**Syllabus**

1. Course Description
   1. Title of a Course, “Introduction to the Semantic Web Technologies”, “Семантическая паутина” (in English)
   2. Pre-requisites, “Discrete Mathematics” or “Programming” or “Data Bases” (optional)
   3. Course Type (compulsory, elective, optional)

Abstract: This course is an introduction to the theory and practice of the Semantic Web, the next generation of the Web, which extends the traditional one with explicit semantics and makes the information on the Web accessible to both human and computer agents.

Learning Objectives:

The aims of this course are to

1. introduce the theoretical foundations of the Semantic Web, including the standard data, query and ontology languages such as RDFS, SPARQL, OWL and the corresponding knowledge representation technologies, and to
2. provide the students with practical skills of building ontologies and querying the Web.

Learning Outcomes:

By the end of the course, the student should be able to:

1. understand fundamental concepts, advantages and limits of the Semantic Web;
2. understand and use the RDF framework and associated technologies such as RDFa and SPARQL;
3. understand and use the ontology language OWL 2 and its profiles;
4. understand the principles of ontology-based data access;
5. understand the basics of the underlying knowledge representation and reasoning formalisms such as description logic.
6. Course Plan

1. The history of the Semantic Web. Syntactic vs semantic web. Ontologies in (Computer) Science.

2. The layered approach to the Semantic Web. XML, the tree model of XML documents, XML Schema. Querying XML documents, XPath.

3. RDF (Resource Description Framework). RDF Schema. RDF/S semantics. Linked Data.

4. Requirements for ontology languages. From RDFS to OWL. Three species of OWL. OWL ontologies.

5. Ontology engineering.

6. Reasoning with OWL. Open vs closed worlds.

7. Description logic EL (the OWL 2 EL profile of OWL 2).

8. Description logic ALC. Tableau algorithms.

9. Description logics extending ALC. First-order logic.

10. Instance data as ABoxes. Ontology-based data access.

The course lasts 34 academic hours for lectures and 32 academic hours for classes.

1. Reading List:
2. Pascal Hitzler, Markus Kroetzsch and Sebastian Rudolph. Foundations of Semantic Web Technologies. Chapman & Hall, 2009. ISBN 978-1420090505.
3. David Wood, Marsha Zaidman and Luke Ruth. Linked Data. Manning Publications, 2013. ISBN 9781617290398.
4. Lecture slides and online resources provided by the lecturer.
5. Grading System: 2 homeworks, 2 in-class tests and an examination.
6. Guidelines for Knowledge Assessment

<http://www.dcs.bbk.ac.uk/~michael/sw15/sw15.html>

1. Methods of Instruction

Practical classes using PC. Individual course projects. Ontology engineering tasks.

1. Special Equipment and Software Support (if required)

Sufficient PC quantity for students.