



## Unit Information Form (UIF)

(The UIF provides the definitive record of the designated Unit)

### SECTION A

#### General Unit Information

<b>Unit Name</b>	<b>Environmental Science and Building Services</b>
<b>Unit Code</b>	STI013-3
<b>Level</b>	6 FHEQ
<b>Credit Value</b>	15
<b>Location(s) of Delivery</b>	Off Campus, STI Myanmar University (Yangon and Mandalay campuses)
<b>Period(s) of delivery</b>	15 weeks (Semester 2)
<b>Pre-requisites or Restrictions</b>	
<b>Aims and Relevance</b>	<p>This unit provides students with an introduction to the engineering practices involved in the study of tropical architecture and human comfort. The unit covers the HVAC system used in the design of buildings, and examines environmental, sustainability, health, safety and risk considerations and constraints within this. Students will gain essential knowledge of the relevant standards and codes of practice involved in environmental design and building services. The unit also aims to provide an insight into the latest research and practices connected with the advent of smart buildings, mechanical and electrical equipment, fire extinguishing systems and elevator facilities. Sustainable building services are explored including water systems traditional and enhanced, including rainwater harvesting, local potable water treatment, drainage, waste and recycling systems, air conditioning. Students will examine traditional and enhanced electrical and mechanical systems of buildings and apply their knowledge to the requirements of case studies. Health, safety and risk management in the application of environmental science to the provision of building services is a key aim of the unit.</p>

<b>Syllabus Content</b>	<p style="text-align: center;"><b>Environmental Science</b></p> <ol style="list-style-type: none"> <li>1. Sustainable development in construction</li> <li>2. General principles of environmental design in construction</li> <li>3. Day lighting and sustainable design Illumination principles and design for visual comfort</li> <li>4. Acoustical environment and design in buildings</li> <li>5. Human comfort in construction</li> <li>6. Control of noise in the living environment</li> <li>7. Tropical architecture in tropical climates</li> <li>8. The bioclimatic approach</li> <li>9. Natural ventilation principles and practices</li> <li>10. Fire protection and egress</li> <li>11. HVAC system</li> </ol> <p style="text-align: center;"><b>Building Services</b></p> <ol style="list-style-type: none"> <li>1. Principles, Systems and Concepts for Sustainable Building Services, including enhanced services such as Photovoltaics, rainwater harvesting, local water treatment, wind and water energy recovery.</li> <li>2.</li> <li>3. Health and Safety in Construction of Elements of a Building</li> <li>4. Myanmar National Code 2016 Part 5A, 5B, 5C, 5D, Part 7</li> <li>5. Risk management for planning and use of building services systems</li> <li>6. Cold and Hot Water Supply Systems</li> <li>7. Ventilation Systems</li> <li>8. Drainage Systems, Sewage Treatment and Refuse Disposal</li> <li>9. Sanitary Fittings and Appliances: Discharge and Waste Systems</li> <li>10. Mechanical Conveyors: Lifts, Escalators and Travellators</li> <li>11. Fire prevention and control services</li> </ol> <p>Codes of practice, building standards, considerations of sustainable development, health, safety and risk will be considered throughout.</p>
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## Learning outcomes

On completion of this unit you should be able to:

1. Demonstrate the following knowledge and understanding
  - Evaluate the principles of environmental science with respect to climactic responsiveness of buildings and building services, with particular reference to tropical regions
2. Demonstrate the following skills and abilities
  - Identify and apply climactic response considerations to the design of buildings and building services

## PSRB outcomes

Indicate any specific Professional, Statutory or Regulatory Body (PSRB) requirements met by this unit.

UK Standard for Professional Engineering Competence (UK-SPEC): AHEP3 IEng Learning Outcomes:

SM1i, EA4i, D2i, D4i, EL2i, EL4i, EL6i, P1, P6, G1

Joint Board of Moderators (JBM) Core Threads - Primary Outcomes (assessed and evidenced):

Design, Sustainability, Health and Safety Risk Management

## Summary learning hours

	Scheduled	Guided	Independent	Autonomous	Placement	Total
Hours	53	27	60	10	97	150
Percentage	35.3	18.0	40.0	6.7	64.7	100.0

### Approach to learning

This unit will be delivered via lectures, discussion, assignment, reading classes, field survey to look at modern buildings for team work and individual presentation. Formal lectures will introduce knowledge and special features of tropical architecture in building, principles of environmental science and traditional and modern approaches to building services. They will also include

- knowledge of mechanical ventilation, vertical transportation, fire prevention, drainage and waste disposal, sustainable Building Services, alternative energy used in Building Services.
- Students' self-directed study.

