MODULE SPECIFICATION

Module Title: **Smart Built Environment**			University module code:	
Level[i]: **MSc**	Credit Value[ii]:	ECTS Value[iii]: **4** (in Lithuania 1 ECTS equals to 26,67 hours of work load)	Length (in Semesters)[iv] **1**	Semester(s) in which to be offered:
New module[v]:	Title of Module being replaced *(if any):*			With effect from[vi]:
Originating School: **VGTU, BSTU**	Module Co-ordinator(s): **VGTU**			
Programme(s) in which to be offered:				
Pre-requisites *(between levels):*			Co-requisites *(within a level):*	
Indicative learning hours:	Percentage taught by School(s) other than originating School[vii] *:*			

Aims of Module:

- To get knowledge about range of concepts, *theories* and *perspectives* of smart built environment.
- Familiarise students with the micro, meso and macroenvironment, which impacts competitive sustainable built environment change.
- To acquire familiarity about *threats* (unemployment, ageing society, social exclusion, urban sprawl, ecosystem disrupted) and *opportunities* (creativity & innovation, connectivity, energy & water efficiency, social cohesive, environmental protection) built environment of tomorrow.
- Provide students with the knowledge about *dimensions* (intelligence, inventiveness and creativity of individuals; the collective intelligence of a city's population; globalisation; artificial intelligence embedded into the physical environment of the city and available to the city's population) and *interdisciplinary analysis* (political, legal, institutional, quality of life, social, cultural, ethical, psychological, emotional, religious, ethnic, ecological, climate change, educational and innovative aspects) of smart cities.
- Gain an in depth knowledge about the *sustainablity indicators* at macro (city), meso (neighourhood) and micro (building (accessibility, efficiency), citizen (happiness index, well being)) levels.
- To acquire knowledge about the basics of *satellites*, *sensors* (smart meters, smart phones/tablets, GPS devices/CCTV, weather sensors, building sensors), *big data*, *data/knowledge bases* of the best practices, *analytics* (algorithims, closed-loop systems, optimize consumption, location sensing) and *services* (location services, crowd sensing, traffic management, smart electric grid, disaster management, security) of data rich world.
- Provide students with the knowledge about *practical applications* (intelligent communities, clusters, regions, knowledge-intensive activities, innovation and competitive edge, education, training, knowledge work, digital democracy, intelligent transport, medicine and healthcare,

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energy, utilities, environmental protection, safety, administration services to the citizen, participatory and direct democracy, services to the citizen, quality of life, development of new businesses, attraction of talented employment and investments, knowledge-intensive companies, etc.)

- Course engagement by way of group discussions through the internet/skype discussions (50% mark attributed to soft skills)

Intended Learning Outcomes

Knowledge and Understanding

On successful completion of this module, a student will be able to:

- Explain and apply the concepts, *theories* and *perspectives* of smart built environment.
- Explore and review the complex micro, meso and macroenvironment, which impacts competitive sustainable built environment change.
- Give details about *threats* and *opportunities* built environment of tomorrow.
- Apply theoretical and practical knowledge about *dimensions* and *interdisciplinary analysis* of smart cities.
- Explore and review knowledge about the *sustainablity indicators* at macro (city), meso (neighourhood) and micro (building (accessibility, efficiency), citizen (happiness index, well being)) levels.
- Explain and apply *satellites data*, *sensors*, *big data*, *data/knowledge bases* of the best practices, *analytics* and *services* of data rich world.
- Apply theoretical and practical knowledge for solving practical problems.

Transferable/Key Skills and other attributes

On completion of the module a student will have had the opportunity to:

- Participate in group discussions and presentations via the internet
- Use Computer Learning Systems
- Exercise of initiative and personal responsibility

Module mark calculation:[viii]

Assessment components (in chronological order of submission/examination date)

Type of assessment[ix]	Weighting%	Duration *(if exam)*	Word count *(if essay/dissertation):*	Component pass required[x]
Assessment of the degree of interaction and participation of the students (50% mark attributed to soft skills)	30%		n/a	Yes ☒ No ☐
Final assessment component Written Group Essay	70%		6000	Yes ☐ No ☒

Learning and teaching strategies[xi]:

The core of the module material is a substantial body of tutors written notes and exercises located

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on Moodle. These incorporate interactive self- and tutor assisted formative assessment exercises. Students are directed to additional resources available online, for example in legal databases, including ScienceDirect, Scopus, the e-library, etc.

Teaching and learning will occur through moderation of forum discussion for the preparation of papers. In addition, in order to foster cohort cohesion, counteract the isolation of distance learning, and provide opportunities to reflect, practise reasoning skills and obtain further formative feedback, students will be encouraged to participate in on-line discussions, peer reviews and group work. (compulsory participation in forum discussion).

Summative assessment involves students applying their knowledge of smart built environment to a practical situation and producing a piece of coursework of 6,000 words, applying critical analysis of the smart built environment from different perspectives (see Aims of Module). Formative group sessions will be held online.

Moodle Virtual Learning Environment (VLE):
All students will be supported by extensive use of the Moodle virtual environment. The programmes utilise an e-based learning strategy to support delivery. The method adopts the following principles:
1. High quality integrated module content that combines a variety of types of information supporting the learning objectives of the module
2. Internet-based communication and submission of assessed work
3. On-line tutorial support during module delivery

Syllabus outline:

- Introduction to the module
- Good practice case studies and examples
- Concepts, *theories* and *perspectives* of smart built environment.
- Micro, meso and macroenvironment, which impacts competitive sustainable built environment change.
- *Threats* and *opportunities* built environment of tomorrow.
- *Dimensions* and *interdisciplinary analysis* of smart cities.
- *Sustainablity indicators* at macro (city), meso (neighourhood) and micro (building (accessibility, efficiency), citizen (happiness index, well being)) levels.
- *Satellites data*, *sensors*, *big data*, *data/knowledge bases* of the best practices, *analytics* and *services* of data rich world.

