ES99H-15 Sustainable Cities and Infrastructures for Emergencies

24/25

Department
School of Engineering
Level
Taught Postgraduate Level
Module leader
Georgia Kremmyda
Credit value
15
Module duration
1 week
Assessment
100% coursework
Study location
University of Warwick main campus, Coventry

Description

Introductory description

This is a five-day intensive module; including lectures and seminars.

Module web page

Module aims

The aims of this module are for the student to explore the planning and conceptual design of sustainable cities and infrastructure improvements for low-income urban communities and familiarise themselves with the range of infrastructure needs for affected communities before, during and following emergencies such as technologies for security, shelter, water supply and engineering management of liquid and solid wastes.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

The module will consist of 5 days sessions.
The core design is that each day the module leader and subject specialists (mainly coming from the Industry) will choose how they wish to deliver a combination of discipline or application grounded material with activities that will allow the students (with the module leader) to develop their learning in an interdisciplinary style that will help them to explore and deepen their knowledge of that day's theories and set texts/materials. Active learning methods (i.e. Team Based Learning; Open Space Learning) will be implemented in order to heighten student engagement and understanding of the week's topic.

Day 1: Urban underground space: solving the problem of today's cities
Population increase leads to an increased demand for reliable infrastructure, nowadays combined with a need for increased energy efficiency and a higher environmental awareness of the public. The use of underground space can help cities meet these increased demands while remaining compact, or find the space needed to include new functions in an existing city landscape. In this lecture we will discuss the possibilities for innovative use of the underground for commercial and residential use, storage, water conveyance and treatment, and heritage conservation, and we will highlight how the use of underground can bring more optimal solutions for urban development.

Day 2: Urban development
This lecture features smart technology, eco-cities and inner-city regeneration schemes, mixed-use developments and multi-model transport interchanges with associated community, heritage or tourism facilities. Approaches to architecture, planning, design and the future of transportation will be presented.
Case studies may include:

- Tianjin Eco-city
- Spinnaker Tower
- Cromer Seafront Enhancement

Day 3: Sustainable Cities and Regions
In day 3 we will examine the roots of urban sustainability as an agenda, and the various ways in which sustainable cities have been redefined by scholars, policy makers and planners. A workshop called City Hack will be delivered from an industry professional exploring a number of city hack scenarios.

Day 4: Infrastructures for developing countries
Infrastructure services are central to economic activities and to facilitate human development, economic growth, and productivity in industry. As low income countries aspire to higher levels of development, the need to meet the increasing demand for housing, energy, transport infrastructure and water supply has become critical. The growing demand for infrastructure presents a challenge as it affects the pace of regional integration, the competitiveness of goods and services in the global and regional trade markets. Topics to be covered on the day are related to critical infrastructures for developing countries such as housing, energy, transportation and water supply.

Day 5: Infrastructures for Emergencies
'In the immediate aftermath of a flood, affected communities need shelters, rudimentary roads, drainage and water supply. Humanitarian Engineers have the essential skills to respond to such an emergency. Infrastructures, both technical and human, are critical components of emergency

response, helping to facilitate and shape both formal work practices and the improvisational work that individuals and organisations take part in as they address emergent challenges during unpredictable events.

Learning outcomes

By the end of the module, students should be able to:

- Interpret the current environmental, energy, housing, health, food, and mobility issues facing cities
- Demonstrate a comprehensive understanding base of the latest technological innovations, strategies, and policies being developed by industry and academia that are being deployed in cities and understand the benefit and cost tradeoffs for these solutions
- Critique the need for various types of infrastructure before, during and following emergencies
- Systematically identify the interdependencies between systems (healthcare, transport, water) and the consequences when they fail
- Autonomously synthesise how administrative aspects (preparing for possible emergencies, communication, and distribution of materials) can provide positive contributions to responses to emergencies
- Implement conceptual design principles to the different infrastructure sub-sectors (rural road engineering, maintenance and network management, use of underground space in fast growing cities)
- Apply their skills in problem solving, communication (written and oral; to technical and non-technical audiences), and information retrieval

Indicative reading list

Essential reading:
DAVIS, Jan, Lambert, Robert., 2002. Engineering in emergencies: a practical guide for relief workers. 2. ITDG.
STERN, Peter H., 1983. Field engineering: an introduction to development work and construction in rural areas. Intermediate Technology.
ACTION Contre la Faim (Association)., 2005. Water, sanitation and hygiene for populations at risk. Hermann.

Recommended/Further reading
COTTON, A.P.;Sohail, M. & Tayler, W.K., 1998. Community initiatives in urban infrastructure. Water, Engineering and Development Centre.
COTTON, Andrew, Franceys, Richard., 1991. Services for shelter : infrastructure for urban low-income housing. Liverpool University Press in association with Fairstead Press.
DIAZ, L.F.; Savage, G.M.; Eggerth, L.L. & Golueke, C.G., 1996. Solid waste management for economically developing countries. ISWA, Denmark & CalRecovery, USA.
COTTON, Andrew., TAYLER, Kevin., 2000. Services for the urban poor. Water, Engineering and Development Centre.

Interdisciplinary

The module adopts an interdisciplinary teaching approach. Students from a wide variety of disciplinary and professional backgrounds will attend this module, enabling them to explore topics from a range of different perspectives.

Subject specific skills

Autonomously synthesize how administrative aspects (preparing for possible emergencies, communication, and distribution of materials) can provide positive contributions to responses to emergencies;
Implement conceptual design principles to the different infrastructure sub-sectors (rural road engineering, maintenance and network management, use of underground space in fast growing cities)

Transferable skills

Communicate (written and oral; to technical and non-technical audiences) and work with others
Exercise initiative and personal responsibility, including time management, which may be as a team member or leader
Awareness of the nature of business and enterprise in the creation of economic and social value
Overcome difficulties by employing skills, knowledge and understanding in a flexible manner
Ability to formulate and operate within appropriate codes of conduct, when faced with an ethical issue
Appreciation of the global dimensions of engineering, commerce and communication
Be professional in their outlook, be capable of team working, be effective communicators, and be able to exercise responsibility and sound management approaches.

Study

Study time

Type	Required
Lectures	20 sessions of 1 hour (29%)
Seminars	10 sessions of 1 hour (14%)
Private study	40 hours (57%)
Total	70 hours

Private study description

Pre-module preparation and reading.
Guided independent learning.

Costs

No further costs have been identified for this module.

Assessment

You must pass all assessment components to pass the module.

Assessment group A

	Weighting	Study time	Eligible for self-certification
Individual portfolio assignment	100%	80 hours	Yes (extension)
Up to 15 pages containing a range of professional and engineering documents (e.g. sketches, drawings, reflection, etc.)			

Feedback on assessment

Individualised feedback will be provided to the student portfolio. Feedback will be given in accordance to the University Policy on the Timing of the Provision of Feedback to Students on Assessed Work.

Availability

Courses

This module is Core optional for:

- TESA-H1C1 Postgraduate Taught in Humanitarian Engineering
  - Year 1 of H1C2 Humanitarian Engineering (with Sustainability)
  - Year 2 of H1C2 Humanitarian Engineering (with Sustainability)

This module is Option list A for:

- TESA-H1C1 Postgraduate Taught in Humanitarian Engineering
  - Year 1 of H1C1 Humanitarian Engineering
  - Year 2 of H1C1 Humanitarian Engineering