Climate Change beyond the pathway through research, internships, and activism).

Examples of 1.5-credit courses offered through the 2017-2018 Core Pathway on Climate Change include:

- Climate Change and Global Justice (satisfies half of a Philosophy requirement)
- Ethics of Climate Change (satisfies half of a Philosophy requirement)
- Plants, People and Climate (satisfies half of a Science requirement)
- Water, People and Climate (satisfies half of a Science requirement)

The inaugural Core Pathway on Climate Change has enrolled over 100 undergraduate students and engages 12 faculty members in teaching Pathway courses. Feedback gathered from both students and faculty after the first semester has been overwhelmingly positive, including from the standpoint of student engagement with the curricular material and faculty engagement with their teaching experience. The inaugural Pathway continues in the Spring Semester 2018, and the Pathway will be run again with Climate Change as the theme in the 2018-2019 school year. Over time, the Pathways Initiative seeks to retain the topic of Climate Change as one thematic option for students while building additional Pathway topics addressing other complex global challenges.

India Innovation Studio:

The India Innovation Studio is a year-long studio-based course taught through a multidisciplinary lens in Georgetown’s Walsh School of Foreign Service. The class operates in partnership with the government of Maharashtra, India, to design, prototype, and implement a solution to a development problem facing India. Each year, the course examines a different challenge.

Last year the topic was drought, the problem identified as the most pressing by the Chief Minister. During the length of the course, students developed strong backgrounds in the technical aspects of drought, the politics of India and design thinking. They worked in groups with partners in India to identify specific potential solutions and then traveled to Mumbai, Maharashtra, in June 2017 to present and discuss policy recommendations with high-level officials in the Maharashtra government. Many stayed in India for the summer to continue working with government and NGO partners. For more information, please visit <https://india.georgetown.edu/essays/india-innovation-studio-designing-for-droughts>. In this year’s class, students follow a similar approach in working with a Member of Parliament on behavioral change to address the critical problem of open defecation.

Contact:

For information about Designing the Future(s) curricular innovations, please contact redhouse@georgetown.edu.

For additional information about sustainability at Georgetown University, please contact sustainability@georgetown.edu.



NATIONAL UNIVERSITY OF SINGAPORE

Engaging and Empowering the NUS Community
in Sustainability



At the National University of Singapore (NUS), we endeavor to provide our students with the opportunity to learn and practice sustainability not just from the formal and informal curriculum, but also in student life and activities. Complementing the classroom student residence experience are various outreach events and activities organized by the university’s faculties, administrative offices, and student environmental groups to raise awareness of topics ranging from global sustainability challenges to different research and educational opportunities on campus to what individuals can do for more sustainable lifestyles.

Three outreach activities on sustainable development are highlighted below.

Example 1: Annual Asia Environment Lecture

Into its fifth year in 2017, the Asia Environment Lecture is a platform for knowledge exchange and networking with eminent thought leaders on sustainability and the environment. It is organized by NUS’s Master of Science in Environmental Management and the Bachelor in Environmental Studies programmes, as well as and the Law Faculty’s Asia-Pacific Centre for Environmental Law. Depending on the lecture speaker, partners include the relevant government agencies such as Building and Construction Authority and the National Parks Board, amongst others.

The lecture is open to the NUS community of students and staff, as well as the general public, and has attracted more than 1,000 attendees in its 5 editions. Past speakers include Dr. Bindu Lohani, Vice President for Knowledge Management and Sustainable Development (Asian Development Bank), Ms Christine Ervin, First President and CEO (U.S. Green Building Council) and Mr. Marco Lambertini, Director General (WWF International). In particular, the 4th Asia Environment Lecture in 2016 featuring Mr. Andrew Steer, CEO (World Resource Institute) was held in conjunction with the multi-anniversary celebrations-cum-conference of the three NUS co-organizers, entitled: “Attaining the Sustainable Development Goals – The Way Forward in Environmental Management”.



Example 2: sustainABLE NUS Showcase

The inaugural sustainABLE NUS Showcase was held in August 2017 to highlight actions that the University is taking to transform NUS into a greener campus, encompassing operations, research and education. Through the 28 booths set up at the Showcase, students had an opportunity to learn about the various research projects and campus initiatives relating to the environment and biodiversity, as well as the sustainability-related course and module offerings. In addition, six key government agencies from the Ministry of the Environment and Water Resources and the Ministry of National Development – the two ministries leading the Sustainable Singapore Blueprint, the country's long-term plans for sustainable development – were also present to share with the NUS community the national vision and priorities. Together with the South West Community Development Council, these agencies also introduced the various national initiatives under the Sustainable Singapore Blueprint that NUS students and staff can volunteer or participate in. The Blueprint outlines Singapore's action plans to support the global sustainable development agenda.

By collaborating with internal stakeholders, as well as various government and community partners, NUS hopes to not only become a greener campus, but also contribute towards the country's vision for a livable and endearing home, a vibrant and sustainable city, and an active and gracious community.

The event, which was covered by the local print and television media, was graced by Singapore's Minister for the Environment and Water Resources, Mr Masagos Zulkifli.

Example 3: NUS Goes Lite

NUS Students Against Violation of the Earth (SAVE) is NUS' main environmental student group. SAVE runs their NUS Goes Lite campaign with various activities and an annual flagship event. The flagship event in 2017 is themed "Ctrl-Alt-Del" and focused on: (i) encouraging individuals to better 'control' their consumption habits, (ii) providing 'alternatives' where the environmentally-friendly option is challenging and (iii) inspiring long-term behavioral change through 'deleting' wasteful habits. At the event, about 600 participants took part in the life-size board game which aimed to promote sustainability on campus.

Activities during this year's NUS Goes Lite campaign included:

- A discount scheme pilot for ordering smaller rice or noodle portions at selected canteens, to reduce food wastage. An estimated 85kg of food was saved at one canteen, with about 10% of those visiting the food stalls asking for less rice/noodles during the trial period.
- A reusable bag loan system at participating retail outlets, to discourage the use of plastic bags
- A life-sized board game at the flagship event to demonstrate the tradeoffs involved in making environmentally-friendly decisions in everyday scenarios.

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PONTIFICAL CATHOLIC UNIVERSITY OF PERU, PERU

LEED Lab Achievement

The LEED LAB course is a multidisciplinary immersion course that utilizes the built environment to educate and prepare students to become Green building leaders and sustainability-focused citizens. Their participation reinforces the sustainable master plan by assessing the performance of existing facilities on campus and choosing the Arts faculty building where they did facilitate the LEED for Existing Buildings Operations and Maintenance.

