**CMP3204 Distributed Information Systems**

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| Period per  Week | Contact Hour per Semester | Weighted  Total Mark | Weighted  Exam Mark | Weighted Continuous Assessment Mark | Credit  Units |

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| 45 | 30 | 00 | 60 | 100 | 60 | 40 | 4 |

**Rationale**

Many computer applications are confronted with ever increasing volumes of data which must be managed, accessed, and processed efficiently. Typical cases arise in the fields of e-Health, banking and insurance, e-Science, digital libraries, etc. From the data management point of view, this has led to a radical shift from centralized, monolithic database systems towards distributed information systems. For such systems, it is of utmost importance:

 To have sophisticated mechanisms and protocols for coordination and access of distributed resources

 To have appropriate infrastructure which support distributed applications

This course is designed to provide a firm understanding of the basic problems associated with distributed information systems and expose the students to the different architectural paradigms, as well as practical experimentation with selected systems.

**Objectives**

 To introduce the student to the concept of distributed information systems

 To expose the student to fundamentals of information integration and interoperability, federation/mediator/brokering architectures, agent-oriented systems agent-oriented systems, query formulation and processing, semi- structured and multimedia data management, metadata, and knowledge management.

 To introduce the student to the practical imperatives of the languages and protocols for developing advanced/distributed/global information systems and their applications.

 To expose the student to recent advances in technology and research in database and intelligent systems

**Course Content**

***1. Introduction***

 What are Distributed Information Systems (IS)?

 Evolution of IS

 IS Architectural Paradigms

***2. Distributed Transactions***

 Atomicity and Concurrency Control in a Distributed Setting

 TP-lite: Application Login Inside Databases

 Practical Exercise: Distributed Transactions & 2PC in DBMSs and in Java

***3. Middleware***

 Is middleware more then the “/” in client/server?

 Practical Exercise: CORBA

***4. Container Architectures, J2EE***

 Enterprise Java Beans

 Practical Exercise: JBoss

***5. Web Services***

 How can Web Services be invoked?

 How can Web Services be described?

 Practical Exercise: SOAP & WSDL

***6. (Web) Service COMPOSITION***

 How can (web) Services be Combined to Complex applications?

 Demo: BPEL4WS / IBM WebSphere

 Practical Exercise: OSIRIS

***7. Semantic Web Services***

 How can the Description of a Web Service (WS) be Enriched with

Semantic Information?

 Demo: OWL-S

***8. Message-Oriented Middleware***

 Asynchronous interactions

 Demo: IBM WebSphere MQSeries

**Learning Outcomes**

On completion of this course, the student will be able to:

 Demonstrate a firm understanding of the concept of distributed information systems

 Appreciate and discuss the fundamentals of information integration and interoperability, federation/mediator/brokering architectures, agent-oriented systems agent-oriented systems, query formulation and processing, semi- structured and multimedia data management, metadata, and knowledge management.

 Implement a distributed Information System using Java EE.

**Recommended and Reference Book**

*[1]* G. Alonso, F. Casati, H. Kuno, V. Machiraju. *Web Services–Concepts, Architectures and Applications.* Springer, 2004. ISBN 3-540-44008-9.

*[2]* F. Berman, G. Fox, A. Hey (Eds.). *Grid Computing*. John Wiley & Sons, 2003, ISBN: 0-470-85319-0.

*[3]* K. Birman: *Reliable Distributed Systems – Technologies, Web Services, and*

*Applications.* Springer, 2005. ISBN: 0-387-21509-3.

*[4]* J. Myerson. *The complete book of Middleware.* Auerbach, 2002. ISBN 0-

8493-1272-8.

*[5]* T. Özsu, P. Valduriez. *Principles of Distributed Database Systems*. Prentice