MODULE SPECIFICATION

Module Title: **Energy Audit**			University module code:	
Level[i]: **Bachelor**	Credit Value[ii]:	ECTS Value[iii]: **5** (in Ukraine 1 ECTS equals to 36 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: **NTUU "KPI"**	Module Co-ordinator(s): **NTUU "KPI"**			
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:

- Gain *sustainable knowledge* in the field of energy auditing.
- Studying *objects and subjects* of the energy audit.
- Studing *terms and definitions* in the field of energy auditing.
- Studing theories and opinions in the field of energy auditing.
- Studing *regulatory support* of energy audit.
- *Types* of energy audit.
- Familiarization with *methods* of energy audit.
- Familiarization with *methodology* of energy audit.
- Familiarization with the basic requirements for the *general strategy* of energy audit.
- Studing *rights, responsibilities and skills* of energy auditor.
- Studying *factors* that have influenced on energy audit and accuracy of it's results.
- Assessment of risks in conducting energy audits and analysis of the results.
- Studing *major phases* of energy audit.
- Studing *main sources* of information during an energy audit.
- Studing *instrumentation* for energy audit.
- Studing *techniques* and obtaining *practical skills* for energy auditing.
- Depth studing *features* of the energy audit , power supply systems, refrigeration equipment, pumps, lighting, thermal-electric and electric welding, and other installations and thermal systems;
- Studying the *causes and sources* of loss fuel and energy resources.
- Studying methods for determining the *potential of energy savings*.
- Familiarization with economic feasibility and technical solutions for *combined production of heat*

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and electricity.

- Studying ways of reducing heat losses through effective thermal insulation types;
- Studying methods for determining and means of reducing losses in *heating and hot water supply* .

Studying sublect is expected in the course of self-study student lecture notes and recommended literature, independent solutions with practical tasks, group discussions via the Internet / Skype (50% of the evaluation are communication and interpersonal skills)

Intended Learning Outcomes

Knowledge and Understanding

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

- Explain and use the *terms, definitions, theories and opinions* in the field of energy auditing.
- Apply *methods and methodology* of conducting an energy audit.
- Detailed represent the sequence information and the content of the *main stages* of the energy audit.
- Apply *techniques* and show practical skills in the energy audit.
- Use theoretical knowledge to solve practical problems..

Transferable/Key Skills and other attributes

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

- Prepare a balance of power and capacity.
- Determine the potential for energy savings.
- Apply the energy metering and energy audit.
- Investigate, identify and remove the causes and sources of energy loss.
- Perform analysis and explain the results of the energy audit.
- Preparing a report on the results of an energy audit.
- Participate in group discussions and presentations via Internet.
- Use a computer training system.
- Take the initiative and take 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 ☒

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Learning and teaching strategies[xi]:

The core of the module material are lecture notes and assignments of teachers, located on Moodle. They include interactive tasks for formative assessment as a teacher, as well as by the student (self-assessment). 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 in energy audit to a practical situation and producing a piece of coursework of 6,000 words, apply analysis of the results of the energy audit from the point of view of various aspects (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.
- Research on best practices with specific examples.
- *Terms, definitions, theories and opinions* in the field of energy auditing.
- *Methods and methodology* of the energy audit.
- Basic *methods* of conducting energy audits.
- *Instrumentation* for energy audits.
- Identification and elimination of *energy losses*.
- Performing the *analysis* and explanation of the *results* of an energy audit.
- Generating a *report* on the results of an energy audit.

Indicative texts and/or other learning materials/resources:

Core text:

Energy audit of examples and illustrations: Manual / V.V.Prokopenko, O.M.Zakladnyy, P.V.Kulbachnyy. - Kyiv.: Osvita Ukrainu, 2008. - 438p.

Energy audit HVAC systems: method. guidelines for laboratory work number 1 on the subject "Energy Audit" for students and trainees specialties 7.000008 "Energy Management", 7.090603 "Electrical system" full-time and distance learning. auth.: V. Prokopenko, Zakladniy OO, Kulbachnyy P., Stepanov VI - K. PPI "Politehnica", 2008 - 64 p.

Energy audit of pump systems: method. guidelines for laboratory work number 2 of the subject "Energy Audit" for students and trainees specialties 7.000008 "Energy Management", 7.090603 "Electrical system" full-time and distance learning auth.: V. Prokopenko, Zakladniy OO, Kulbachnyy VV, Stepanov VI - K. PPI "Politehnica", 2008 - 64 sec.

Energy Management / A.V.Prahovnik, A.I.Solovey, V.V.Prokopenko etc. - Kiev, IEE NTU "KPI", 2001

Energy audit: Manual / O.I.Solovey, V.P.Rozen, Yu.H.Leha, O.O.Sytnyk, A.V.Chernyavskyy, H.V.Kurbaka. - Cherkasy: ChSTU, 2005. - 299 p.

2. Energy audit of housing and communal services: Monograph / VP Rosen, O. Solovey, S. Brzhestovskyy, AV Cherniavskyi, PV Rosen / / Under the total. yet. VP Rosen, O. Solovey. - K.: PP. PKF "Delta Fox", 2007. - 224 p. ISBN 978-966-96808-0-8

DSTU 4713:2007 Energy. Energy audit industry. Procedure and requirements for the

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organization of work. - Kyiv: State Committee of Ukraine, 2007. - 20 p.
DSTU 4714:2007 Energy. Energy balance of the industry. Methods of construction and analysis. - Kyiv: State Committee of Ukraine, 2007. - 33 p.
M 0013184.0.33-04. Typical methods of industrial energy surveys / V.Rozen, O.Solovey, A.Chernyavskyy, Yu.Shulha. - Kyiv: State Committee of Ukraine, 2004. - 70 p.
Leznov BS Saving energy in pumping systems. - M. Energoatomizdat, 1991. - 144 p.

Recommended text:

Law of Ukraine on energy efficiency. July 1, 1994 № 74/94 – VR
Rules of Operation of electrical installations (PTEE). Kiev 1995.
Technical operation of thermal installations and heat networks. Kiev 1995.
Energy of the next century. Newsletter. Chief editor Prakhovnik AV
Kovalko M. Energy saving - experience, problems and future. Kyiv 1997.
Industry of Ukraine: the path to energy efficiency. TACIS - Program.
Ukraine: Energy efficiency in buildings. TACIS - Program.
F. Shinsky. Control processes by saving energy. - M.: “Mir “,

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*
[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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