LEED® Facts
 FACULTAD DE ARTE / PABELLÓN Y
 Lima, PE

LEED EBOM v4
 Certificación otorgada 20 de Setiembre de 2017

GOLD	60 *
Sitios Sustentables	1 / 10
Eficiencia del Agua	4 / 12
Energía y Atmósfera	26 / 38
Ubicación y Transporte	15 / 15
Calidad del Ambiente Interior	7 / 17
Innovación en el Diseño	3 / 6
Prioridad Regional	4 / 4

**De 110 puntos posibles*



Project Objectives:

The LEED LAB course has two main objectives. The first one is to transform the University's campuses into a Green and Sustainable Campus using LEED certification as a main tool to transform existing buildings into Green Buildings. The second one is to educate and prepare students to meet the challenging needs of the 21st century, equipping students with the skills, knowledge and expertise required to be effective communicators, project managers, critical thinkers, problem solvers, engaged leaders and effective team players, by becoming Sustainable Professionals with the LEED AP Accreditation.

Learning Outcomes:

Last September, the Arts Faculty Building that was used for the LEED LAB Course, achieved LEED EBOM Certification at Gold level, becoming the first existing building within the Campus to get such a certification, is a great milestone for the Sustainable Master Plan and thanks to this achievement the LEED LAB course that was functioning as a pilot, is now to be integrated as a part of the Engineering and Architectural program. One of the students that holds now a bachelor degree in Engineering is working for an international real estate company managing the green buildings portfolio and another one that holds a bachelor degree in Architecture is leading the sustainable architectural design for an urban development company.

Success:

Achieve the LEED Gold Certification in the first existing building in the Campus means the world. Leading by exemplary performance is always good. One Green building is energy efficiency at its best, Green purchase policies and waste management educates and reduces CO2 emissions. One green building is the building block for a sustainable campus and green sustainable professionals are the key players for a sustainable city. I think that if we can replicate this among other high education institutions, we are moving sustainability forward to a higher level.

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Others involved with the project:

Dr. Carlos Fosca Administrative Vice Rector; Dr. Miguel Mejia Dean of Science and Engineering Faculty



UNIVERSITÀ DEGLI STUDI DI TORINO



UNIVERSITÀ DEGLI STUDI DI TORINO (UNITO), ITALY

Linking Education for Sustainable Development with Open Innovation.

We aim to present a new approach to link Education for Sustainable Development (ESD) principles with an Open Innovation process.

The proposed approach has been tested during a two-phases workshop, entitled "Education for Sustainable Development: Leadership Training". The "ESD: Leadership Training" is divided into two main parts, each based on a different teaching methodology. The 1st part, based on a non-formal and unconventional approach, aims to promote the SDGs values and to teach the basic knowledge on interlinkages among SDGs, as well as the complexity of sustainability issues according to ESD principles (e.g. K-12 standards). The 2nd part, based on an open innovation process, aims to encourage participants to conceive, design and plan innovative projects linking as many SDGs as possible. This approach is helpful for participants to develop personal skills and knowledge linked to the SDGs, while for teams to develop a Project for a "real" action stemming from the SDGs. "HOW TO GUIDE" ESD APPROACH: this first part is split into 5 activities. 1) The "What are the SDGs?" activity is organized as a serious game where each participant represents one of the 17 goals. Aims and rules: each participant represents

a single SDG and, during the game, has to obtain as much information as possible on the other SDGs by interviewing the other players. Necessary materials: two sheets of paper for each participant. The goal sheet, containing all basic information related to one SDG, is different for each of the 17 participants (one for each goal). The empty sheet, provided to all participants, is a document with all 17 SDGs logos and three open questions for any SDGs: i) Goal name, ii) Why? (list some data) and iii) What can I do? 2) The Negotiation and Conflict Management module shows how to connect SDGs to deal with a real multi-stakeholder problem. Aims and rules: students are split into groups. Each group represents a particular stakeholder involved in the case study. For instance, in our case, the game focused on the freedom of education and access to education. Thus, our stakeholders were students and their families, the Minister of Education, University Boards of Directors and Academic staff. Necessary materials: one information sheet for any simulated stakeholders (one for each group) explaining needs, aims and constraints. 3) The Project Cycle Management (PCM) activity intends at introducing SDGs targets and indicators. Aims and rules: students learn the PCM approach and how to apply it to SDGs. The aim is to point out the interconnection among SDGs through the identification of common/similar targets. The activity consists of drawing root-cause tree graphs related to several SDGs and comparing the graphs among different SDGs (represented by teams). Necessary Materials: A2 sheet papers. 4) The Visual Thinking module aims at introducing basic tools to analyze an issue with a visual approach. Aims and rules: participants are split into different groups and each group start to analyze a SDG in detail. For this purpose, different analysis approaches may be adopted. In our case, we used the Ishikawa diagram Ishikawa, a deep root-cause analysis which allows to identify up to third-level causes. On the base of the common identified causes students may understand interlinkages between different SDGs. Necessary Materials: A2 white sheet papers,



Figure 2: Overview of the workshop



Figure 3: The Negot and the SDGs module



Figure 4: The Visual Thinking module



Figure 5: The Leadership and Public Speaking module



UNIVERSITÀ DEGLI STUDI DI TORINO

pencils of various colors. 5) The Leadership and public speaking activity is based on the simulation of an interview in order to stimulate participants to speak in front of a camera. Aims and rules: participants are split into groups of minimum 3 persons. Each group must choose one SDG, two persons who simulate to be experts on that goal and one person who simulates the interviewer. The activity consists in simulating a 3 minutes television interview based on three questions: 1) describe the SDG, 2) what is the main problem related to that goal and 3) describe possible solutions to the presented problem. Necessary Materials: a camera connected to a projector, or a TV screen, in order to stream the interview in real time. THE OPEN INNOVATION PROCESS: this second part of the ESD Leadership Training is based on an Open Innovation process. Participants must accomplish two main modules: 1) the Design Concept and 2) the Pitch and presentation. 1) The Design Concept module is organized in two main moments. First, participants have to present their projects and create multidisciplinary working teams, selecting the most promising idea. Second, once the teams are formed, each group has to work on the business model canvas. 2) The Pitch and Presentation: the following module is dedicated to pitch and to realize a 5-minute presentation. Any team must answer five questions: 1) What? Idea description; 2) How?, innovation and necessary technology; 3) Scalability and modularity; 4) Environmental and social Sustainability, interdependence with SDGs; 5) Economic Feasibility.

Project Objectives:

A new teaching approach has been tested, linking the Education for Sustainable Development principles to an Open Innovation approach. An input-output learning process, split into two main parts, has been adopted: a “generate needs” stage to conceive new and innovative concept design and an “evaluation” phase of the students works. The first part is based on values promoted by the Sustainable Development Goals (SDGs), while the second part is based on stakeholder engagement theory and open innovation. With this approach, students learn SDGs and sustainability complexity and, at the same time, they contribute to the local territory and organizations sustainability becoming active part of the local community (e.g. the University itself).

