



COURSE OUTLINE: CSD215 - PROG. PARADIGMS

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Approved: Martha Irwin, Dean, Business and Information Technology

Course Code: Title	CSD215: PROGRAMMING PARADIGMS
Program Number: Name	2095: COMPUTER PROGRAMMING
Department:	COMPUTER STUDIES
Academic Year:	2024-2025
Course Description:	<p>The Object-Oriented Programming (OOP) and Functional Programming (FP) paradigms have been important to software design since the dawn of information technology. Using a variety of programming languages, students explore how these paradigms affect approaches to software design. Topics include composition vs inheritance, higher-order functions, mutability vs immutability, map/reduce/filter, and advanced type systems.</p> <p>Students will employ functional approaches in languages they are already familiar with and will also have an opportunity to explore new programming languages.</p>
Total Credits:	4
Hours/Week:	4
Total Hours:	56
Prerequisites:	CSD121
Corequisites:	There are no co-requisites for this course.
Vocational Learning Outcomes (VLO's) addressed in this course:	<p>2095 - COMPUTER PROGRAMMING</p> <p>VLO 10 Contribute to the development, documentation, implementation, maintenance and testing of software systems by using industry standard software development methodologies based on defined specifications and existing technologies/frameworks.</p> <p>VLO 11 Apply one or more programming paradigms such as, object-oriented, structured or functional programming, and design principles, as well as documented requirements, to the software development process.</p>
Essential Employability Skills (EES) addressed in this course:	<p>EES 4 Apply a systematic approach to solve problems.</p> <p>EES 5 Use a variety of thinking skills to anticipate and solve problems.</p> <p>EES 6 Locate, select, organize, and document information using appropriate technology and information systems.</p> <p>EES 7 Analyze, evaluate, and apply relevant information from a variety of sources.</p> <p>EES 10 Manage the use of time and other resources to complete projects.</p>
Course Evaluation:	<p>Passing Grade: 50%, D</p> <p>A minimum program GPA of 2.0 or higher where program specific standards exist is required for graduation.</p>



Other Course Evaluation & Assessment Requirements:

Students are expected to be present to write all tests in class, unless otherwise specified. If a student is unable to write a test due to illness or a legitimate emergency, that student must contact the professor prior to class and provide reasoning. Should the student fail to contact the professor, the student shall receive a grade of zero on the test.

If a student is not present 10 minutes after the test begins, the student will be considered absent and will not be given the privilege of writing the test.

Students exhibiting academic dishonesty during a test will receive an automatic zero. Please refer to the College Academic Dishonesty Policy for further information.

In order to qualify to write a missed test, the student shall have:

- a.) attended at least 75% of the classes to-date.
- b.) provide the professor an acceptable explanation for his/her absence.
- c.) be granted permission by the professor.

NOTE: The missed test that has met the above criteria will be an end-of-semester test.

Labs / assignments are due on the due date indicated by the professor. Notice by the professor will be written on the labs / assignments and verbally announced in advance, during class.

Labs and assignments that are deemed late will have a 10% reduction per academic day to a maximum of 5 academic days at 50% (excluding weekends and holidays). Example: 1 day late - 10% reduction, 2 days late, 20%, up to 50%. After 5 academic days, no late assignments and labs will be accepted. If you are going to miss a lab / assignment deadline due to circumstances beyond your control and seek an extension of time beyond the due date, you must contact your professor in advance of the deadline with a legitimate reason that is acceptable.

It is the responsibility of the student who has missed a class to contact the professor immediately to obtain the lab / assignment. Students are responsible for doing their own work. Labs / assignments that are handed in and are deemed identical or near identical in content may constitute academic dishonesty and result in a zero grade.

Students are expected to be present to write in-classroom quizzes. There are no make-up options for missed in-class quizzes.

Students have the right to learn in an environment that is distraction-free, therefore, everyone is expected to arrive on-time in class. Should lectures become distracted due to students walking in late, the professor may deny entry until the 1st break period, which can be up to 50 minutes after class starts or until that component of the lecture is complete.

Grade
Definition Grade Point Equivalent
A+ 90 - 100% 4.00
A 80 - 89%
B 70 - 79% 3.00
C 60 - 69% 2.00
D 50 - 59% 1.00
F (Fail) 49% and below 0.00

CR (Credit) Credit for diploma requirements has been awarded.

S Satisfactory achievement in field /clinical placement or non-graded subject area.

U Unsatisfactory achievement in field/clinical placement or non-graded subject area.

X A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.



NR Grade not reported to Registrar's office.
 W Student has withdrawn from the course without academic penalty.

Books and Required Resources:

Grokking Simplicity: Taming complex software with functional thinking by Eric Normand
 Publisher: Manning
 ISBN: 9781617296208
 This book is recommended, but OPTIONAL

Course Outcomes and Learning Objectives:

Course Outcome 1	Learning Objectives for Course Outcome 1
1. Discuss the history and nature of programming paradigms	1.1 Describe the history of programming languages and their paradigms 1.2 Distinguish between Procedural, Object-Oriented (OOP), and Functional programming (FP) paradigms 1.3 Discuss FP's mathematical roots 1.4 Identify the paradigms supported by various popular programming languages 1.5 Examine and compare the syntax of languages from a variety of paradigms 1.6 Describe dis/advantages of the various paradigms
Course Outcome 2	Learning Objectives for Course Outcome 2
2. Describe and employ functional programming concepts	2.1 Explain the difference between a variable and a value 2.2 Discuss the advantages of immutable vs mutable data 2.3 Discuss how to use an `immutable` approach even in non-FP languages 2.4 Explain the equivalence of recursion and loops 2.5 Define what a pure function is, and explain the advantages of pure functions vs impure functions 2.6 Define higher-order functions and lambda expressions, and explain how they can improve software 2.7 Use higher-order functions and lambda expressions in working programs 2.8 Describe and use closures in working programs 2.9 Describe and use common higher-order functions such as map, reduce, filter, fold
Course Outcome 3	Learning Objectives for Course Outcome 3
3. Describe and use advanced type system concepts	3.1 Discuss the dis/advantages of strong vs weak and static vs dynamic type systems 3.2 Define type inference 3.3 Describe and use algebraic data types, specifically product, sum, intersection, and union types 3.4 Discuss how type systems can help prevent certain kinds of errors 3.5 Discuss pattern matching and how it can be used to achieve polymorphism in functional code 3.6 Write programs using languages of various type systems
Course Outcome 4	Learning Objectives for Course Outcome 4
4. Discuss programming paradigms other than OOP	4.1 Discuss the unique considerations when programming cloud-based applications



	and FP	4.2 Use cloud platforms to deploy and run application code 4.3 Describe how machine learning models are trained and used to perform computations 4.4 Train and use a simple machine learning model
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Evaluation Process and Grading System:

Evaluation Type	Evaluation Weight
Coding Assignments	40%
Final Project	15%
Glossary	5%
Test 1	20%
Test 2	20%

Date: June 16, 2024

Addendum: Please refer to the course outline addendum on the Learning Management System for further information.