Partner 07 Module 00 ENG

Module Title: Green Built Environment			University module code:	
Level[i]: **Master**	Credit Value[ii]: **6**	ECTS Value[iii]: **6**	Length (in Semesters)[iv] **Single semester**	Semester(s) in which to be offered: **Winter semester/ Summer semester**
Existing/new module[v]: **New module**	Title of Module being replaced *(if any):* ___			With effect from[vi]: **09/2014**
Originating School: **MGSU Moscow**	Module Co-ordinator(s): **Prof. A. Balakina, Prof. M. Eichner**			
Programme(s) in which to be offered:				
Pre-requisites *(between levels):*			Co-requisites *(within a level):*	
Indicative learning hours: **180**	Percentage taught by School(s) other than originating School[vii] *:* 0%			

Aims of Module:

The master module “Green Built Environment” is addressing the need for architects and engineers to develop awareness for short and long term consequences of architecture to our environment. The course is providing comprehensive skills in key areas of sustainable research and design with a methodology, based on three levels of innovation (**digital data, sustainable evaluation, technology innovation**). These processing levels will form the teaching framework for the master students with the possibility to set individual research focuses in the field of “green building ad green environment innovation”. Discussion and presentation of current innovative architectural projects and cooperation with external research partners and specialists gives the course its specific reference to reality.

Key aspects

Rather than just proposing specific designs, the course will stimulate generating scientifically proven sustainable solutions for building structures, urban ecology, formal logics, materiality and “green environments”. Understanding and applying **“digital sustainable data strategies”** will allow for deepened analytic approaches of urban environments to define sustainable development potential. **“Sustainable evaluation”**, based on fundamental theoretical and practical knowledge of certification systems for sustainable quality enables for a successful decision making in the design process of different scales, climatic environments as well as social-cultural conditions. As future green buildings and living environments depend on “**innovation in architecture and technology**” the field of new energy efficiency, resources saving and material reuse, new production and material technologies will be explored to stimulate conceptual development of innovative building components, building materials and planning solutions.

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Intended Learning Outcomes

Knowledge and Understanding

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

- Understand innovative design and valuing strategies for sustainable urban environments and buildings of different typologies.
- Consider architectural design as a research process of creation through sustainable experiments with constant references to a wide range of architectural theories and technologies, as well as of demonstration of the dynamics of design, with tools, charts, maps and a series of prototypes.
- Receiving theoretical and practical knowledge about eco-sustainable standards in architecture and building construction. Understanding and applying systematics of international building quality certificates for sustainable planning approaches and using them as tools to guide design and realization process of architecture.
- Studying digital technology and architecture, the interaction between them and mutual influence on the creation of comfortable, environmentally friendly, healthy and social urban environments.
- Developing concepts for smart material solutions, which can enhance energy efficiency and sustainable performance of buildings.
- Bringing together environmental, economic, social and cultural aspects for poetic space creation of sustainable buildings and urban environments in a contemporary sense.
- Gaining expertise in the complexity of high quality sustainable architecture and the relation of resource saving, energy efficiency, renewable energy, newly developed materials, material efficiency, life cycle analysis and cost for integral architectural and construction design.
- Gaining design competence in project-specific sustainable solutions to be able to develop buildings or urban environments of high architectural standards and apply eco-sustainability valuation aspects.
- Becoming familiar with different architectural form finding methods and exploring them in design classes and workshops. The main methods being taught during the course will be "**sustainable data processing"**, valuing numeric sustainable aspects and environmental research by data processing in algorithms, "**biomimetics"** as an inspiration approach through natural phenomena - with analysis of nature to finding design solutions and "**sustainable research"** with sustainable quality evaluation as a basis for design and technology innovation.

Transferable/Key Skills and other attributes

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

- Real space experience in excursions and field study of innovative buildings and urban environments in Russia and international;
- Collection and organization of digital sustainable data information and computer programs to verify data like climate data, data of social networks, in place sensor collected date, to use it in a modern sense for conceptual urban planning.
- Using digital planning tools (Grasshopper, programming language "processing", Rhino, a.o.) for research and conceptual architectural designing. The tools allow for processing data, collected from different sources like the internet, sensors or data bases to further processing and architectural form finding.
- Presenting of research strategies (drawings, online presentation, video material, physical models) to explain how research affects the achievement of planning objectives.
- Discussion of current issues on living quality, social balance and resource saving in urban space and cityscape. Participation in interdisciplinary group discussions and workshops on contemporary sustainable problems;
- Sustainable standards: Getting familiar with latest European eco-sustainable certification systems for housing buildings.
- Becoming aware of the direct relationship of architects planning decisions, material properties, construction solutions and socio-cultural cultural dimensions for short term and

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long term environmental quality of buildings and urban environments
- Appling “integrated research and design methods” based on “digital and analogue sustainable data strategies” for different project scales, urban environments and building innovations.

