Course Title	**WEB ENGINEERING**				
Course Code	**DLWSS502**				
Course Type	**Compulsory**				
Level	Master (2nd Cycle) – Distance Learning				
Year / Semester	1 / 1				
Teacher's Name	**Achilleas Achilleos, PhD**				
ECTS	10	Lectures / week	3	Laboratories/week	0
Course Purpose	The aim of this course is to provide students with critical understanding on how to effectively engineer Web Applications. The course addresses the concepts, methods, technologies and tools for developing advanced Web applications. Topics covered include evolution of the Internet and the Web, Web technologies and the basic models and architectures in a Web environment. The course kicks-off with a theoretical examination of web engineering and its phases. It proceeds to introduce client-side technologies (HTML5, CSS, JavaScript, jQuery, BootStrap.js) and server-side technologies (PHP, JSP, Java JAX-RS) that support the development of static web sites, dynamic web applications and rich internet applications. It provides an overview of cutting-edge concepts, technologies and frameworks (MEAN stack – MongoDB, Express.js, Angular.js, Node.js) that support full stack web development. It concludes by demonstrating the importance of new technologies such as Service Oriented Engineering, Internet of Things, Semantic Web and Cloud Computing, their relevance, benefits and implications for the web engineering discipline. The course has a theoretical underpinning, with the focus on practical examples that reveal how to engineer Web applications using the introduced implementation methods, techniques and tools. This course aims to cultivate knowledge of the essential principles, methods and tools to: ● Critically assess and apply web engineering methods and tools. ● Execute the process of web engineering, including requirement analysis, design, implementation, deployment, maintenance and evaluation of web applications.				
Learning Outcomes	By the end of the course the students are expected to: ● Describe and explain the concepts, principles and software processes that are used for engineering websites and web applications. ● Outline the stages of the web evolution and describe the conceptual and technological differences of Web 1.0, Web 2.0 and Web 3.0. ● Gain theoretical knowledge and analytical skills to develop web sites and dynamic web applications.				

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<tr><td></td><td colspan="3">Utilize different Web technologies and programming languages in theory and through practical exercises.
Apply these concepts and technologies (HTML, CSS, JavaScript, jQuery, PHP, JSP, JAX-RS) to develop Websites and/or Dynamic Web Applications.
Critically evaluate the differences and benefits of Full Stack Web Development in comparison to the above web concepts and technologies.
Outline and explain the purpose and capabilities offered by advanced web frameworks of the MEAN stack – MongoDB, Express.js, Angular.js and Node.js.
Demonstrate critical awareness and explain the relevance, implications and benefits of advanced web engineering technologies and concepts: service-oriented engineering, semantic web, internet of things and cloud computing.</td></tr>
<tr><td>Prerequisites</td><td>None</td><td>Corequisites</td><td>None</td></tr>
<tr><td>Course Content</td><td colspan="3">This course consists of six units that will be taught within twelve (12) weeks:
Unit 1 (Week 1) is the initial session that delivers an introduction to web engineering (concepts, principles and methods), web application features, processes and models, evolution challenges and drivers.
Unit 2 (Weeks 2-3) covers the concepts, methods and tools of early client-side web technologies (HTML, CSS, JavaScript, Scripting Libraries – jQuery, Bootstrap.js).
Unit 3 (Weeks 4-7) deals with the topic of server-side scripting and the concepts, methods and languages for implementing web applications based on the 3-tier architecture (PHP, MySQL, MVC) and the 4-tier architecture (Java Servlets, JSP, JavaBeans, ASP).
Unit 4 (Weeks 8-10) introduces the asynchronous web communication model, on the basis of the XML Meta-Language, AJAX (Asynchronous JavaScript and XML) and web services (WS*-stack services, RESTful services), as well as applying the technologies for developing service oriented web applications.
Unit 5 (Week 11) delivers a basic introduction to full stack web development and provides an overview to front-end and back-end programming of web applications using the MEAN (MongoDB, Express.js, Angular.js, Node.js) stack frameworks.
Unit 6 (Week 12) provides a high-level overview of the topics on service-oriented engineering, cloud computing and Web 3.0: The Semantic Web and the Internet of Things.
The course also includes the final revision week for the entire content of the course (Week 13).</td></tr>
<tr><td>Teaching</td><td colspan="3">Mode of Delivery: Distance Learning</td></tr>
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Methodology	The course is designed to introduce and explain the material students are expected to learn through an on-line learning environment. The on-line environment provides an opportunity for receiving on-line feedback from the Course Instructor during their study. In addition, students will be encouraged to interact both with other students and the instructor so as to feel part of an on-line community of learners that belong to the University network. The course content will be delivered through online material/notes, recorded lectures and/or narrated presentations. Therefore, students may be asked to download and study notes, tutorials and numerical exercises as well as watch recorded lectures/demonstrations or narrated presentations posted on the web addressing the main concepts of a particular unit. Furthermore, the planned communication and the dynamic/online interaction activities between the course instructor and the students will include asynchronous communication tools (Discussion Forum) that students may be asked to participate, wherever appropriate, in an online forum posting their views on certain topics covered in a particular unit; and synchronous communication tools (instant messaging, such as Skype, chat rooms, video-conferencing, etc.), that students may discuss on-line with the Instructor (s) and/or other students specific issues covered in a given unit. Moreover, a number of case study readings are also considered, so as to demonstrate the relevance and practical applicability of mobile and ubiquitous computing methods and systems covered in the various units of this course. Case-studies can illustrate that what students have studied in each unit is not just of academic or theoretical value but also has value in terms of improving real-life challenges.
Bibliography	**Compulsory Bibliography** 1. Sven Casteleyn, Florian Daniel, Peter Dolog, Maristella Matera, “Engineering Web Applications”, Book: Data-Centric Systems and Applications, 2009, Springer-Verlag Berlin Heidelberg, ISBN: 9783540922001. 2. Bill Burke, “RESTful Java with JAX-RS 2.0: Designing and Developing Distributed Web Services”, Paperback: 392 pages, Publisher: O'Reilly Media; Second edition (December 2, 2013), Language: English, ISBN-10: 144936134X, ISBN-13: 978-1449361341 **Additional / Complimentary Bibliography** 1. Robin Nixon, “Learning PHP, MySQL & JavaScript: With jQuery, CSS & HTML5”, 5th Edition, Series: Learning PHP, MYSQL, Javascript, CSS & HTML5, Paperback: 832 pages, Publisher: O'Reilly Media; 5 edition (June 8, 2018), Language: English, ISBN-10: 1491978910, ISBN-13: 978-1491978917. 2. Nicholas S. Williams, “Professional Java for Web Applications”, 1st Edition, Paperback: 936 pages, Publisher: Wrox; 1 edition (March 10, 2014), Language: English, ISBN-10: 1118656466, ISBN-13: 978-1118656464. 3. Simon Holmes, Clive Herber, “Getting MEAN with Mongo, Express, Angular, and Node”, 2nd Edition, Paperback: 504 pages, Publisher: Manning Publications; 2 edition (May 10, 2019), Language: English,