### Learner development

This Unit particularly focuses on the development of your abilities in the following areas:

<b>Learner Development</b>	
This Unit focuses on the development of your abilities in the following areas:	
<b>Enquiry</b>	The curriculum for this unit is informed by the latest research and engineering practice in environmental science as relating to the provision of building services. You will develop your enquiry skills by solving problems relating to the challenges of health, safety, risk management and sustainability in the provision of environmentally appropriate design of buildings and provision of building services.
<b>Contextual understanding</b>	You will consider the wider contexts of the study of environmental science as related to the provision of building services. These will include environmental and ethical issues, awareness of professional practices, sustainable development, social and economic factors.
<b>Collaboration</b>	You will develop your collaborative skills by working independently and in groups to complete a portfolio assignment of assessing a new modern buildings.
<b>Enterprise</b>	The curriculum for this unit will help you to evaluate and implement ideas, and to solve challenges and problems. It will help you to understand the importance of ethical practices and professional codes of conduct and standards.

## Assessment summary

No	Assessment Method Code <sup>1</sup>	Learning outcome(s)	Weight %	Submission week	Length (of exam)	Exemption from Simplified Marking Scheme approved <sup>2</sup>
1	CW-PO	1 & 2	40	14		
2	Ex	2	60	15	3 hours	

## Assessment details

**Assessment 1.** A developmental portfolio that looks at the application and installation of traditional mechanical and electrical systems in buildings, including hot and cold-water distribution, heating and cooling systems, firefighting system, drainage system, vertical transportation system. Selection of appropriate solutions for the given case studies and required conditions should be recommended.

**Assessment 2.** A (3) hour invigilated exam looking at applying mechanical and electrical systems alongside traditional installations in buildings, the need for these and justification of efficiency of operations.

## Threshold expectations

In order to pass Assessment 1 you will need to:

- Demonstrate knowledge and understanding of the scientific principles underpinning relevant aspects of environmental science and parts of the building. (contributing to SM1i)
- Apply an integrated approach to environmental and engineering problems through know-how of the relevant building services and their application. (contributing to SM1i, EA4i)
- Apply problem-solving skills, technical knowledge and understanding to create or adapt design solutions of services systems that are fit for purpose including operation, maintenance, reliability etc. (contributing to SM1i, D4i)
- Show awareness of risk issues, including health and safety, environmental and commercial risk in building services (contributing to SM1i, EL6i)
- Use appropriate codes of practice and industry standards by learning current building regulations and international building standards. (contributing to SM1i, P6i)
- Apply skills in problem solving, communication, information retrieval, working with others and the effective use of general IT facilities. (contributing to SM1i, G1)

<sup>1</sup> See the UIF Guide for permissible codes

<sup>2</sup> Exemptions can only be granted by TQSC. The types of assessment task that can request an exemption are detailed in Chapter 8 of the Quality Handbook

In order to pass Assessment 2 you will need to:

- Generate recommendations for a complete mechanical/electrical system for a case study. (contributing to P1i)
- Demonstrate ability to apply quantitative methods in order to understand the performance of systems and components. (contributing to EL2i)
- Define a building services problem identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; codes of practice and standards. (contributing to D2i)
- Understand the requirement for engineering activities to promote sustainable development; prepare a recommendation for low impact sustainable building services and the need for green buildings. (contributing to EL4i)
- Show an awareness of risk issues, including health and safety, environmental and commercial risk. (contributing to EL6i)

## SECTION B

### Recommended Reading

**Core text**–This unit is supported by the following core text:

- Smith, D. L. (2011), *Environmental Issues for Architecture*, Hoboken, NJ: John Wiley & Sons, Inc.
- Hall, F., & Greeno, R. (2017). *Building Services Handbook*. 9<sup>th</sup> ed. New York, NY: Routledge, ISBN: 978-1-138-24435

**Guided reading:** the following is expected reading for this unit. Details of what to read and when will be provided in the BREO site, Google Classroom or the LMS.