Learning Outcomes:

Education for Sustainable Development must spread the following needed skills: Envisioning, to imagine a “better” future; Critical Thinking, to question and criticise the actual state-of-the-art status-quo; Systemic Thinking, in order to understand the complexity behind sustainability and the interconnections among environment, economic and social systems; Building Partnerships, to promote participation in decision-making processes. Taking into account this definition, sustainability cannot be taught as a normal subject with frontal instruction and teacher-centred lectures, but it has to be taught with active and open learning approach.

Success:

The workshop engaged 30 participants, selected among more than 80 applications, and 5 experts/tutors to facilitate the team activities. Participants were selected based on background in order to guarantee multi-disciplinarily with respect to at least 5 different fields (Environment, Science, Humanities, Communication, and Economics). Thanks to this process the 5 participating teams realized 5 pitches and presentations interconnecting many SDGs at the same time. The final projects are: Lovin' Corks, a circular economy local supply chain to recycle cork, engaging local producers, suppliers and retails (SDGs: 13, 12, 15, 17 and 11); OmiCup, a new design for a sustainable water bottle for students (SDGs: 6, 8, 11, 12, 14 and 15); FreeWaste, an innovative and fast bio-digester to produce biofuels and compost at a local scale (SDGs: 7, 9, 11, 12, 13, 15 and 17); MyButtaTo, innovative reverse vending machines for aluminum and plastics waste to stimulate the recycling through an eco-gamification process (SDGs: 6, 11, 12 and 14); UniTogether, an interactive and participated service maps for foreign students within the City of Turin in order to facilitate integration and social inclusiveness (SDGs: 4, 10 and 11).

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[http://www.green.unito.it/it/ESD_LeadershipTraining;](http://www.green.unito.it/it/ESD_LeadershipTraining)
<http://www.green.unito.it/it/node/316>

Others involved with the project:

Gabriela Cavaglià - University of Turin / Unesco Chair in Sustainable Development and Territory Management



UNIVERSITY OF CAMBRIDGE

A Masters programme in Engineering for Sustainable Development (Cambridge University Engineering Department)

The purpose of the MPhil in Engineering for Sustainable Development is to educate engineers who already have some years of post-graduate experience, to meet the challenges posed by the Sustainable Development Goals. To achieve this, they must operate within an increasing set of constraints, and across a wider set of boundaries. The programme is based on some very straightforward principles including: i living within Earth's finite limits and resources, ii helping everyone on the planet to achieve an acceptable quality of life, iii acting as stewards of the environment for future generations, and iv dealing with complexity and handling the many trade-offs which have to be made.

What makes the study of Engineering for Sustainable Development different than simply focusing on the technical performance of engineering systems is that much of the discourse centres around values and people's behavioural response to the issues and solutions. It has been described by a former graduate of the MPhil as "not an engineering degree, but a course for engineers that fills in all the missing pieces."

The core programme can be mapped directly onto a number of Sustainable Development Goals including most explicitly: Goal 6 Clean Water and Sanitation; Goal 7 Affordable and Clean Energy; Goal 9 Industry, Innovation and Infrastructure; Goal 11 Sustainable, Cities and Communities and Goal 12 Responsible consumption and Production; 13 Climate Action and implicitly addresses the remaining goals. Issues relevant to these goals dealt with on the programme include: managing resources within limits; managing the effects of climate change; providing infrastructure and engineering products and services equitably to all parts of society; dealing with some of the basic needs in the developing world, such as provision of shelter, water and sanitation; innovating in sustainable design; leveraging benefits of a circular economy; understanding the nature of international development and recognising the influence of policy economics and regulation. Through the extensive elective programme students can choose specific modules in: Resilience and Hazard Mitigation in Future Cities; Infrastructure Design of Poor Settlements in Developing Countries; Development Engineering; Management of Resilient Water Systems; Sustainable

Energy; Present and Future Energy Systems, Sustainable Architecture and Urban Design and many more. Furthermore most Dissertation topics have direct relevance to the SDGs including recent examples such as : Developing a strategic road map for the deployment of renewable technologies in rural Nepal; A critical study of international aid and global development goals in addressing the aspirations of the poor; A review and analysis of private operator models for the management of rural water supply services in sub-Saharan Africa; ICT and Women to Value Perception of ICT and its Role in Women Empowerment in developing countries; A case study in Kenya; Climate Change Resilience in Slum Communities; and a Study on the Enabling Environment for Public-Private-Partnerships based Waste-to-Energy Projects in underdeveloped Countries in Asia.

Project Objectives:

Key themes include the need to recognise complexity which can be better understood through adopting a systems approach for understanding a problem. Students learn how to recognise and manage uncertainties which emerge when engineering decisions have to be made in the absence of complete information or evidence. Participants are also encouraged to challenge orthodoxy and develop a clear vision for the future so they can respond by not just seeking to replicate traditional solutions, but to boldly challenge orthodoxy and to lead and implement change. The course embraces skills provided by other disciplines, and encourages engineering graduates to respect environmental limits through always seeking to optimise resource efficiency, and ensure pollution control and the maintenance of ecosystem services. A further dimension is dealing with people through consultation processes and negotiation to meet both society's and individual's needs. An important consideration is to consider whole life costs and to recognise project externalities and to adopt life cycle management. The course also addresses trade-offs as the time when optimising solutions around a single variable or metric have passed and answers are needed which are acceptable to a wide range of stakeholder interests. Key objectives include encouraging:



- A more integrated multi-disciplinary style to develop bridges between the technical and physical sciences and the humanities.
- The need to take a systems approach with the ability to deal with complexity through a recognition of wider system boundaries.
- An appreciation that there are limits to what can be achieved through technology alone, and that singular prescribed technical solutions may not be capable of addressing real needs.
- An acceptance that value judgments play an important role, and that engineering education should not be exclusively about facts and empiricism, but should embrace ethics, creativity and social responsibility.
- The need to engage in problem definition through careful dialogue with all stakeholder groups and a proper recognition of context.
- An understanding of mechanisms for managing change in organisations so future engineers are equipped to play a leadership role.
- An acknowledgement that technical innovation and business skills also must be understood, nurtured and combined as precursors to the successful implementation of sustainable solutions.

