

Course Outline

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| School: | Eng. Tech. & Applied Science |
| Department: | Information and Communication Engineering Technology (ICET) |
| Course Title: | Java EE Programming |
| Course Code: | COMP 303 |
| Course Hours/Credits: | 56 |
| Prerequisites: | COMP 214, COMP 228 |
| Co-requisites: | N/A |
| Eligible for Prior Learning, Assessment and Recognition: | Yes |
| Originated by: | ILIA NIKA |
| Creation Date: | Fall 2005 |
| Revised by: | ILIA NIKA, Paula McMillan |
| Revision Date: | Winter 2017 |
| Current Semester: | Winter 2017 |
| Approved by: | <i>ppesikan</i> <i>l c/o</i> |

Chairperson/Dean

Students are expected to review and understand all areas of the course outline.

Retain this course outline for future transfer credit applications. A fee may be charged for additional copies.

This course outline is available in alternative formats upon request.

Course Description

This course builds on Java Programming, COMP228, and covers Java EE APIs. Coursework emphasizes distributed objects, Java Web applications and Java enterprise applications for deployment to Java Application Servers. The course also covers using the Java Persistence API in Java SE and Java EE environments. Hands-on exercises use Eclipse and Wildfly 10.

Program Outcomes

Successful completion of this and other courses in the program culminates in the achievement of the Vocational Learning Outcomes (program outcomes) set by the Ministry of Advanced Education and Skills Development in the Program Standard. The VLOs express the learning a student must reliably demonstrate before graduation. To ensure a meaningful learning experience and to better understand how this course and program prepare graduates for success, students are encouraged to review the Program Standard by visiting <http://www.tcu.gov.on.ca/pepg/audiences/colleges/progstan/>. For apprenticeship-based programs, visit <http://www.collegeoftrades.ca/training-standards>.

Course Learning Outcomes

The student will reliably demonstrate the ability to:

1. Design, code and test RMI applications using Java Standard Edition
2. Design, code and test Java Web applications based on servlets and Java ServerPages (JSP).
3. Explain MVC and build web applications using MVC architecture.
4. Describe the Java EE n-tier architecture and explain how Java Application Servers support distributed applications
5. Explain the concept of Enterprise Java Beans (EJBs) and decide when EJBs are the appropriate model for application components.
6. Design, code, and test session EJBs and use them in distributed applications.
7. Use the Java Persistence Architecture for object-relational mapping and develop EJB applications using JPA.
8. Develop Java Web applications using Java Server Faces
9. Develop and package Java-based Web and enterprise applications using an enterprise edition IDE and test them using an Application Server.

Essential Employability Skills (EES)

The student will reliably demonstrate the ability to*:

1. Communicate clearly, concisely and correctly in the written, spoken, and visual form that fulfills the purpose and meets the needs of the audience.
4. Apply a systematic approach to solve problems.
5. Use a variety of thinking skills to anticipate and solve problems.
7. Analyze, evaluate, and apply relevant information from a variety of sources.
10. Manage the use of time and other resources to complete projects.

**There are 11 Essential Employability Skills outcomes as per the Ministry Program Standard. Of these 11 outcomes, the above will be assessed in this course.*

Global Citizenship and Equity (GC&E) Outcomes

N/A

Text and other Instructional/Learning Materials

Text Book(s):

Text:

Purchase not mandatory: Lecture notes and websites make up the main references for this course.

Dr. Danny Coward, Java EE 7: The Big Picture, Publisher: Oracle Press, Date: October 2014, ISBN: 9780071837330.

Recommended Additional references – for extra reading and background

Java EE 7 Essentials by Arun Gupta, Publisher: O'Reilly, Date: September 2013, ISBN: 978144930176.

Pro JPA 2 Second Edition, By: Mike Keith and Merrick Schincariol, Date: Apress, September 2013, ISBN: 1430249269.

Online Resource(s):

Java EE tutorial online: <https://docs.oracle.com/javaee/7/tutorial/>

Java SE Documentation: View online at <http://docs.oracle.com/javase/8/docs/api/>

Java SE Tutorials: View online at <http://docs.oracle.com/javase/tutorial/>

<http://pdf.coreservlets.com/>

Evaluation Scheme

- ✧ Test 1: Hands-on test and MC questions covering Week 1-6.
- ✧ Test 2: Short answer questions
- ✧ Quiz 1: This quiz will be in week 5.
- ✧ Lab Assignment 1: Use collections with supplied test driver
- ✧ Lab Assignment 2: Build a distributed app using RMI
- ✧ Lab Assignment 3: Complete the demo web app with MVC
- ✧ Lab Assignment 4: Create a simple Web app web using scopes
- ✧ Lab Assignment 5: JPA for persistence in a layered Web app with MVC-P
- ✧ Lab Assignment 6: Develop a JSF Application
- ✧ Lab Assignment 7: EJB façade for JPA
- ✧ Team Project: Propose a web app that uses JPA for persistence

