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Knowledge Management Course for Master Program in Nuclear Engineering

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National Research Nuclear University "MEPhI" at a Glance

NRNU MEPhI:

- **Main Educational and Research Partner of Rosatom**
  - **One of Two First Research Universities (2008)**
  - **21 branches**
  - **Located in 15 Federal Districts and in 20 atomic cities throughout Russian Federation**
- **Combines 11 Higher Education Institutions and 20 colleges:**
  - **Over 38 thousand students;**
  - **over 1500 professors and associated professors.**

Scientific-educational cluster NRNU MEPhI for nuclear engineering training

IATE, Obninsk

MEPhI, Moscow

VITI, Volgodonsk

STI, Seversk

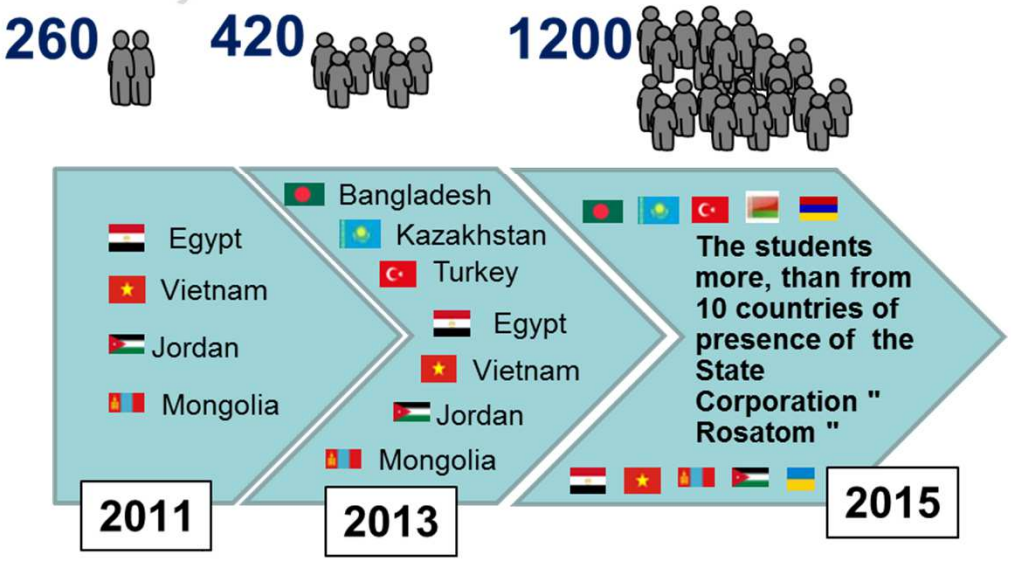
Nuclear Energy Complex
(10 NPP, 25 facilities)

Nuclear Research Complex
(46 Research Institutes)

Nuclear and Radiation Safety Complex
(Production Plant «Mayak», Siberian Chemical Plant, 17 facilities)

DITI, Dimitrovgrad

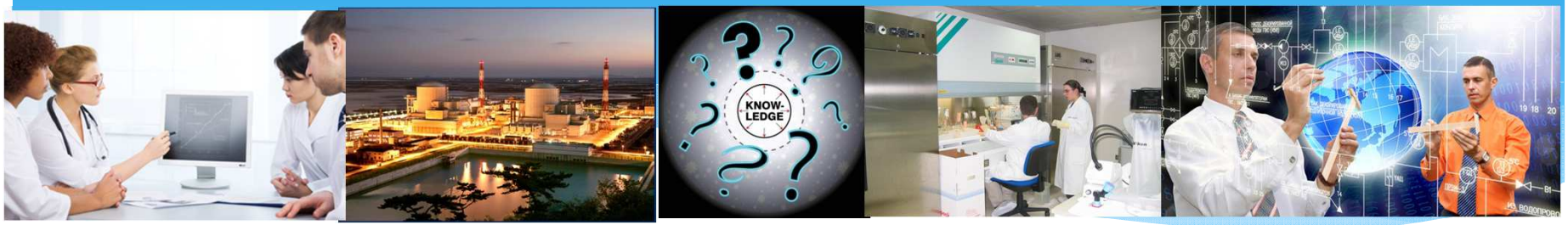
Rosatom – MEPhI collaboration for foreign students training



