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| **CMSE 491 Selected Topics in Software Engineering I** |
| **Department:** Computer Engineering Department |
| **Instructor Information****Name:** Assoc. Prof. Dr. Duygu Çelik Ertuğrul**E-mail:** duygu.celik@emu.edu.tr**Office:** CMPE 206**Office Tel:** 0 392 630 1178   |
| **Assistant Information****Name:** Selin Bitirim**E-mail:** selin.bitirim@emu.edu.tr**Office:** CMPE 203**Office Tel:** 0 392 630 1191 |
| **Meeting times and places**Tuesday 08:30-10:20, CMPE 236Thursday 08:30-10:20, CMPE 236Wednesday 14:30-16:20, CMPE 236 (LAB) |
| **Program Name:** Software Engineering  | **Program** **Code:** 29 |
| **Course Code** CMSE 491 | **Credits** 4 | **Year/Semester**2018-2019 Fall |
| [ ]  Required Course [x]  Elective Course |
| **Prerequisite(s):**None. |
| **Catalog Description**This course is to be arranged as seminar course. Students and faculty members participate in studying recent articles published on the research interests of the department. (4'th year standing) (Pre-requisite: none)**Aims & Objectives**This course aims to provide the basic overview of what the Semantic Web (SW) is and how it can be used. It mainly contains three parts: SW theory, ontology and SW programming applications. The major part of the course is the SW languages and applications. Course will cover URI scheme; XML and processing; resource description framework (RDF): model, syntax, schema and languages; ontology concept, Web-based ontologies, integration and interoperability, semantics and abstract syntax of OWL, Semantic Web Rule Language (SWRL), Semantic Query-Enhanced Web Rule Language (SQWRL) and applications; ontology parsing and reasoning; best practice case studies; W3 Consortium, current activities and future directions. The practical part of this course involves semantic related expert knowledgebase system applications. |
| **Course Web Page**https://staff.emu.edu.tr/duygucelik/en/teaching/cmse492 |
| **Textbook(s):**Recommended books for this course:* Daconts, M.C., L.J. Orbst, and K.T. Smith. 2003. The Semantic Web: A Guide to the Future of XML, Web Services, and Knowledge Management. New York: Wiley. [ISBN: 0-471-43257-1]
* Antoniou, G. and F. van Harmelen. 2004. A Semantic Web Primer. Cambridge, MA: MIT Press. [ISBN: 0-262-01210-3]
* G. Antoniou, P. Groth, F. Harmelen and R. Hoekstra. A semantic Web Primer. The MIT Press, 2012.
* Powers, S. 2003. Practical RDF. Sebastopol, CA: O'Reilly.[ISBN: 0-596-00263-7](One copy is reserved at IU Library Media & Reserve Service Department (http://www.libraries.iub.edu/index.php?pageId=307) under Prof. Ding's personal reservation)
* Semantic University, <https://www.cambridgesemantics.com/blog/semantic-university/>
* M. P. Singh, and M. H. Huhns. Service-Oriented Computing: Semantics, Processes, Agents. John Wiley & Sons, 2005.
* B. DuCharme. Learning SPARQL, O´Reilly, 2011
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| **Indicative Basic Reading List:*** Davies, J., D. Fensel and F. van Harmelen, eds. 2003. Towards the Semantic Web: Ontology-Driven Knowledge Management. New York: Wiley.
* Gomez-Perez, A., M. Fernandez-Lopez, and O. Corcho. 2003. Ontological Engineering: Advanced Information and Knowledge Processing. Berlin: Springer.
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| **Topics Covered and Class Schedule (4 hours of lectures per week)**