- Butler, R.B., (2002). *Architectural Engineering Design: Mechanical Systems*. New York, NY: McGraw-Hill. ISBN:0-07-138546-0
- Janis, R.R., & Tao, W.K.Y. (2013). *Mechanical and Electrical Systems in Buildings*. 5<sup>th</sup> ed. London: Pearson Education. ISBN: 0138015627
- Kukreja, C.P. (1978). *Tropical Architecture*. C: McGraw-Hill. ISBN 978-0070964858
- McMullan R.,(2017). *Environmental Science in Building*. 8<sup>th</sup> ed. London: Red Globe Press/ Macmillan International Higher Education.
- Merritt, F.S. & Ricketts, J.T. (2001). *Building Design and Construction Handbook*. 6<sup>th</sup> ed. New York, NY: McGraw-Hill Education.
- Muthu Shoba Mohan, G. (2018) *Principles of Architecture*. Oxford: Oxford University Press.
- Sharma S. C., (2011) *Construction Engineering and Management of Projects [for Infrastructure and Civil Works]*, 2<sup>nd</sup> ed. Delhi, India: Khanna Publishers
- Singh G., & Singh J. (2009). *Building Planning Designing And Scheduling*, 4<sup>th</sup> ed.. Delhi, India: Standard Publishers.
- Olgyay, V. et al. (2015). *Design with Climate, Bioclimatic Approach to Architectural Regionalism*. Princeton, NJ: Princeton University Press.

**Independent study** – to receive high grades you will need to demonstrate your wider reading. The following resources provide useful background reading for the material in this unit. This is not an exhaustive list and students should read widely from the variety of journals available in the Learning Resources Centre

- Grondzik, W.T., & Kwok, A.G. (2019). *Mechanical and Electrical Equipment for Buildings*. 13<sup>th</sup> ed. New York, NY: John Wiley & Sons. ISBN-13: 978-1119463085
- Stein, B. (1997). *Building Technology: Mechanical and Electrical Systems*. 2<sup>nd</sup> ed. New York, NY: John Wiley & Sons. ISBN 0-471-59319-2

Once the unit has been approved this list can be replaced with a link to the online reading list.

Once initial approval of the unit has been given, the Unit Co-ordinator may propose changes to this section to the Academic Liaison Librarian

#### Articles from Journals and Proceedings

- <http://global.ctbuh.org/resources/papers/download/1758-report-on-the-mechanical-and-electrical-technology-of-the-latest-tall-buildings-in-japan.pdf>
- [http://www.ucl.ac.uk/estates/maintenance/fire/documents/UCLFire\\_TN\\_038.pdf](http://www.ucl.ac.uk/estates/maintenance/fire/documents/UCLFire_TN_038.pdf)

#### Other Useful Links

- <http://libguides.qub.ac.uk/c.php?g=282339&p=1881212>

#### Equality Impact Assessment

Question	Y/N/NA	Additional anticipatory adjustments/actions if necessary
Learning materials will be made available in advance of sessions for students to adapt as appropriate?	Y	As new materials are developed, they may be the only ones that may not appear earlier than the session or the materials developed during the sessions, like sun charts, etc.
The approach to teaching and learning is sufficiently flexible to enable all students to succeed?	Y	
The approach to group work takes account of the needs of students with disabilities and from diverse backgrounds?	Y	
The approach to practical work takes account of the needs of students with disabilities?	Y	
Students with a protected characteristic <sup>3</sup> have an equal opportunity to achieve the learning outcomes?	Y	
The assessment tasks provide all students with an equal opportunity to succeed?	Y	
Any other aspects of the unit that might pose potential challenges from an equality or	NA	

<sup>3</sup> Age, Gender reassignment, Marriage and civil partnership, Pregnancy and maternity, Race, Religion and belief, Sex, Sexual orientation

diversity perspective have been considered?		
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**SECTION C**

Administrative Information – Faculty completion	
<b>Faculty</b>	<b>Engineering</b>
<b>Portfolio</b>	
<b>School/Department</b>	Architectural Engineering
<b>Unit Co-ordinator</b>	Daw San San Moe, Dr. Myat Soe Phyu, Dr. Yin Min Paik
<b>Version Number</b>	1/2020
<b>Approved by</b>	
<b>Date of approval (dd/mm/yyyy)</b>	

Shared Units – Indicate below all courses which include this Unit in their diet
BEng (Hons) Architectural Engineering BEng (Hons) Civil & Architectural Engineering

	Name	Date
<b>Form completed by</b>	Dr. Myat Soe Phyu, Dr. Yin Min Paik, D Jazani	18 May 2020
<b>Signature of Chair of Faculty TQSC to confirm the accuracy of information presented</b>		

Unit Updates – ensure that the revised UIF is given a new version number each time a change is made		
Date	Nature of Update	FTQSC Minute Ref:

Administrative Information – Academic Registry completion	
<b>JACS / HECoS code (KIS)</b>	