Success:

Success is the production of change agents who return to the engineering profession and who are capable of challenging orthodoxy and leading the implementation of more sustainable practices. Many students who have graduated from the MPhil have returned to their own countries and made significant impacts. Examples include Feriha Mugisha who has contributed to food security issues in Uganda; Tombo Banda from Malawi is now an Associate with the Africa Delivery Hub of McKinsey, Mauricia Nambatya has returned home to Uganda and has worked for Haileybury Youth Trust, performing both managerial and technical roles conducting monitoring and evaluation of building projects; Vincent Sakeni has returned to Zambia where he is ensuring the sustainable delivery of a \$1.5 billion hydropower project across the entire design, procurement, construction, and commissioning spectrum of its development; and Pravin Karki from Nepal is now Head of Global Hydropower at the World Bank.

Many other graduates from the developed world take on a range of roles in development, such as Stephi Hirmer who has worked on off grid electrification for rural communities in Uganda, Sarah Banas and Francesca O'Hanlon who have worked on managing construction projects and health care facilities in South Sudan, Samantha Passmore is now working for a UK-based international development consultancy, IMC Worldwide, on the Schools Reconstruction and Rehabilitation Programme in Pakistan, funded primarily by DFID UK.

Contact:

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Learning Outcomes:

In addition to formal lectures, discussion seminars and individual and group project work the programme extensively uses a range of other pedagogical approaches including Role Plays (Tradeoffs, Uncertainty, People, Change); Case Study Field Work (Complexity, Environmental limits, Change, Whole life costs); Simulation games (Complexity, Environmental limits, Change, Whole life costs); Individual and Organisational Change challenges (Change); Multi-criteria decision making (Complexity, other disciplines); Awareness of literature and viewpoints from other disciplines (Other disciplines) and Client Consultancy projects with external industrial organisations (People, tradeoffs, whole life costs). The details of how these are used to support the aims of the programme have been described in several published papers¹²³⁴⁵.

- ¹ Bajzelj, B., Fenner R.A., Curmi E., Richards K. (2016) Teaching sustainable resource management using an interactive research tool. *International Journal of Sustainability in Higher Education (EMERALD) Volume 17 Issue 1*
- ² Dahlin J-E, Fenner R.S.A., Cruickshank H., (2015) Critical evaluation of simulations and games as tools for expanding student perspectives on sustainability. *7th International Conference on Engineering Education for Sustainable Development EESD 15 Vancouver 10-12th June*
- ³ Fenner R.A., Cruickshank H.J., Ainger J., Harding P., Owen S (2015) *Maintaining Entropy: developing skills to help graduate engineers lead change 7th International Conference on Engineering Education for Sustainable Development EESD 15 Vancouver 10-12th June*
- ⁴ Fenner R.A., Cruickshank H.J., Ainger C., (2014) *Sustainability in civil engineering education: why, what, when, where and how. Proceedings of Institution of Civil Engineers, Engineering Sustainability. October Volume 167 ES 5 pp 228-237 October 2014*
- ⁵ Fenner R.A., Cruickshank H.J (2012) *Exploring key sustainable development themes through learning activities. International Journal of Sustainability in Higher Education Vol. 13 No. 3, p 249-262 2012*



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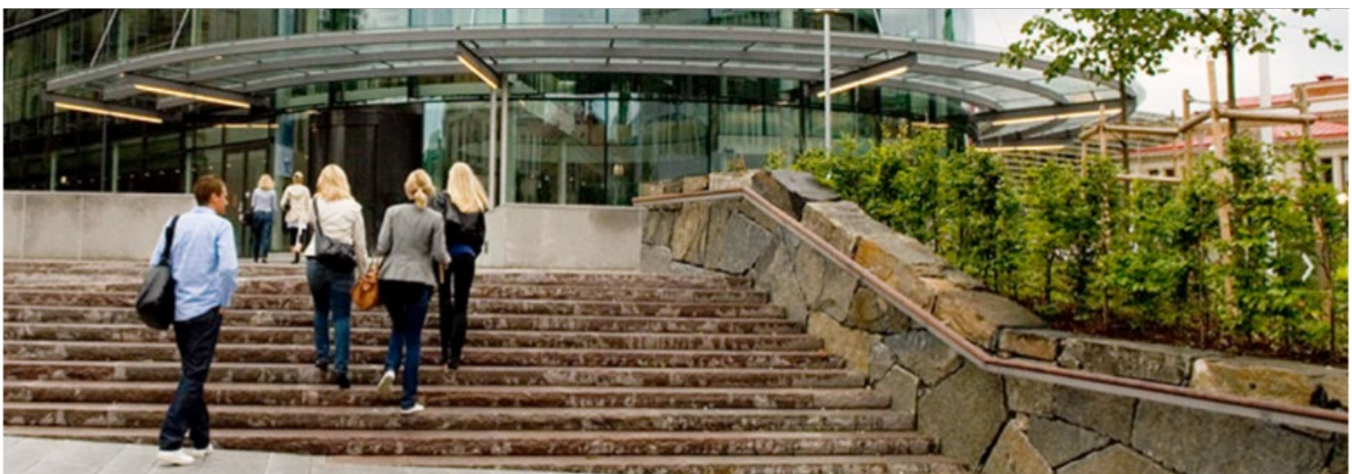
UNIVERSITY OF GOTHENBURG, SWEDEN

International Master's Programme, Education for Sustainable Development

There is only one Earth. With global challenges such as accelerating climate change, mass extinction of species, rising inequity and a growing world population, the urgency of creating a more sustainable world is alarming. In what ways do we need to re-think and re-enact education, in the face of current ecological crises?

As a response to the major environmental crises and changing life conditions for humans as well as other species, this interdisciplinary ESD Master's Programme brings together four departments at the University of Gothenburg and one at Chalmers University of Technology in a pioneering curriculum at the forefront of the international research debate on education and sustainability.

The ESD Master's Programme prepares you not only to respond to local and global sustainability challenges, but also to counteract them and contribute to more sustainable futures through education and research. As a Master's student in the ESD programme you will enter into critical dialogue with recent scientific debates in the educational, social, and natural sciences, and get access to a range of analytic tools that will help you develop theoretical as well as practice-based knowledge in education for sustainable development.





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Project Objectives:

Why study the programme?

The ESD Master's Programme is of interest if you:

- Want to work for increased public awareness, knowledge and action competence in sustainable development
- Are interested in supporting learning for sustainable development among diverse groups
- Are involved in social movements for the environment, and want to learn more about the role of education in creating a more equitable, peaceful, and ecologically viable world
- Are a teacher/educator looking for ideas and strategies to better integrate education for sustainable development in your classrooms or in community settings
- Want to pursue a research career in the broad area of education for sustainable development

Learning Outcomes:

- Sustainability challenges are wicked problems and tackling them inevitable requires co-production of knowledge from various disciplines. Based on these premises, the courses in the programme are offered by 5 departments, from two different Universities
- It is important to have one responsible and coordinating department for the development process. The Department of Pedagogical, Curricular and Professional Studies at the Faculty of Education, University of Gothenburg, has played that important part.
- It is important to have one committed and responsible person as programme coordinator from start, that is managing and coordinating the whole development process.
- Anticipated to be an exemplary programme in terms of resource intensiveness: zero ecological footprint, no/less paper consumption, less costly and time conscious.