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| **Week 1** | Chapter 1: Today’s Web and the Semantic WebChapter 2: The Business Case for the Semantic Web |
| **Week 2** | Chapter 3: Understanding XML and its Impact on the EnterpriseChapter 4: Understanding XML Related Technologies |
| **Week 3** | Chapter 5: Understanding Resource Description Framework (RDF) |
| **Week 4** | Chapter 6: Understanding TaxonomiesChapter 7: Understanding Ontology |
| **Week 5** | Chapter 8: SWRL & SQWRL and Reasoning (based on the rules by using Ontology Reasoners: Hermit, Race Pro, Pellet etc. on Protégé). |
| **Week 6** | **Class Exercise: Ontology generating by using Protégé 5.x** **Class Exercise: Rule Knowledgebase generating based on SWRL/SQWRL****Class Exercise: Semantic Web Programming via Java by using Ontology Parser and Reasoner by using Ontology APIs tools** |
| **Week 7**  | **\*Assignment Stage 1: %10 (Create Ontology on Protégé editor +Presentation) will be** **Week 7: 06 November 2018** |
| **Week 8**  | **\*Assignment Stage 2: %10 (Create Rules by using SWRL/SQWRL +Presentation) will be** **Week 8: 13 November 2018** |
| **Week 9**  | **MIDTERM EXAM** |
| **Week 10** | **MIDTERM EXAM** |
| **Week 11** | Chapter 9: SPARQL |
| **Week 12** | Chapter 10: Ontology parsing, querying, and reasoning through a Java application.Chapter 11: Semantic Web Services Chapter 12: An Organization’s Roadmap to Semantic Web |
| **Week 13** | **\*Assignment Stage 3: %15 (Coding "An Ontology Parser/Inferencing Engine" with Java by using OWL API & a Pellet Reasoner API & SWRLAPI + Presentation) will be** **Week 13: 18-20 December 2018** |
| **Week 14** | **\*Assignment Stage 4: %15 (Final Report (article format) + Presentation) will be** **Week 14: 25-27 December 2018***Students will prepare an article report and demonstrate/run their program. The article format will be* [*IEEE Word format*](http://ieeeauthorcenter.ieee.org/wp-content/uploads/Transactions-template-and-instructions-on-how-to-create-your-article.doc). |
| **Week 15** | **FINAL EXAM** |

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| **Lab Schedule****Semantic Web Programming Tools for Labs (Find them in the CODING-TOOLS-PACK folder):*** NETBEANS 8.2
* OWL JAVA API 5.2
* Protege-5.2.0-win
* SWRL JAVA APPI
* PELLET JAVA API

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| **Weeks 3-4** | Introduce Protégé 5 editor and other Semantic Web tools. |
| **Weeks 5-6**  | Developing an ontology. |
| **Weeks 6-7** | Creating a decision table for generating SWRL and SQWRL rules of the application.  |
| **Weeks 9-12** | Using NetBeans 8.x Java Framework for Semantic Web Programming. Students will use some well-known Ontology Parser APIs and Ontology Reasoner APIs for managing their ontologies. This exercise will involve Database, GUI/Web/Mobile applications, Ontology to create an Expert Knowledgebase System application. |

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| **Course Learning Outcomes:*** Learn the fundamental concepts, advantages and limits of the semantic web (SW).
* Learn main differences between Web 1.0/Web 2.0 and semantic web (Web 3.0).
* Learn W3C Standards, Ontology Languages, and Ontology Application Areas.
* Learn RDF Framework and Associated Technologies.
* Learn OWL and creating ontology knowledgebase via Protégé ontology editor.
* Learn Querying Ontologies.
* Learn designing ontology rules and querying the rules by using Semantic Web Rule Language (SWRL and SQWRL).
* Learn SW programming for ontology-based parsing and reasoning by using Java and different SW Java APIs.
* Design and Develop an Expert Rule-based Knowledgebase Software System (as real-world applications) by applying Semantic Web technologies for term project
* Write Final Report/Article for the Project
* Make Presentations of the term project with demo
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| **Assessment** | **Method** | **No** | **Percentage** |
| Midterm Exam(s) | 1 | 20 % |
| Final Examination | 1 | 30 % |
| Attendance | - | 0 % |
| Lab | 1.Stage & 2. Stage of assignment | 20 % |
| AssignmentLab | 3.Stage & 4. Stage of assignment | 30 % |
| **Attendance grade:** No grade will be given. However, compulsory for weekly design studio meetings. |
| **Policy on makeups:** For eligibility to take a makeup exam, the student should bring a doctor's report within 3 working days of the missed exam. |
| **Policy on the NG grade:** If you miss two exams with no valid excuse, you will be given the NG grade. |
| **Policy on missed labs:** There will be no makeup for missed labs. If you cannot attend a lab for some reason, you should contact the assistant *beforehand* so that you can present your work in advance. |
| **Relationship of the course to Program Outcomes**The course has been designed to contribute to the following student outcomes:1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.3. an ability to communicate effectively with a range of audiences5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusionsThe contribution of each course learning outcome to student outcomes is specified in parenthesis. The studentoutcomes are available at <http://cmpe.emu.edu.tr/abet> |
| **Prepared by:** Assoc.Prof. Dr. Duygu Çelik Ertuğrul | **Date Prepared:** 10 Dec 2018 |