**COURSE OUTLINE - SE 329 - Software Architecture & Design – spring 2017**

**Department of computer Science & Engineering Air University Multan Campus**

**Course Info**

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| Course Title | Software Architecture & Design |
| Course Code | SE – 329 |
| Pre – Requisite | OOP and Software Engineering |
| Elective Stream | Software Engineering |
| Credit Hrs. | 3 |
| Instructor | Ahmad Mohsin |
| Contact | [ahmad@aumc.edu.pk](mailto:ahmad@aumc.edu.pk), Ext. 115 |
| Lab | Shall be required time to time |
| Contact hrs. | Monday to Wednesday 03 – 04 pm |
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Course Objectives

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| * Learn to understand the Software Architectural perspective and how it differs from lower-level design Ability to understand the need for a Software Architecture. * Help students to understand current era Software Architectures Ability to develop and apply an Software * To learn about Software Architectural Styles in use in modern day applications * To understand Patterns and their roles in the development of software architectures * To get Students acquainted with modern programming Design Patterns * Get students equipped with all necessary UML artifacts involved in Software Design and Architecture * To understand Software Refactoring Techniques * To get understanding of Software Architecture for Internet of Things. |

Books: Resources

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| **Software Architecture – Foundations, Theory and Practice.** Taylor, Medvidovic, Dashofy. Wiley 2009.  **Head First Design Patterns.** O’Reilly, Freeman and Freeman.  **Design Patterns.** Erich Gamma, Richard Helm, Ralph Johnson and John Vlissides, . Addison-Wesley, 1995  **Refactoring: Improving the Design of Existing Code.** Martin Fowler.  Amy Brown and Greg Wilson (Eds.). [*The Architecture of Open Source Applications*](http://aosabook.org/). Published under the Creative Commons Attribution 3.0 Unported license, 2012  **An Introduction to Software Architecture.** David Garlan and Mary Shaw (Article).   * Emmerich, Wolfgang. [[\*] "Software Engineering and Middleware: A Roadmap".](https://s3.amazonaws.com/content.udacity-data.com/courses/gt-cs6310/readings/gt-sad-emmerich-paper.pdf) International Conference on Software Engineering - Future of Software Engineering Track, 117-129, 2000 * Harel, David. [[\*] "On Visual Formalisms."](https://s3.amazonaws.com/content.udacity-data.com/courses/gt-cs6310/readings/gt-sad-harel-paper.pdf) Communications of the ACM, 32(5):514-530, May 1988 * ‘Warmer, Jos, and Anneke Kleppe. [*The Object Constraint Language.*](http://www.amazon.com/gp/product/0201379406/qid=1136216038/sr=1-2/ref=sr_1_2/104-9753716-9478358?s=books&v=glance&n=283155)  Addison-Wesley, 1999. * Fielding, Roy Thomas. ["Architectural Styles and the Design of Network-based Software Architectures."](http://www.ics.uci.edu/~fielding/pubs/dissertation/top.htm) Department of Information and Computer Science, University of California, Irvine, 2000. * Garlan, David, and Mary Shaw. [[\*] "An Introduction to Software Architecture."](https://s3.amazonaws.com/content.udacity-data.com/courses/gt-cs6310/readings/gt-sad-garlan-and-shaw-paper.pdf) Carnegie Mellon University Technical Report, CMU-CS-94-166, January 1994.   Web services architecture and its characteristics:  <http://smdfarooq.weebly.com/uploads/4/9/5/4/49543715/unit_3_farooq.pdf>  <https://msdn.microsoft.com/en-us/library/ms996441.aspx>  **SOA**  <http://www.service-architecture.com/articles/web-services/index.html> |

Grading Criteria

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| Grading Component | Weightage |
| Midterms | 30 |
| Final Terms | 45 |
| Assigments | 5 |
| Quizzes | 5 |
| Term paper | 5 |
| Term project | 5 |

Software:

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| Microsoft VISIO  OCTOPUS FOR OCL: <http://octopus.sourceforge.net/>,  <http://www.dresden-ocl.org/index.php/DresdenOCL:Download> (OCL)  C#.net : Visual Studio 2015 Community Edition |

Course Breakup

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| Week # | Topics Covered | Tasks | Readings |
| 1  Note:  These Notes are must to read in order to establish a strong conceptual base for Architecture and Design Learners. | Introduction, Architectural Styles, Design of a System, quality and Architecture | Convert Java Code into C# Code and remove bugs in a given case study of Address Book. Submit on Coming Monday. | **Classic Paper of David Garlan and Mary Shaw**  Article 2, 3 (Available on General Share)  Ch2 (SA in Practice) , Microsoft Architecture Guide , Ch . No. 02 |
| 2 | OO Analysis UML & Design, Design Artifacts in UML, Library Example UML, Assigned papers discussion (1, 2 , 3) | Designing OOP Solutions:  A Case Study (Chapter 4 Book 3)  4+1 View Architecture | Book 3 Chapters 1, 2, 3  UML ATM Case Study |
| 3 | Component Level Design, UML COMPONENT MODELING  Model your Apps Architecture  Layer Diagrams for Your Application | Case study paper related to component level design at General Share. | <https://msdn.microsoft.com/en-us/library/dd490886.aspx>  Related Handout on General share for UML component modeling  Related Handout on General share for UML component modeling |
| 4 | Software Connectors, Intro Software Design patterns and Architecture |  | Chapter from Text Book1  Head First Design patterns Book |
| 5 | GANG OF Four Pattrens |  |  |
| 6 | C # Design patterns | USING DOT NET FOR WRITING D. P |  |
| 7 | Java Design patterns |  |  |
| 8 |  |  |  |
| Midterms |  |  |  |
| 10 | Service oriented Architectures |  |  |
| 11 | SOA and RESTful |  |  |
| 12 | Architectures for IOTs |  |  |
| 13 | Open Source Systems Architecture |  |  |
| 14 | Refactoring and Software Architecture | Removing Bad Smells in C# Code:  Improve design by refactoring | Examples from Text  Martin Flower Book on Refactoring  Refactoring in C# |
| 15 |  |  |  |
| 16 |  |  |  |
| 17 |  |  |  |