Success:

- It is a pioneer MA programme-the first of its kind in Sweden
- It is an interdisciplinary programme offered by cross-faculty. It is jointly offered together by four departments at the University of Gothenburg and one at Chalmers University of Technology
- It is research based while 100% web based, i.e. an endeavor to embrace research without being a blended programme. Most online MA across the world are taught programmes-just one-year course based degree.
- International outreach

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UNIVERSITY OF LUXEMBOURG, LUXEMBOURG

Certificate in Sustainable Development and Social Innovation



The Certificate, approved as an official study programme in November 2012, is the university's first part-time programme open to Bachelor-, Master-, Ph.D.-students and professionals. The Certificate aims to provide a better understanding of and an enhanced repertoire of action on the complex challenges that societies, organisations and individuals face as we approach the limits of the biophysical carrying capacity of our planet. Sustainability and Social Innovation are inseparable: Active involvement of both citizens and science is necessary for guiding and monitoring the innovations that promise to protect or improve our lifestyle standards.

Project Objectives:

The existential problems of civilization in the 21st century are complex, as they involve interactions between society and culture, the techno-sphere and the environment. Traditional disciplinary fields of 'normal' science and traditional approaches to management based on prediction and control can only play a limited role in resolving such complex problems, especially considering the prevailing rift between the natural and the social sciences. For these 'post-normal' problems society requires different approaches to knowledge creation. Transformative sustainability science is a particular approach to the practice of scientific inquiry that aims to fundamentally changing human –environment interaction.

The study programme was designed to equip research scientists, students and citizens for the practice of

transformative sustainability science and to contribute to systemic change in Luxembourg over the long-term. One aim was to develop a knowledge production process in Luxembourg that takes into account how science, technology, knowledge and social norms, values and practice are actually co-produced interdependently.

For this purpose, we engage experts in disparate knowledge fields spanning the natural sciences, social sciences and humanities, as well as stakeholders defending different interests and worldviews, in order to better characterize diverse and at times contradictory facets of complex sustainability challenges. It can be argued that key to such transformative scientific inquiry is rethinking how new actionable knowledge is co-created in collaborative processes. With their combined mission of research, teaching and engagement, universities can play a leading role in establishing such processes. This project presents an innovative study programme, a part-time Certificate in evening classes, that equips students and practitioners for the practice of transformative sustainability science.

The main attributes of our conception of transformative sustainability science are i) collaborative inquiry with a systems perspective to characterize complexity; ii) diversity of theories and methods including the natural, social and practice-based sciences and humanities, that are juxtaposed in a process allowing for critical interdisciplinarity to transform each engaged discipline to overcome limiting and divergent assumptions and pre-suppositions; iii) diversity of



stakes and interest to understand and make explicit divergent preferences and priorities and their value bases that are united in their orientation to co-create more sustainable futures; iv) requisites for processes to critique, judge and evaluate new knowledge emerging from such processes from diverse points of view; and v) empathy, humility, reflection required when directing attention to people, roles and relationships in place- and issue-based analysis.

The transformative learning process we seek to foster in the Certificate assumes that knowledge is constructed for action, and that learning can be mediated by practice. Transformative learning for sustainability, engages learners to rethink and act upon how societies and individuals interact with each other and their environments. Learning often happens by challenging boundaries of learning environments. Learning is not only based on personal experience in the sense of Kolb (1983), but learners - including teachers- need to be challenged by the experiences and perceptions of others in a dialectical manner. Transformative learning relies on collective learning in diverse groups, organizations or networks. In order to embrace complexity, conflict, uncertainty and ignorance we need to draw on plural rationalities and contradictory behavior. Successful learning interventions need to be managed to ensure that experiential situated knowledge from diverse communities of practice is made explicit, communicated and understood by others. Transformative learning is considered as a life-long iterative process, doors to which may be opened through engagement in projects that integrate education, research and civic engagement. Transformative learning is conceived similar to Wals et al. as 'opening up to and relating in a different manner to diverse ways of knowing, based on interacting with others and the world around you'.

Learning Outcomes:

The Certificate is conceived as a platform for a transformative social learning process; it relies on scientific inquiry in diverse groups of stakeholders and experts. The underlying conception of social learning focuses on the relation of learning across different scales of social organization – individual, group, organizational or societal - and builds on prevailing conceptions of social learning in environmental management. The conception of transformative learning as collective scientific inquiry is rooted in John Dewey's work (1938). Accordingly, learning is a process of developing an enriched understanding and repertoire of action on problems as a result of open experimentation and judgment of results following criteria of rationality. The fact of knowing more and mastering knowledge in a different manner changes our relationship between the world and ourselves. Progress then builds on the evaluation of and passing judgment on a direction of development. Participants will develop the following competences:

- to apply systems thinking to understand the complexity of society, environment and their interactions.
- to respect the conflicting perspectives on an issue that are held by diverse experts and stakeholders, stemming from diversity in experience, values and world views.
- to recognize uncertainties and tensions arising from the gulf between local and global perspectives and modes of inquiry.
- skills in negotiation: respect, listening, giving and taking to find mutually acceptable solutions to complex problems.
- an appreciation of alternative forms of social organization and enterprise for achieving a sustainable economic exchange system.
- to develop 'citizen science' approaches and techniques for creatively integrating the social and scientific emphases of the two phases of the course.
- to engage science and scientists productively in social learning processes with diverse groups of stakeholders for concerted action on local issues of environment and sustainability.

Success:

We defined success in terms of the level of engagement of alumni in sustainability initiatives after they finish the study program. We carefully assess self-evaluation in final reports on whether the program has strengthened the resolve and resourcefulness to engage more actively on a personal and professional level. This study program describes an innovative approach to building and situating the Universities as a nodal point in a social learning in network of stakeholders in place- and issue-based sustainability transitions in Luxembourg

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UNIVERSITY OF OXFORD, UNITED KINGDOM

Education for Sustainable Development in Practice at the University of Oxford



Students are taught sustainable development issues in a variety of ways at the University of Oxford. There are courses at all levels touching on many of the goals but here we are highlighting two particular methods.

The two contrasting examples are offered by the Department of Continuing Education in the form of a Masters course and the School of Geography and the Environment with a three-day workshop.

The Masters programme attracts a lively and engaged group of students, who combine postgraduate study with their professional lives, and an active alumni network. Students on the course typically come from a wide international background and share a variety of work experiences in not limited to urban development and the built environment.