Background for NKM Course

* A *basic level* of nuclear knowledge is a part of the general human culture.
* An *intermediate level* of nuclear knowledge is a part of *general scientific-technical culture* and is taught at university.
* An advanced level of nuclear knowledge has been accumulated by many experienced workers in both power and non-power applications.

Background for NKM Course



- KM in the last 20 years has established itself as a key strategic approach for management of intellectual assets and knowledge that can improve *efficiency and safety*, increase *innovation* and help *preserve and enhance* current nuclear knowledge.
- Considering the critical importance of nuclear knowledge for power generation, medicine, agriculture, it is timely to introduce the concept of managing knowledge at the university level.

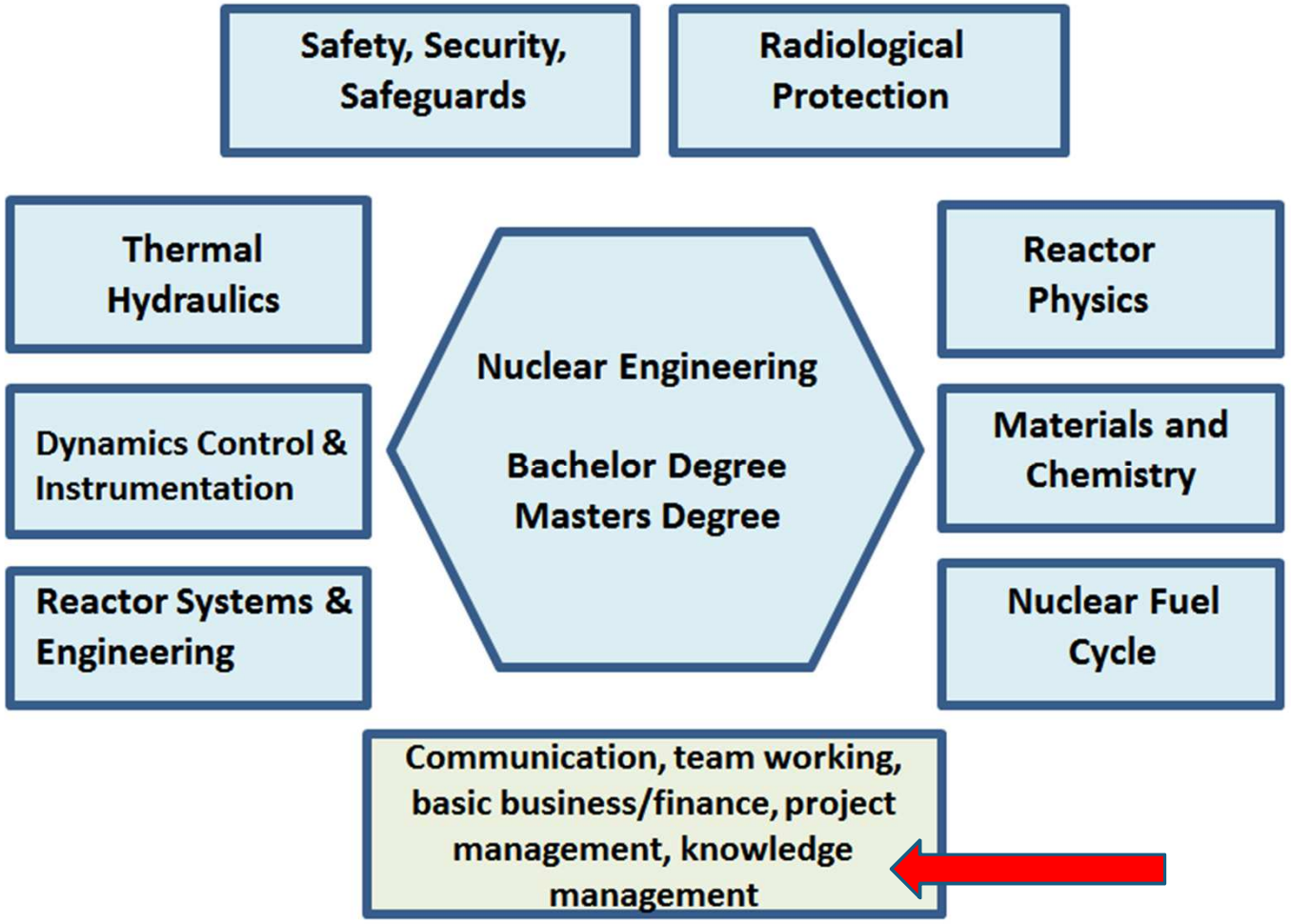
IAEA recommendations

IAEA TRAINING COURSE SERIES

NUCLEAR KNOWLEDGE MANAGEMENT COURSE FOR NUCLEAR ENGINEERING MASTER PROGRAMMES AT UNIVERSITIES, 2014

Technical universities providing master level programmes on Nuclear Science, Nuclear Technology and Nuclear Engineering should recognizes that core curriculum consists not only of technical courses in reactor physics, nuclear fuel cycle thermal hydraulics, materials, radiochemistry, radiological protection, safety, security and safeguards, dynamics, control and instrumentation, nuclear instrumentation and reactor systems and engineering but also managerial courses on communication, team working, basic business, project management and Knowledge Management.

Scope of Nuclear Engineering Academic Programmes



Study program

* Master of Nuclear Engineering / Physics of Nuclear Power Installation
* 1st or 2nd year (optional)
* Teaching method: Lectures – 18 hours, Practical (individual and group work, seminars), written essay, presentation at student conference, self-study
* Examination method: the final test.

Target Audience

- Master level students of Nuclear Science, Nuclear Technology and Nuclear Engineering.

- The program and structure are also useful as a base of a training course on NKM (within continuous education) for engineers working in nuclear industry