Indicative texts and/or other learning materials/resources:

Core text:

Kaklauskas, A.; Zavadskas, E. K. 2010. *Intelligent and biometric web-based decision support*. Vilnius: Technika, 372 p.

Kaklauskas, A.; Zavadskas, E. K. 2011. *Biometric and Intelligent Decision Support*. Vilnius: Technika, 372 p.

Jay Yang, Peter S. Brandon, Anthony C. Sidwell (editors). Smart and Sustainable Built Environments. Blackwell Publishing. 2005. 256 p.

Arturas Kaklauskas, Edmundas Kazimieras Zavadskas, Jurga Naimavicienė, Mindaugas Krutinis, Vytautas Plakys, Donatas Venskus. Model for a Complex Analysis of Intelligent Built Environment. Automation in Construction, Volume 19, Issue 3, May 2010, Pages 326-340

Dario Bonino, Fulvio Corno, Luigi De Russis. dWatch: A Personal Wrist Watch for Smart Environments. Procedia Computer Science, Volume 10, 2012, Pages 300-307

Donggen Wang, Tao Lin. Built environments, social environments, and activity-travel behavior: a case study of Hong Kong. Journal of Transport Geography, In Press, Corrected Proof, Available online 24 May 2013

Ding Ding, Klaus Gebel. Built environment, physical activity, and obesity: What have we learned from reviewing the literature? Health & Place, Volume 18, Issue 1, January 2012, Pages 100-105

George Cristian Lazaroiu, Mariacristina Roscia. Definition methodology for the smart cities model. Energy, Volume 47, Issue 1, November 2012, Pages 326-332

Jung Hoon Lee, Robert Phaal, Sang-Ho Lee. An integrated service-device-technology roadmap

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for smart city development. Technological Forecasting and Social Change, Volume 80, Issue 2, February 2013, Pages 286-306

Jean-Philippe Vasseur, Adam Dunkels. Chapter 22 - Smart Cities and Urban Networks. Interconnecting Smart Objects with IP, 2010, Pages 335-351

Recommended text:

F.H. Abanda, J.H.M. Tah, R. Keivani. Trends in built environment semantic Web applications: Where are we today? Expert Systems with Applications, Volume 40, Issue 14, 15 October 2013, Pages 5563-5577

Ellie Cosgrave, Kate Arbuthnot, Theo Tryfonas. Living Labs, Innovation Districts and Information Marketplaces: A Systems Approach for Smart Cities. Procedia Computer Science, Volume 16, 2013, Pages 668-677

R. Niemi, J. Mikkola, P.D. Lund. Urban energy systems with smart multi-carrier energy networks and renewable energy generation. Renewable Energy, Volume 48, December 2012, Pages 524-536

Yoshiki Yamagata, Hajime Seya. Simulating a future smart city: An integrated land use-energy model. Applied Energy, In Press, Corrected Proof, Available online 20 February 2013

Sung Ah Kim, Dongyoun Shin, Yoon Choe, Thomas Seibert, Steffen P. Walz. Integrated energy monitoring and visualization system for Smart Green City development: Designing a spatial information integrated energy monitoring model in the context of massive data management on a web based platform. Automation in Construction, Volume 22, March 2012, Pages 51-59

AmirHosein GhaffarianHoseini, Nur Dalilah Dahlan, Umberto Berardi, Ali GhaffarianHoseini, Nastaran Makaremi. The essence of future smart houses: From embedding ICT to adapting to sustainability principles. Renewable and Sustainable Energy Reviews, Volume 24, August 2013, Pages 593-607

Journals:

International Journal of Sustainable Built Environment: http://www.journals.elsevier.com/international-journal-of-sustainable-built-environment/
Sustainable Cities and Society: http://www.journals.elsevier.com/sustainable-cities-and-society/
Cities (The International Journal of Urban Policy and Planning): http://www.journals.elsevier.com/cities
Automation in Construction: http://www.journals.elsevier.com/automation-in-construction/
International Journal of Strategic Property Management: http://www.tandfonline.com/toc/tspm20/current

***On-line resources*:**

EU Smart Cities Stakeholder Platform: www.eu-smartcities.eu
ESF Smart Cities Initiative: www.esf.org/smartcities
EuroCities: www.eurocities.eu
EU Covenant of Majors: www.eumayors.eu

Date of completion of this version of Module Specification …….....

Date of approval by the Faculty Programme Approval and Review Sub-committee: ……

[i] *indicate level (e.g. first, second or third cycle; sub-level if applicable). All qualifications in the European Higher Education Area are located within three cycles - undergraduate; graduate and doctoral studies*

[ii] *permissible credit values as set out in Institution's Academic Regulations*

[iii] *European Credit Transfer System*

[iv] *indicate 0.5, 1, 1.5 or 2*

[v] *delete as applicable*

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[vi] *insert month and year of first/next delivery of module*

[vii] *identify all participating Schools other than Originating School*

[viii] *To be defined*

[ix] *please indicate, in chronological order of submission date, each assessment component by type, e.g. examination, oral, coursework, project, dissertation*

[x] *indicate* Yes *to specify the assessment component(s) to be passed in order to pass the module*

[xi] *please note the requirement to give full consideration to issues of equality, diversity and accessibility*

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