The MSc is designed for those operating in a range of urban and non-urban contexts worldwide - public, private or third sector organisations - and fosters collaboration, creativity, perspective-sharing and effective networking skills. The MSc is an accredited course within the Royal Institution of Chartered Surveyors University Partnership.

The course is delivered by University academics, industry experts, urban researchers and practitioners in the built environment. Regular contributors include the International Institute for Environment and Development and the University's Transport Studies Unit.

The Environmental Change Institute in the School of Geography and the Environment run the Training Better Leaders workshop which aims to improve sustainability literacy and skills.

Students who attend this workshop receive a Sustainability Skills Certificate from ECI and have the opportunity to meet sustainability professionals from various organizations. Students who register must attend the full workshop in order to qualify for the certificate.

This year the workshop welcomed over 20 representatives from the UK Department for Energy and Climate Change, HSBC, The Nature Conservancy, City Council, Sainsbury's, 2Degrees, ECI, Synergy, Climate Care, and many more.



Project Objectives:

To give students an opportunity to learn from sustainability experts – whether from a theoretical or practitioner background.

Learning Outcomes:

Improve sustainability literacy and skills for professionals and to equip them with the tools they need to take into global leadership roles.

Success:

- That having a good mix of policy and practical theory is invaluable to students interested in sustainability issues.
- That sustainable development is a topic in which everyone can make a valuable contribution and a cohort with a diverse background adds great value through the potential for wide ranging discussion and a holistic approach to solutions.

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UNIVERSITY OF PENNSYLVANIA, UNITED STATES

Integrating Sustainability into the Curriculum

Colleges and universities increasingly have the mandate and motivation to integrate sustainability into their curricula. The purpose of this case study is to share the strategy used at the University of Pennsylvania (Penn) and provide an evaluation of its success and guidance to others creating similar programs. There is broad agreement for the need to integrate sustainability not only into university missions, facilities and operations and business practices but also into the curriculum, student and faculty life, community outreach and beyond (Martin and Samels, 2012; Rusinko, 2010; Barlett and Chase, 2004). Numerous studies (Reid and Petocz, 2006) have stressed the importance of accounting for the perspectives of multiple disciplines when integrating sustainability into the university curriculum. As such, Barlett and Eise (2006) report "issues and problems in the environment and sustainability are complex and require inter-disciplinarity to develop useful solutions and approaches". Mitchell Thomashow, Director of the Second Nature Presidential Fellows Program, describes a curriculum as "rigorously scrutinized as a repository of values [that is] perceived as the most likely platform for educational reform" and notes that while changes in the curriculum are often slow moving and inefficient because of administrative obstacles, it is essential to remain current, especially in the field of environmental sustainability and to engage faculty in the curriculum development process (Thomashow, 2014, p. 152).

This case study summarizes Penn's Integrating Sustainability across the Curriculum (ISAC) program. In concert with other Penn initiatives (a course inventory, faculty discussion groups and a research network), ISAC increases Penn's sustainability-related courses and creates dialogue regarding how various disciplines contribute to sustainability. The ISAC program teams include paid undergraduate research

assistants and participating faculty who work together for eight weeks over the summer to revise or develop a course that incorporates sustainability as a theme. The program kicks off with a faculty workshop to introduce participating instructors and establish the program intent. Each student research assistant works with one-two faculty members to identify relevant materials, create new assignments and lectures and help to develop the course in a meaningful way to incorporate sustainability. Over the course of their assistantships, the students participate in three mini-workshops and several field trips to provide an opportunity to exchange ideas and share experiences with fellow participants. At the end of the summer, the students present their course development work in a poster session for the other students, faculty and staff involved in the program, and some students go on to present their posters at the University's Center for Undergraduate Research and Fellowships' research poster session in the fall. A key component of sustaining and improving our sustainability initiatives is to explore them with a critical eye, the motivator for this case study. Practical implications – The program described is replicable at other institutions. The presenters will demonstrate that the logistics of recruiting students and establishing the program are straightforward. Undergraduate students are on campus; their pay requirements are modest; and they are desirous of such research experiences.

Social implications – The ISAC program inculcates a cultural and behavioral shift as students and faculty approach sustainability issues collaboratively, and it facilitates the development of a shared language of environmental sustainability. Such social implications are difficult to quantify, but are nonetheless valuable outcomes.



Originality/value – The faculty–student partnership used to facilitate the integration of sustainability into courses at Penn is original. The program provides a framework for engaging students and faculty in curriculum development around sustainability in a manner that benefits the student research assistants, the participating faculty and future students.

This case study will detail the benefits and challenges of the Penn program aimed at integrating concepts of sustainability into the curriculum, with a strong “teacher-learners together with learner-teachers” approach. To strengthen our current courses in sustainability and offer opportunities for integrating sustainability concepts in coursework across multiple disciplines, the Academics Subcommittee of Penn’s Environmental Sustainability Advisory Committee (ESAC) sent representatives to a Sustainability Across the Curriculum workshop in 2011 organized by The Association of the Advancement of Sustainability in Higher Education (AASHE).

Afterwards, we put together an interdisciplinary student-partnered approach to encourage faculty to create and revise courses that incorporate relevant material on many aspects of sustainability. Greater integration was achieved by attracting faculty from many different departments and partnering with undergraduate students in this process. We ran our first ISAC faculty workshop and student research assistantship program in the spring and summer of 2012. We completed our sixth iteration of this program in the 2017/2018 academic year. As of the Fall of 2017, the program has involved 40 faculty and 20 student researchers focused on 18 revised courses and 25 new courses.

Project Objectives:

1. Assisting faculty to integrate environmental sustainability themes into their coursework.
2. Exposing students to university-level teaching pedagogy and methodology.
3. Providing a one-on-one learning opportunity to students in specific fields of study.

Learning Outcomes:

Students use the lease of sustainability thinking to gain an in-depth understanding of a specific topic area.

Success:

There are three main ways to define success for this project: 1. Was the participating faculty successful in integrating sustainability thinking (characterized by themes such as systems thinking, recognition of limits, feedback, and amplification, earth time scales, ecosystem intricacy, complexity, resiliency, evolution, behavior, and predictive modeling); 2. Has the student gained an appreciation of pedagogy and teaching methods; and 3. Has the student gained an appreciation of the specific course of study/ research over the summer.