	ISBN-10: 1617294756, ISBN-13: 978-1617294754, Book examples code: LINK. 4. A series of entry-level tutorials on various Internet Technologies: www.w3schools.com. 5. The official site of the World Wide Web Consortium. Various references, RFCs and interesting reading material on Internet development: www.w3c.org. 6. Yogesh Deshpande, San Murugesan, Athula Ginige, Steve Hansen, Daniel Schwabe, Martin Gaedke, Bebo White, “Web Engineering”, Journal of Web Engineering, Vol. 1, No.1 (2002) 003-017, Rinton Press. 7. Georgia Kapitsaki, Alexia Dini Kounoudes and Achilleas Achilleos, “An overview of user privacy preferences modeling and adoption”, IEEE Euromicro Conference on Software Engineering and Advanced Applications (SEAA 2020), track ES-IoT: Embedded Systems and the Internet of Things, 2020. 8. I. Szilagyi and P. Wira, "Ontologies and Semantic Web for the Internet of Things - a survey," IECON 2016 - 42nd Annual Conference of the IEEE Industrial Electronics Society, 2016, pp. 6949-6954, doi: 10.1109/IECON.2016.7793744.
Assessment	The Students are assessed via continuous assessment throughout the duration of the Semester, which forms the Coursework grade and the final written exam. The coursework and the final exam grades are weighted 50% and 50%, respectively, and compose the final grade of the course. Various approaches are used for the continuous assessment of the students, such as dynamic online activities, online quizzes, group project design, implementation and presentation. The assessment weight, date and time of each type of continuous assessment is being set at the beginning of the semester via the course outline. An indicative weighted continuous assessment of the course is shown below: ● **1st Online activity – Research Paper Study & online quiz** (10% of total marks for module) ● **Two marked assignments** (30% of total marks for module) ● **2nd Online activity – Quiz** (10% of total marks for module) ● **One closed-book, 3-hour final exam** (50% of total marks for module) Students are prepared for final exam, by revision on the matter taught, problem solving and concept testing and are also trained to be able to deal with time constraints and revision timetable. The criteria considered for the assessment of each type of the continuous assessment and the final exam of the course are: (i) the comprehension of the fundamental concepts and theory of each topic, (ii) the application of the theory in solving related problems and (iii) the ability to apply the above knowledge in complex real-life problems. The final assessment of the students is formative and summative and is assured to comply with the subject’s expected learning outcomes and the quality of the course.

Language	English