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]
Final assessment Component 1 (practical): Design project on individual program part of the semester group theme;	70%		___	Yes ☒ No ☐
Final assessment Component 2 (theoretical): Final research report on individual sustainable research thesis (master thesis);	30%		18 000	Yes ☒ No ☐

Learning and teaching strategies[xi]:

- The course is based on exploration, real site analysis and architectural and urban design case study design with related sustainable research and evaluation. In each semester, students will work on various site related socio-cultural, urban economic and resource saving actual problems. In the beginning of each semester, students get the chance to discuss and set with tutors individual research focus with relation to the general sustainable semester topic.
- Teaching will be organized in weekly seminars, discussions and tutor consultations, with interim reviews and presentation. During design seminars, systematic and practical application of sustainable certification, evaluation methods and architectural quality aspects taught.
- The growing role of the virtual space, big data and online as well as offline tools for architects research activities will be constantly explored on their digital design potential for green architecture and green environments. Digital and analog investigation of various urban situations and the presentation of logical sustainable urban intervention will be an integral part of the module.
- Exploring the use of 3D printing and customized prototyping technology for architectural ideas and future architecture. An overview of resources for hard and software to carry out digital prototyping will be provided during the course.
- Regular preparation of online and offline presentations, production of analysing drawings, research reports and 3D prototypes is of particular importance.

Individual research thesis:
- In practical and theoretical module parts, students will be trained in the key categories of

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architectural sustainability, ranging from innovation in building technology, passive energy-saving solutions, building physics, conceptual building modeling and spatial and social integration in architecture. Students get the chance to define in the first part of the course an individual research thesis, guiding their semester activities.

Lectures:

- The weekly held lectures of the module are fundamental part of the module and provide students with innovative knowledge on all important module aspects. Evaluation systems for sustainability will be presented and discussed. Provided printouts of the lecture topics will support practical seminars and the design classes on “green living environments”.

Practical seminars:

- In seminars and workshops the use of digital simulation and data collecting tools will be applied. The interpretation of digital databases and online data, like EPD’s, social media, global and local data and others, relevant for sustainable development will be explored in practical case study design.

Individual research:

- The module is project orientated for individual research and design; urban territories or experimental building design with strong focus on sustainable and integrative social aspects will be developed y students individually or as part of wider formulated group topics. The semester program can be further developed till fully master thesis in a 2 year program after successful completion of the 1. Semester.

Innovative technology:

- Theoretical obtained knowledge during lecture and discussion with specialists of other disciplines has to be independently investigated in greater depth through self study and practically applied in design tasks, to develop new concepts for architecture, that are truly sustainable, innovative, transferable and relevant to the development of our discipline.

Syllabus outline:

- Advanced sustainable housing building certification
- Digital sustainable data and digital analysis
- Energy efficient and resource saving strategies
- Design of sustainable buildings and urban environments
- Experimental sustainable concepts
- Emerging technology & engineering
- Innovation in building technology

Indicative texts and/or other learning materials/resources:

Core text:

- Arjen Oosterman; Ole Bouman; Rem Koolhaas; Mark Wighley : Volume - Internet of Things, Archis 2011 #2, ISBN 09789077966280;
- Santamouris, Mat (Hg.): Environmental design of urban buildings. An integrated approach. London, 2006;
- Johann Jessen; Ute Margarete Mayer; Jochen Schneider: stadtmachen.eu, Karl Kraemer Verlag, Stuttgart, 2008, ISBN 978-3-7828-1524-6;
- Juergen MayerH., Neeraj Bhatia, -atrium Whether + Architecture, A Daniels Faculty Publication
- Hegger, Manfred; Fuchs, Matthias; Stark, Thomas; Zeumer, Martin: Energie Atlas - Nachhaltige Architektur, Institut für Internationale Architekur-Dokumentation, München 2007;
- Sophie Wolfrum; Winfried Nerdinger: Multiple City, Jovis Verlag, 2008, ISBN 978-3-86859-0012

Recommended text:

- Erhorn-Kluttig, Heike et al.: Energetische Quartiersplanung. Methoden Technologien Praxisbeispiele, Stuttgart, 2011

Journals:

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- Rivka Oxman, Robert Oxman ,The New Structuralism, AD Architectural Design, 04/2010, ISBN 978-0470-742273
- Detail Praxis, Photovoltaik, B. Weller, C. Hemmerle, S. Jakubetz, S. Unnewehr, 2009
- Detail Green 1/2013

On-line resources:
- NaWoh, Nachhaltigkeit im Wohungsbau, Germany 2012, sustainable certification system for housing buildings, online publication, http://www.nawoh.de/
- http://www.novatlantis.ch/2000watt.html
- http://www.nachhaltige-quartiere.ch
- Energiekonzepte und Nachhaltigkeitsberatung | Bürobroschüre ee concept, online publication, http://www.ee-concept.de/publikationen/buerobroschuere_web_es.pdf
- "Leitfaden Nachhaltiges Bauen 2013" engl. guidelines for sustainable architecture 2013, Bundesministerium fuer Verkehr, Bau und Stadtentwicklung, online publication, http://www.nachhaltigesbauen.de/leitfaeden-und-arbeitshilfen-veroeffentlichungen.html

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

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

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[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*

[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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