| Evaluation Name | CLO(s) | EES Outcome(s) | GCE Outcome(s) | Weight/100 |
|------------------|------------------|----------------|----------------|-------------|
| Test 1 | 1, 2, 3 | 1, 4, 5, 10 | | 25 |
| Test 2 | 4, 5, 6, 7, 8, 9 | 4, 7, 10 | | 25 |
| Quiz 1 | 1, 2, 3 | 1, 4, 5, 7, 10 | | 10 |
| Lab Assignment 1 | 1 | 1, 4, 5 | | 4 |
| Lab Assignment 2 | 1 | 4, 7, 10 | | 4 |
| Lab Assignment 3 | 2, 3 | 4, 5, 10 | | 4 |
| Lab Assignment 4 | 2, 3 | 1, 4, 5 | | 4 |
| Lab Assignment 5 | 3, 7 | 4, 5, 7, 10 | | 4 |
| Lab Assignment 6 | 8 | 4, 5, 7 | | 5 |
| Lab Assignment 7 | 4, 5, 7, 9 | 1, 4, 5, 10 | | 5 |
| Team Project | 4, 5, 7, 9 | 5, 7, 10 | | 10 |
| Total | | | | 100% |

If students are unable to write a test they should immediately contact their professor or program Chair for advice. In exceptional and well documented circumstances (e.g. unforeseen family problems, serious illness, or death of a close family member), students may be able to write a make-up test.

All submitted work may be reviewed for authenticity and originality utilizing Turnitin®. Students who do not wish to have their work submitted to Turnitin® must, by the end of the second week of class, communicate this in writing to the instructor and make mutually agreeable alternate arrangements.

When writing tests, students must be able to produce official College photo identification or they may be refused the right to take the test or test results will be void.

Student Accommodation

Students with permanent or temporary accommodations who require academic accommodations are encouraged to register with the Centre for Students with Disabilities (CSD) located at Ashtonbee (L1-04), Progress (C1-03), Morningside (Rm 190), and Story Arts Campus (Rm 284). Documentation outlining the functional limitations of a disability is required; however, interim accommodations pending receipt of documentation may be possible. This service is free and confidential. For more information, please email csd@centennialcollege.ca.

Use of Dictionaries

- Any dictionary (hard copy or electronic) may be used in regular class work.

Program or School Policies

N/A

Course Policies

N/A

College Policies

Students should familiarize themselves with all College Policies that cover academic matters and student conduct.

All students and employees have the right to study and work in an environment that is free from discrimination and harassment and promotes respect and equity. Centennial policies ensure all incidents of harassment, discrimination, bullying and violence will be addressed and responded to accordingly.

Academic honesty is integral to the learning process and a necessary ingredient of academic integrity. Academic dishonesty includes cheating, plagiarism, and impersonation. All of these occur when the work of others is presented by a student as their own and/or without citing sources of information. Breaches of academic honesty may result in a failing grade on the assignment/course, suspension or expulsion from the college.

For more information on these and other policies, please visit www.centennialcollege.ca/about-centennial/college-overview/college-policies.

Students enrolled in a joint or collaborative program are subject to the partner institution's academic policies.

PLAR Process

This course is eligible for Prior Learning Assessment and Recognition (PLAR). PLAR is a process by which course credit may be granted for past learning acquired through work or other life experiences. The PLAR process involves completing an assessment (portfolio, test, assignment, etc.) that reliably demonstrates achievement of the course learning outcomes. Contact the academic school to obtain information on the PLAR process and the required assessment.

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Topical Outline (subject to change):

