Interdisciplinary training and education in Humanitarian Engineering

Dr Georgia Kremmyda
Humanitarian Challenges

- Inequality;
- Pollution;
- Conflicts and Refugee crisis;
- Energy & Sustainability;
- Fast growing populations;
- Natural and man-made disasters;
- Access to water;
- ...

2nd Symposium in Humanitarian Engineering, 3-4 July 2017
783 million people cannot access safe drinking water

2.5 billion people have no access to proper sanitation facilities
Population growth places greater demands on energy provision.

Poor roads in Africa lead to almost as many fatalities as AIDS; 1 billion people lack access to paved roads.
Increased need for emergency relief to war refugees
Need for emergency relief after natural disasters
Over 50% of the world population lives in cities. This places stress on infrastructure, provision of water and food.

Climate change will challenge the security of many coastal cities.
Sendai Framework for Disaster Risk Reduction 2015-2030

It is a 15-year, voluntary, non-binding agreement which recognizes that the State has the primary role to reduce disaster risk but that responsibility should be shared with other stakeholders including local government, the private sector and other stakeholders.

“The substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries.”

Adopted by UN Member States on 18 March 2015
Transforming our world: The 2030 Agenda for Sustainable Development

This Agenda is a plan of action for people, planet, prosperity, peace and partnership.


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UN Dialogues

- Lots on explicit and implicit talk about resilience and transformative change;

- Recognition of the importance of humanitarian intervention;

- A focus on Humanitarian education and training

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Why Humanitarian Engineering?
✓ **Engineering** has a pivotal role to play in the solution of global humanitarian challenges.

✓ **Engineering** can be used as the catalyst for the change that the world needs.

From water supply to renewable energy provision, from efficient transport systems to digital infrastructure, from constructing resilient cities to the provision of sanitation facilities and from resource protection to effective agriculture, *engineering* underpins the responses needed for us all to pursue a sustainable future [EWB UK, 2016].
**Humanitarian Engineering** is the use of science and engineering to:

- invent,
- create,
- design,
- develop, or
- improve technologies which enhance and improve the well-being of populations facing grand challenges.

This can be on a local, national or international level and does not necessarily have to follow a disaster or crisis.
Jan Egeland, former UN undersecretary-general for humanitarian affairs and emergency relief coordinator, said [ACT International, 2009]:

“There were instances where the response was untested, chaotic, amateurish, doubled up, overlapping, done by “Mom and Pop” operations...

Saving human lives is no place for amateurs.

Why is that? Because the poor, dispossessed and disaster-prone should have at least one basic right left to them: to be, protected from incompetence”
Finding humanitarian experts is not easy...

Most of the humanitarian employees:

- are on short-term contracts due to lack of long-term budgets of non-governmental organisations (NGOs);
- abandon their involvement to humanitarian action because they seek a more long-standing career or because they cannot stay for long far from home;
- are usually locals who are employed by the NGOs after local training. However they lack skills to respond to global challenges on international scale.
There is need to...

- Improve the perception of science and engineering in the developing world, beyond ‘charity and volunteering’
  *i.e. as mainstream, long term, and highly skilled profession, and for which a vast market exists;*

- Cover a skills gap for Scientists/Engineers in managing complex interdisciplinary projects, and in adapting their skills to the developing world.
Joined-up approaches

- The issues of humanitarianism are not just engineering problems;
- There is need to engage with other professions and stakeholders;
- We need to break down previous siloed approaches and obdurate practices;
- There is need for interdisciplinary education and training to enhance combinational expertise.
Humanitarian Engineering at Warwick
Warwick Humanitarian Engineering Centre (WHEC)

- Paving the way to WHEC
- WHEC; Creating Shared Value
Objectives of the new PG course

- Provide an educational programme to meet the needs of a diverse multi-disciplinary student population;

- Develop an educational programme that defines the professional standards for Humanitarian Engineers;

- Establish Humanitarian Engineering as an academic field of study within the University of Warwick.
Who can take the course?

The course is offered to students, professionals and practitioners from a range of disciplines:

- Engineering (Civil; Chemical; Electrical/Electronic; Mechanical; Systems);
- Natural sciences (Chemistry; Physics; Computer and Information Science; Materials);
- Health and Medical Sciences;
- Social Sciences (Law; Economics; Sociology; Politics and International Studies);
- Business (Management)
Which departments are involved?

The course has input from the following Departments:

- School of Engineering
- School of Law
- Medical School
- Business School
- Institute for Advanced Teaching and Learning (IATL)
- Centre for Interdisciplinary Methodologies (CIM)
Course structure

- 180 credits
- 4 entry degrees; 3 variants
- Modules running in week-long blocks
- 9 modules of 15 credits and 1 project of 45 credits

The course is offered for full-time, part-time and CPD studies.
Entry degrees

- PG Award (30 credits)
- PG Certificate (60 credits)
- PG Diploma (120 credits)
- MSc (180 credits)
Degree variants

- MSc in Humanitarian Engineering
- MSc in Humanitarian Engineering with Sustainability
- MSc in Humanitarian Engineering with Management

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Course content

Humanitarian Engineering: Ethics, Theory and Practices
Urban Resilience, Disasters & Data
Renewable Energy
Water & Environmental Management
Sustainable Cities & Infrastructures for emergencies

Sustainable Operations
Introduction to Global Health
One Humanity; Shared Responsibility
Humanitarian Law
Project

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Main features of the course

- **Student-driven curriculum**
  Will allow students’ interests to shape issues of application.

- **Open-ended, problem-based learning**
  Will shift the curriculum from mastery of disciplinary content to the critical integration of disciplinary knowledge relative to a specific problem.

- **Collaborative learning**
  Gained value from interaction with multiple groups.

- **Experiential learning**
  Students will be offered the opportunity for theory to practice understanding, gained through application.
Skills to be developed...

- **Contextual skills**
  i.e. humanitarian sector, international development, developing countries, humanitarian standards;

- **Specialist/discipline specific**
  Overlapping competencies among disciplines; engineering, health, law, business management, humanities and arts;

- **Functional skills**
  In the humanitarian sector three levels roughly exist: field practitioners, project managers, national/international managers/directors
The Warwick Humanitarian Engineering Team
Recent news
HEFCE Catalyst Fund A project

‘Developing a student-driven educational model between, beyond and across disciplines’

The project will develop a conceptual model for exploring the ways in which students act as co-producers of learning, and how they might work beyond traditional disciplinary boundaries.

Total budget £99,490; Duration 18 months
In collaboration with the Royal Academy of Engineering and the University of Dar es Salaam

‘Problem-based learning and Challenge-based learning in engineering education’

November 2017
ICWES 18 in 2020

September 2020

On the theme

‘Global Humanitarian Challenges’
Women’s Engineering Society
Annual Student Conference 2017

Autumn 2017

On the theme

‘The role of Engineering in Humanitarian Challenges’
Thank you for listening!

warwick.ac.uk/HumanitarianEngineering