- The course content can also be modified to be used as a general basic course on KM for other science or engineering programs (e.g. Electrical Engineering / Power Engineering / Mechanical engineering / Chemical engineering, etc.) with some adaptations if necessary

Development of general and specific competencies

Upon completion of the course students should be able to critically appraise the nature of nuclear knowledge and its management, and how this can contribute towards achieving safe operation of nuclear facilities, gains in economics and operational performance, facilitating innovations and ensuring the responsible use of sensitive knowledge.

In other to gain this competence graduates should:

- **Understand the meaning and importance of treating knowledge as an asset;**
- **Be able of identifying potential benefits of applying KM tools and techniques in their future work;**
- **Understand approaches and practices to manage nuclear knowledge;**
- **Be able to work efficiently with specialized nuclear related information resources;**
- **Apply appropriate Knowledge Management methods and tools in their future workplace.**

Prerequisites

- **Prerequisites for the Nuclear Knowledge Management course: Bachelor in sciences or engineering completed.**

- **It is recommended to include it in the second half of the master program, when basic or intermediate nuclear knowledge level has been acquired.**

Syllabus

* 8 modules supported by lectures (including video presentations), student's individual projects, seminars and teamwork.
* Total course duration – 30 hours (core)
* Optional lectures and practicals – 24 hours
* Self-study – 50 hours

Course Modules

1	Introduction to nuclear knowledge management
2	KM in nuclear science and technology
3	Methods and tools for KM (tacit and explicit knowledge)
4	Knowledge loss risk management
5	Human resource management and competence development
6	KM and managing intellectual property
7	Implementing NKM in nuclear industry
8	NKM organizational challenges

The main elements of the course (1-3)

