Wayne State University
Department of Computer Science

CSC 6991, Advanced Web Technologies
Spring/Summer 2016, T – Th, 07:30 - 08:50 P.M.

Principles of Semantic Web Technologies and Applications
Both Online Section (CRN: 32047, Section: 04) and/ or Traditional Section (CRN: 35055, Section: 01)

Instructor: Dr. Javad Abdollahi
E – Mails: javad@cs.wayne.edu
Websites: http://www.cs.wayne.edu/~javad
Prerequisites: Both CSC 5750 and CSC 5710, or consent of the Instructor

Textbook website:
https://mitpress.mit.edu/books/semantic-web-primer-0

Textbook website:
http://store.elsevier.com/product.jsp?isbn=9780123859655
Student body: This course should be of interest to graduate (and highly motivated forward looking undergraduate) students in computer science, engineering, education, instructional technology, medical science and management who are determined to learn Principles of Semantic Web technologies, in a practical and hands-on course environment.

Course description: This course will cover the fundamentals of Web Science and the Semantic Web Technologies and Applications.

Students will master new SW (Semantech Web) Technologies such as: RDF, FOAF, Ontologies, and OWL.

All background material will be developed within the course itself from scratch.

Basics of XML

- XSLT (Extensible Stylesheet Language Transformations)
- XPath. XSLT relies upon the W3C's XPath language for identifying subsets of the source document tree, as well as for performing calculations.

RDF (Resource Description Framework)

- RDF graphs. An RDF graph is a set of RDF triples. The set of nodes of an RDF graph is the set of subjects and objects of triples in the graph.
- RDF Graph Database products
- FOAF (Friend of a friend). FOAF is a descriptive vocabulary, which combines RDF technology with 'Social Web' concerns.
- SPARQL (SPARQL Protocol and RDF Query Language). SPARQL is an RDF query language.
- RDFS Extension: DAML+OIL
Ontologies

- In information science, an ontology is a formal knowledge representation. A set of concepts within a domain and the relationships between those concepts are used.
- Uses of ontologies. Ontology is used to reason about the properties of a domain.
- Basics of Ontology Development
- Ontology components. Most ontologies contain classes (concepts), instances, attributes, and relations.
  - Classes (concepts)
  - Attributes
  - Relations
- Ontology languages: RDF, OWL
- OWL (Web Ontology Language)
- Frame Based ontologies
- OWL Based ontologies

Frame Based Ontologies using Protégé

OWL Based Ontologies using Protege, ...

- Semantic Web Technologies
  - TopBraid Composer from TopQuadrant
  - Protégé OWL plugin

Future Trends of the Internet and highly Advanced Topics (if time permits)

Fundamentals of Semantic Web Services (with hands-on simple examples)

Testing/evaluation: 1. Two Project/Exams are to be given as follows:

Project/Exam I (Midterm I) 3rd week of June 100 points
2. **Homework assignments, 10 points each**

3. Literature review and term paper
   **100 points**

4. Quizzes (announced or unannounced), 10 points each

The final course grade will be determined based on the following scale:

- **A**: 95 - 100%
- **A-**: 90 - 94%
- **B+**: 87 - 89%
- **B**: 84 - 86%
- **B-**: 80 - 83%
- **C+**: 77 - 79%
- **C**: 74 - 76%
- **C-**: 70 - 73%
- **D**: 60 - 69%
- **F**: 0 - 59%

**LITERATURE REVIEW**

**Objective:**

The intent of this assignment is to introduce students to an advanced topic in web programming and lead them to critically evaluate literature in this challenging
and rapidly evolving field.

Requirement:

Students are to identify a topic of interest to them in the area of advanced web technologies such as web services, semantic web, web services, semantic web services, ontology engineering, and intelligent internet systems. They are to research recent (2014 and later) literature on the topic and select four related articles. The lead article of these four must be drawn from an academic journal. Each paper must be at least 7 pages long. From these articles the student will prepare a double spaced eight to twelve pages paper with attached copies of the articles that:

- Briefly summarizes the content of each article.
- Develops an underlying theme from the articles - no that this should involve synthesis by the student, not merely a restatement of the articles.

Sample Topics:

Semantic Web
Web Services
Web 2.0
Web 3.0
Application Servers
Ontology Engineering
Object Oriented Technology and Philosophy
Natural Language Processing

Self-organization
Social Networks
Duality (Semantic – Syntax, Algebra – Geometry,)