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UNIVERSITY OF SÃO PAULO, BRAZIL

Environmental Policy on Campus



Since 2014, University of São Paulo (USP) initiated a comprehensive Environmental Management Plan, coordinated by the Superintendence of Environmental Management (SGA). The Environmental Policy at the University was created by the need for a document that would legitimize and guide the environmental initiatives at the University of São Paulo, in order to promote more efficient environmental management and in accordance with the principles of the University. The topics covered are: management, water and wastewater, green areas and ecological reserves, sustainable buildings, environmental education, greenhouse gas emissions, energy, fauna, mobility, waste, and land use. Thus, USP's Environmental Policy is the basis to guide the formulation of policies on environmental issues, plans on environmental issues, environmental masterplans with 11 thematic chapters and the environmental program of each school or department. By establishing objectives and targets stemming from the diagnosis, these documents establish a better-defined framework for environmental management within the university. Parallel to the USP internal procedures in endorsing the Environmental Policy, The Regional Office of the Cities Program of the United Nations Global Compact

was inaugurated at USP on October 24th, 2017. This is the first office of the program (a humanitarian agreement among businesses, civil society organizations and other institutions around the world, coordinated by the UN) in the world and located on the main campus of University of São Paulo. With the establishment of the office and in partnership with the International Secretariat of the program, based at the Royal Melbourne Institute of Technology (RMIT), USP will contribute to the advancement of the UN Agenda for Sustainable Development Objectives, Agenda 2030. This will be done by facilitating projects with governments, civil society, private sectors, academia and UN agencies; of broad-spectrum collaboration so that access to financing own funds is possible for projects that contribute to this agenda; and the exchange of scientific knowledge and cooperation at all levels. Thus, with the official seal by the highest levels of USP, that happened in 12th December 2017, the Environmental Policy was established in official terms by the university, all the efforts were reinforced not only to establish and implement the general objectives of the Environmental Policy, but also to align their practices to actions established within the parameters established by the SDGs United Nations.



Project Objectives:

The general purpose of the Environmental Policy document is to encourage environmental education at the university, to protect health and the environment and to adopt sustainable patterns. In short, these documents aim to promote integrated environmental management at the university in order to improve the quality of life of its members and society in general. The governing principles of this policy are the prevention and precaution, fairness and proportionality, the mainstreaming of education, interdisciplinary, transparency, participation, access to information, shared responsibility, respect for local conditions, the appreciation of the knowledge produced at the University and responsible action. Moreover, it applies the principle of proximity, by which all environmental problems should be resolved as close to the source as possible in order to stimulate local development.

Some of the means to achieve these objectives, aligned to SDGs United Nations main goals are:

- the computerized corporate system for data and environmental monitoring
- monitoring and control of environmental performance
- cooperation between university units and with society as a whole
- continuous education processes
- reallocating human and financial resources for environmental management

Learning Outcomes:

Nowadays USP has almost 1600 of courses/modules related to environment and sustainability offered (2016 database) in a total amount of 15799 courses/modules offered. On the other hand, the total amount applied in research funds dedicated to environmental and sustainability exceeds 25% of the total resources funds. This fact illustrates the USP potential on environmental and sustainability issues and also the need to join efforts not only to implement Environmental Policy but also to align its actions with UN SDGs.

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UNIVERSITY OF SIENA, ITALY

MOOC “Sustainable Food Systems: a Mediterranean Perspective”



Why a MOOC? And why on Food?

Literature recognizes Massive Open Online Courses (MOOCs) as one of 30 the most promising trends in education until 2028 and the tool for ‘innovative disruption’ that will improve education. Moreover, the online courses are capable of overcoming physical barriers, distance and cultural borders. By this way, they could integrate the traditional university courses giving students, and all civil society, great opportunities to improve knowledge on the main challenges of the Sustainable Development. MOOCs (and ICT more in general) can represent an enormous opportunity to introduce positive changes also across the developing world, especially since the availability of learning opportunities expands and the cost of access continues to decline. The online courses could therefore be a “win-win situation” for society and for the environment.

Over the years, University of Siena has placed the Sustainable Development at the core of its strategic multiannual plan, reaching a very high level of expertise on sustainability issues thanks both to the success in research, demonstrated by its departments, and the transformation of teaching with a new focus and innovative approach towards sustainability related learning outcomes. Boosting research and teaching in Sustainable Development provided for an interesting case study of a higher education institution (HEI) campus where students are educated on the concept of sustainability regardless their study sector and young researchers are stimulated to include Agenda 2030 and the SDGs as research framework.

To harmonize teaching and research within an innovative hub, the University of Siena created the SANTA CHIARA LAB, a centre where different cultures, disciplines and approaches merge to explore new perspective of knowledge.

One of the most relevant flagship projects in the field of Education for Sustainable Development promoted by the University of Siena Campus is a Massive Open Online Course (MOOC) with the title “Sustainable Food Systems: a Mediterranean Perspective”. The MOOC is a product born within a public private partnership, one of the higher impact configurations of partnerships for the achievement of SDGs. The regional network SDSN Mediterranean hosted by the University of Siena, supported by the Barilla Centre for Food and Nutrition Foundation, coordinated a faculty of twelve professors and experts on food related issues for setting of a comprehensive and high-level course.

The food systems play a pivotal role in the framework of the SDGs, being relevant not only for their mainstream SDG n.2 but also strictly linked with many other goals. In the end we can state that the sustainability of Food Systems must be pursued through a multifaceted approach, taking into consideration a complex framework of analysis, where not only agriculture and lands matter but also health, nutrition, water resources, fisheries, climate constrains, food loss and waste and new business models within the value chains.

The “Sustainable Food Systems: a Mediterranean Perspective” MOOC aims at raising awareness and deep knowledge among young generation, but also the general public, of the history, the best and worst practices, the challenges and the objective of the whole food sector in the Mediterranean Area, paying attention in particular to the great differences between north-western and south-eastern countries of the basin. One of the general objectives of the MOOC is to promote the Agenda 2030 and the knowledge of the SDGs using food as driver.

The course is structured around a series of pre-recorded lectures, readings, quizzes, discussion forums, and other activities, that are available on the SDG Academy web platform (www.sdgacademy.org) since February 2018. Each of these course components can be completed at a time that is convenient for the student. All students who successfully complete the course will receive a digital certificate of completion, signed by the scientific director of the course. A procedure for the official granting of the course within the student career is going to be finalized.