1	Introduction to nuclear knowledge management	Types of knowledge and knowledge concepts; Knowledge as a resource; Intellectual capital; Individual and organizational aspects of knowledge; Knowledge Management life cycle.
2	KM in nuclear science and technology	NKM specifics; Needs and challenges of KM in the nuclear area; Managing critical competencies; NKM objectives (safety, performance, economics, innovations, responsible use); Risk and consequences of knowledge loss (explicit and tacit); Knowledge loss risk management; NKM and safety culture; Elements of effective NKM systems;
3	Methods and tools for KM (tacit and explicit knowledge)	Knowledge prioritization; Critical knowledge; Knowledge transfer; IT tools to support KM; Knowledge organization systems; Information preservation; Specialized nuclear related information resources.

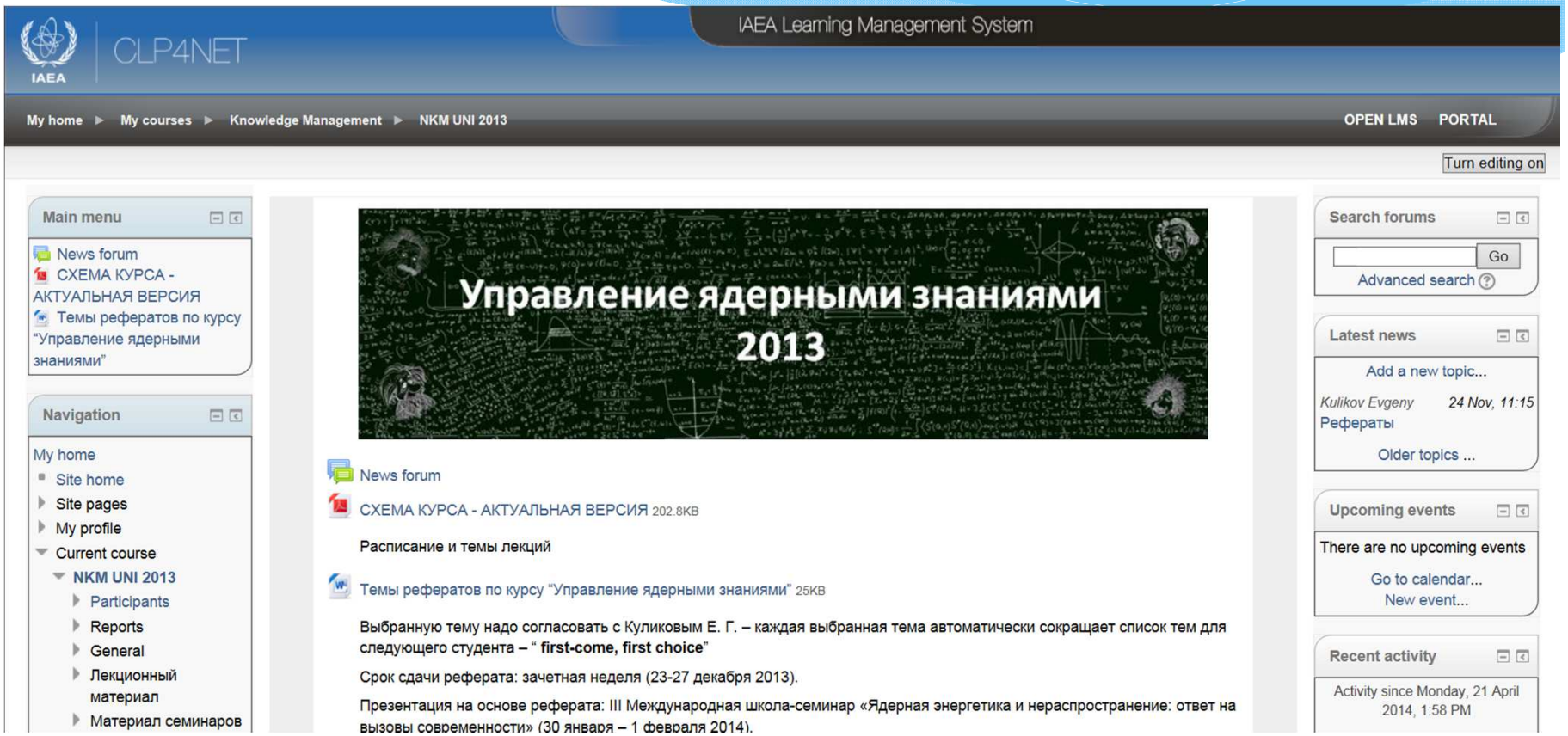
The main elements of the course (4-6)

