Distributed Object-Oriented Architectures

1. **Course number and name:** 020ENDES4 Distributed Object-Oriented Architectures

2. **Credits and contact hours:** 4 ECTS credits, 35 contact hours (lectures + labs)

3. **Instructor's or course coordinator's name:** Rima Kilany

4. **Text book:**
   a. **Other supplemental materials:**
      Handouts and course material posted on the Web

5. **Specific course information**
   a. **Catalog description:**
      This course explains the concept of middleware within the context of object-oriented distributed applications. It covers the following distributed architectures: Java RMI, OMG - CORBA, Enterprise Java Beans distributed components as well as Web Services.

   b. **Prerequisites or co-requisites:**

   c. **Required:** Elective for CCE students; required for CCE software engineering option students

6. **Specific goals for the course**
   a. **The student will be able to:**
      - Evaluate the challenges of application distribution, as well as the advantages/disadvantages of different communication middleware/ architectures.
      - Implement a Java RMI distributed application
      - Implement a CORBA distributed application in Java
      - Implement a distributed application using Enterprise Java Beans (Session, Message Driven Beans) and JPA entities(Java persistence API)
      - Implement a web distributed application using web services.

   b. **KPI:**

KPI	a2	c2	e3	j1	k2	k3
Covered	x	x	x	x	x	x
Assessed	x	x	x	x	x	x

7. **Brief list of topics to be covered**

Lecture	Description
1	Application distribution : Evolution and needs

2	middleware - Distributing functions with RPC - DCE - Object Request Brokers Properties
3	Distributing objects with Java RMI
4	Implement a distributed Java RMI application
5-6	Configure dynamic class loading and security of a Java RMI application
7	Personalize RMI transport layer and Distributed Garbage Collecting. Define on-demand activatable RMI objects.
8-9	Lab : Java RMI application development
10	CORBA: Bus, components, Object management architecture (OMA)
11	Understand implementation elements of a CORBA application in Java
12	Implement a CORBA application, using the Java IDL ORB provided with the Java Development Kit.
13	Interoperable Corba object reference (IOR). Portable Object Adapters (POA)
14	POA policies configuration in order to personalize deployment and execution of a CORBA application
15-16	Lab : CORBA application development
17	Introduction to JEE (Java Enterprise Edition) framework, APIs such as JNDI, and EJB components (Differences between Session Beans, Message Driven Beans and JPA entities.)
18	Session beans in detail: Stateless, Stateful, Pooling, Passivation, application server configuration, callback methods.
19	Development of a Session bean with Netbeans IDE and and Oracle Glassfish application server.
20	JPA entities in detail, persistence frameworks, configuration and database mapping.
21	Implement a solution showing session beans and JPA entities interaction.
22	Advanced notions on persistence: Inheritance, polymorphism.
23	Asynchronous Middleware - JMS - Message Driven Beans
24	Configuration of destinations (Topic, Queue) on the Glassfish application server, and implementation of a Message Driven Bean.
25	Transactions in an EJB environment
26	Security in an EJB environment.
27	Web Services : protocol stack, context of use : Comparison with all distribution solutions,
28	Development of a web service in C# with Visual Studio