The syllabus is composed by the following modules:

1. The Mediterranean challenges around food and agriculture
2. History of agriculture in Mediterranean basin and Mediterranean Diet
3. Poverty alleviation, economic and social rural development
4. Fisheries and Aquaculture
5. 4. How to achieve the Sustainable Development Goals (SDG) in the Mediterranean – The way forward I. Water resources
6. How to achieve the Sustainable Development Goals (SDG) in the Mediterranean – The way forward II. Sustainable farming systems under environmental and climatic constraints
7. How to achieve the Sustainable Development Goals (SDG) in the Mediterranean – The way forward III. Food value chains for regional and local development
8. How to achieve the Sustainable Development Goals (SDG) in the Mediterranean – The way forward IV. Reducing food waste and enhancing by-product innovations
9. How to achieve the Sustainable Development Goals (SDG) in the Mediterranean – The way forward V. Nutrition and Education
10. New professional profiles in a Mediterranean context

The added value of this MOOC derives from the wide group of academic partners collaborating in the promotional phase. Global and regional networks of Universities and Research Centres have demonstrated a great interest in joining the partnership of this project, helping in promotion and dissemination, trusting in the effectiveness of this practical example of innovative frontier of teaching and learning for Sustainable Development.

Project Objectives:

- to raise awareness and knowledge of the main challenges of the food sector in the Mediterranean area
- to promote an innovative tool for teaching at the higher education level
- to promote a multidisciplinary scientific approach to the issue of the sustainability of food systems in the Mediterranean area
- to adopt a regionalized point of view with the SDGs

Learning Outcomes:

- students will be provided with high level knowledge of the main challenges of the sustainable development in the Mediterranean area
- students will be part of a stimulating international class with the opportunity to attend courses of eminent scholars and expert coming from different universities, research centres and enterprises involved in projects and activities on sustainability

Success:

We can define success of the project the achievement of two main objectives: a) the setup of the whole course with such relevant partners and such high-level quality of footages and contents, b) a wide attendance among students and young generation of the Mediterranean countries, both enrolled and not enrolled in university official courses.

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Yale

16 PEACE, JUSTICE AND STRONG INSTITUTIONS



YALE UNIVERSITY, UNITED STATES

Yale Scholarship and the Sustainable Development Goals



SDG review of 2,117 Faculty Members

In 2015, the Yale Office of Sustainability started a project aimed at helping understand how Yale teaching and research aligns with the 17 United Nations Sustainable Development Goals (SDGs). This project serves three purposes:

1. Start to identify pathways for collaboration between disciplines;
2. Provide a rationale for thinking of higher education sustainability beyond operational commitments and student campaigns;
3. Identify the expertise Yale might lend to the process of achieving the SDGs.

The pilot phase of the project concluded in the summer of 2016, and a revised program was launched that fall.

There are over 4,400 faculty members at Yale and there are 17 SDGs, so the review process has required a team of dedicated student researchers over the course of two years. In preparation for the research, each student is required to develop a thorough understanding of the SDGs, including the narrative and targets that undergird each goal. Students are assigned batches of departments for review. Importantly, the team is composed of students from degrees under the humanities, social sciences, and natural sciences, which both provides balance in perspectives and opportunity for dialogue. The team leader makes an effort to assign students to departments related to their interests, as this both keeps the work interesting and avoids confusion over technical language.

The team uses an online form mainly composed of pre-populated fields to reduce human errors in data entry and to ensure consistency in how particular data points are entered



Yale

(i.e. Yale Nursing, Nursing, YSN, School of Nursing). The basic review tactic is an audit of faculty biographies, websites, and courses taught. In some cases, a brief internet search may supplement information available on Yale websites.

Information entered into the form includes

- Full name, title, email
- Primary appointment
- Secondary appointment (where applicable)
- Centers, Labs, or Programs (where applicable)
- Other Affiliations (where applicable)
- Specialties & Interests
- Website(s) (link)
- Courses (link)
- Connections to each of the 17 goals

Once the information has been entered into the form, it can be downloaded as a CSV file for analysis and to generate lists and spreadsheets by department or by goal. The primary appointment is determined by the Yale Directory. Secondary appointments are important to consider, as several of Yale's degree-granting programs are multidisciplinary and are therefore are not a primary affiliation for faculty.

Learning Outcomes:

Initial results show that every department at Yale has at least one faculty member whose scholarship relates to the SDGs, and the University has ample coverage for each SDG (see figure). This is to be expected in departments such as the School of Forestry & Environmental Studies and the School of Engineering and Applied Science. Sustainability is an integral part of the identities of some other departments, such as the Yale's School of Management and Divinity School, so it makes sense that these have strong showings in the charts. The more compelling findings lie in groups such as the School of Drama and the Classics Department, which some may not instinctively link to sustainability. The School of Drama has at least one faculty member who qualifies for each of the SDGs, for example, and inquiries have revealed that they have a robust set of internal initiatives related to wellness. Similarly, a ground-truthing exercise with a faculty member in the Classics Department revealed that not only does everyone who teaches in this department qualify for at least one SDG, most qualify for two or three and several are passionate and eager to collaborate.

As of this writing, the Yale Sustainability team is using the data collected to-date for three purposes:

- Upon request, create multidisciplinary lists of faculty with shared interests in key topics such as urbanization or climate change & health.
- Integrate academic highlights into a set of sustainability action plans for professional schools and academic departments;
- Develop department-specific reports to be used to start discussions with department leadership and faculty.

It is important to note that this is not intended to be a perfect or finite project. Faculty members come and go each semester and department websites and faculty information are updated with inconsistent frequency, so the source of the information is not entirely accurate. In addition, reviewing biographies is a subjective exercise and since the students working on this project have been from a variety of degree programs – including public health, political science, economics, engineering, global studies, environmental studies, and music – key terms and concepts have been subject to interpretation. While the drop-down menus of the webform have gone a long way to streamline the data entry process and offer more consistent results, the next phase of this project will necessarily include active review with faculty members and department leaders.

As we refine the matrix and verify its outputs, we will start to explore platforms that might be used to share the data internally. There may also be an opportunity to share the methodology, and ultimately the platform, with peer institutions.

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ABOUT THE ISCN

The International Sustainable Campus Network (ISCN) is a non-profit association of globally leading colleges and universities representing over 30 countries and working together to holistically integrate sustainability into campus operations, research and teaching.

The ISCN is governed by the ISCN Board, composed of senior representatives of the ISCN co-host member universities. The Board is supported by an ISCN Advisory Committee that includes representatives elected by the \ISCN network universities.

Execution of the ISCN's strategic goals is supported by the ISCN Secretariat, operated by SustainServ, Inc., and led by the Executive Director of the ISCN. The Secretariat supports and manages member relations, network development and outreach, resource materials, and strategic program management activities.

The ISCN has instituted working groups to explore critical issues and facilitate the development of resources related to the three ISCN-GULF Sustainable Campus Charter principles. These working groups are led by experienced faculty and staff from institutions that participate in the ISCN network and are located all over the world.

ISCN CO-HOST SCHOOLS



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This report contains hyperlinks. The electronic version may be downloaded from the ISCN website.

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The International
Sustainable Campus
Network (ISCN) in
Collaboration with the
Global University Leaders
Forum (GULF) of the
World Economic Forum