4	Knowledge loss risk management	Organisational knowledge; Critical knowledge; Risks associated with knowledge loss; Practical approaches; Case studies.
5	Human resource management and competence development;	Integrated approach to HR development; Transferring knowledge within organization; Competence development; KM and safety culture.
6	KM and managing intellectual property	Intellectual property (IP) basics; KM and innovations; Different aspects of IP issues related to KM; Development of KM culture within organization.

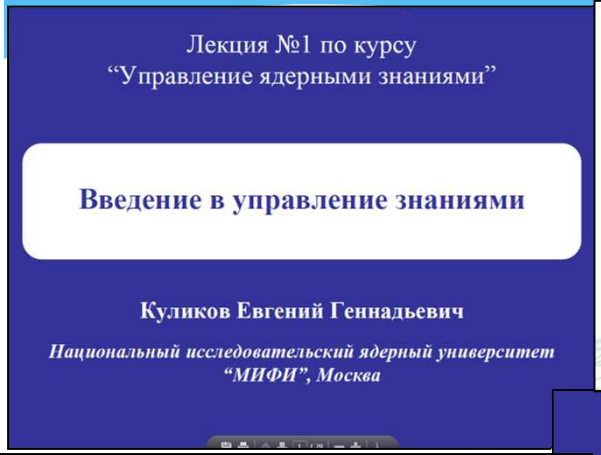
The main elements of the course (7-8)

7	Implementing NKM in nuclear industry	KM objectives for different organizations; Knowledge domains in nuclear organizations; Specificities of each type of organization; NKM maturity assessment; Case studies: NKM in different nuclear organizations (NPP, R&D organizations, universities, regulatory bodies, other users of nuclear and radiation technology).
8	NKM organizational challenges	KM linkage to business goals and safety; KM policy and strategy development and implementation; Integration of NKM in organizational management systems; Organizational culture influence; Implementation of NKM projects.

Course support via the Cyber Learning Platform CLP4NET



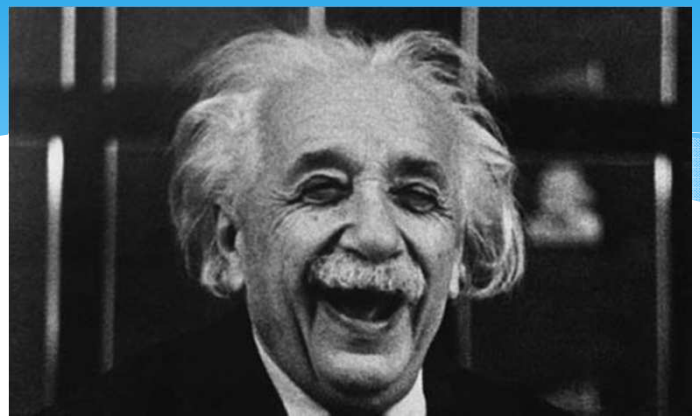
Lectures and presentations



Follow-up

* 2014-2015 – the NKM course implementation for 3-4 Master Programs at the MEPhI,
* 2014-2016 – implementation the course at 14 universities of the association “Consortium of Rosatom Supporting Universities” taking into account the good practices from the pilot (3 years) implementation in MEPhI,
* June 2014 – NKM school for university teachers ‘Train trainers”,
* 2015 – textbook on Nuclear Knowledge Management.

The Role of Teachers



* *It would be better if you began to teach others only after you yourself have learned something….*

* *Albert Einstein*

Thank you for your attention!

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