| Week | Topics | Readings/Materials | Weekly Learning Outcome(s) | Instructional Strategies | Evaluation Name | Evaluation Date |
|------|--|--|---|--|---|-----------------|
| 1 | Course overview Editions of Java platform - SDK and JRE Coding standards - Java Beans | Lecture slides Java SE docs and tutorial | Recall Java skills from previous courses. Discuss the differences between Java SE, EE and micro editions. | Lecture Demonstration of IDE In-class discussion | Hand out Asgn 1: SEReview: Use collections with supplied test driver | |
| 2 | Java SE API - java.util - java.net vs RMI - threads Design Patterns - Singleton - value obj /DTO | Lecture slides Java SE docs and tutorial | Use the Java SE API to create a simple client-server application. Code a singleton. | Lecture Workshop Asgn 1 Distribute software for students to install. | Converting a class to a Singleton. | |
| 3 | Distributed objects - CORBA , RMI Java EE intro - Java EE n-tier architecture | Lecture slides Test chapter 1 | Define distributed objects. Describe the Java EE run time. Name tiers in a typical n-tier architecture. | Lecture In-class discussion Workshop for Asgn 2 Hand out Asgn 2: Build a distributed app using RMI | Lab Assignment 1 | Week 3 |
| 4 | Basic Web Apps - Servlets - JSP MVC Web app navigation | Lecture slides Text chapter 2 | State the role servlets, JSPs and POJO in MVC. Code navigation among servlets and JSP. Use simple JSP EL and requestScope to pass data. | Lecture Review HTTP etc Demonstration In-class discussion Hand out Asgn 3: Complete the demo web app with MVC | Lab Assignment 2 | Week 4 |
| 5 | More syntax - Servlet API - JSP EL - JSTL Web app scopes Java EE packaging | Lecture notes Text chapter 3 | Master enough syntax to build a simple servlet-JSP web app. Use scopes provided by server to store state. Deploy an EAR and WAR. | Lecture In-class discussion Workshop for Asgn 3 Hand out Asgn 4: Create a simple Web app web using scopes | Quiz Lab Assignment 3 | Week 5 |
| 6 | Web app summary - Best practices | Lecture notes Text Chapter 11 | Design and build robust basic web apps. | Lecture In-class discussion | Optional bonus Asgn: | |

| Week | Topics | Readings/Materials | Weekly Learning Outcome(s) | Instructional Strategies | Evaluation Name | Evaluation Date |
|------|--|---|---|---|--|-----------------|
| | Data sources JDBC review - Precompiled & dynamic SQL transactions | Java SE docs | Add persistence with JDBC Explain the advantages of connection pooling. | Workshop for Asgn 4 Practice for midterm | Asgn 4 with JDBC | |
| 7 | Introduction to JPA - Entity beans - Persistence manager, context and unit - annotations | Lecture notes Text Chapter 12 Java EE tutorial Book: Pro JPA | Define entity beans. Manage lifecycle and state of entity beans. Perform CRUD on entities using a persistence manager. | Lecture Demonstration In-class discussion | Test 1 Lab Assignment 4/ bonus due | Week 7 |
| 8 | JPA for DB tables in relationships - ORM - JPQL XA connections - 2-phase commit | Lecture notes Text Chapter 12 Java EE tutorial Book: Pro JPA | Add relational integrity to related entities in a web app. Use JPQL Explain how app server manages global connections. | Lecture In-class discussion Workshop for Asgn 5 Hand out Asgn 5: use JPA for persistence in a layered Web app with MVC-P | | |
| 9 | Evolving web app technology - Struts - Spring - JSF Web design patterns | Lecture notes Text Chapter 4 Web resources | Discuss the issues deciding what technology to adopt for maintaining web apps. Explain how JSF and framework enable developers and support Web 2.0. | Lecture Demonstration In-class discussion | Lab Assignment 5 | Week 9 |
| 10 | Starting JSF - Faces servlet - Tag libraries - Managed beans - Listeners | Lecture notes Text Chapter 4 Java EE tutorial | Build a simple web app with JSF in Eclipse using JSF tags and JSF EL. Use implicit navigation and event listeners. Use backing beans as DTO. | Lecture Demonstration In-class discussion Hand out Asgn 6 JSF. | Team Programming Project startup | |
| 11 | JSF continued - Facelets - Configuring JSF - Converters & validators - Web app life cycle CDI | Lecture notes Text Chapter 4 Java EE tutorial | Build foundation for expanding ability to build web apps with JSF Discuss need and role of tools for developer productivity. Explain how dependency injection works and is used by JSF framework. | Lecture In-class discussion Workshop for Asgn 6 | Team Project Proposal due: Propose a web app that uses JPA for persistence Lab Assignment 6 | Week 11 |

| Week | Topics | Readings/Materials | Weekly Learning Outcome(s) | Instructional Strategies | Evaluation Name | Evaluation Date |
|------|--|---|--|---|---|-----------------|
| 12 | Concepts of EJB 3 - Why and when to use EJB - Issues of state - EJB lite Container services Annotations & DD Light intro to JNDI | Lecture notes Text Chapters 9 & maybe 10 Java EE tutorial | Use stateless session beans as an envelope for the model tier. Use stateless session beans as a façade for JPA. Explain how adding an EJB layer adds robustness and security to enterprise apps. | Lecture Demonstration In-class discussion Hand out Asgn 7: EJB façade for JPA | Team Project UI and plan for navigation due | |
| 13 | Teams demonstrate projects to class | Lecture slides Java EE 6 tutorial | Students share ideas, practical tips and experience from building team projects Workshop for Asgn 7. | Lecture Demonstration In-class discussion | Team Project full design due including model and persistence tiers. Lab Assignment 7 | Week 13 |
| 14 | Review Complete term work | Review slides | Review concepts and frameworks covered in last seven weeks. | In-class discussion | Team Project EAR due Test 2 | Week 14 |