Wayne State University
Department of Computer Science
CSC 5991: Advanced Web Technologies

**Functional (Scala) Programming for the Web**

Fall 2016

A Hybrid Course or/ and Traditional:

**Hybrid section:** CSC 5991, Section: 006, CRN: 18543

**Traditional section:** CSC 5991, Section: 002, CRN: 18542, Tuesday - Thursday - 7:30–8:50 P.M., Room 318 (State Hall)

**Instructor:** Dr. Javad Abdollahi

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**Website:** http://www.cs.wayne.edu/~javad

**Office hours and place:** Tuesday and Thursday - 7:00 – 7:25 P.M. in Room 318, State Hall

**Student body:** This multidisciplinary Web Technologies and Functional Programming course should be of interest to highly motivated students in computer science, compute information systems, management information systems, engineering and instructional technology who are determined to learn modern aspects and features of Web technologies (using Functional Programming approaches), in a practical and hands-on course environment.

**Course prerequisite:** A basic programming course such as C, C++, Java, or permission of the instructor. Having had a basic course in relational databases and/or HTML programming are a plus. For “Functional Programming” aspects of the course some basic notions from discrete mathematics are very helpful.

**Required Texts:**

by Martin Odersky, Lex Spoon, and Bill Venners
Also, look into Other Scala Material (Not required for the course)

Instructor's note:

This book is co-written by the creator of "Scala programming language" - Martin Odersky - and will be required for basics and fundamentals of Scala


Instructor's note:

Although no previous Java programming experiences and skills are assumed for students of this course, Java will be involved right from the beginning (as Scala gets installed on top of Java) and it continues to be a major player, throughout the course, in various manners and ways.

After all, following the advent of Java SE 8, the Java language itself, has rapidly become a Functional Programming player.

Recommended Texts:

1. Internet & World Wide Web, How to Program, by P. Deitel, H. Deitel and Deitel, 5/e, by Pearson Education, Inc. 2012,
   ISBN-10: 0-13-215100-6

2. Haskell
   The Craft of Functional Programming, 3rd Edition
   by Simon Thompson
   ISBN: 9780201882957
   June 2011, Paperback, 608 pages


   http://www.kehogo.com/xml2e
Web Sites to, frequently, learn from:

- [https://playframework.com/](https://playframework.com/)
- [http://akka.io/](http://akka.io/)

Testing/evaluation:

Two Project/Exams are to be given as follows:

1. Project/Exam I (Midterm) 100 points
2. Project/Exam II (Final) 100 points
3. Homework assignments 10 points each
4. Literature review 100 points

The final course grade will be determined based on the following scale:

- A: 95 – 100%
- A-: 90 – 94%
- B+: 87 – 89%
- B: 84 – 86%
- B-: 80 – 83%
- C+: 77 – 79%
- C: 74 – 76%
- C-: 70 – 73%
- D: 60 – 69%
- F: 0 – 59%

LITERATURE REVIEW

Objective:

The intent of this assignment is to introduce students to an advanced topic in web programming and lead them to critically evaluate literature in this challenging and rapidly evolving field.

Requirement:

Students are to identify a Java and Functional Programming related topic of interest to them in the area of web programming. They are to research recent (2014 or later) literature on the topic and select four related articles. The lead article of the four must be drawn from an academic journal. Each paper must be at least 7 pages long.
long. From these articles the student will prepare a double spaced eight to twelve pages paper with attached copies of the articles that:

- Briefly summarizes the content of each article.
- Develops an underlying theme from the articles - no that this should involve synthesis by the student, not merely a restatement of the articles.

**Sample topics:**

- Abstraction
- Reactive programming
  - What is Reactive Programming?
- Event-Driven Programming
  - Introduction, Tutorial and History
- “Category Theory” for Web Development
- "Functional Programming" for Web Development
- Duality approaches in Functional Programming

**Material to be covered:**

From Scala Book:
- Chapter 2, First Steps in Scala
- Chapter 3, Next Steps in Scala
- Chapter 4, Classes and Objects
- Chapter 5, Classes and Objects
- Chapter 5, Basic Types and Operations
- Chapter 6, Functional Objects
- Chapter 8, Functiona and Closures
- Chapter 11, Scala's Hierarchy
- Chapter 12, Traits
- Chapter 16, Working with Lists
- Chapter 17, Collections
- Chapter 32, Actors and Concurrency
- Chapter 34 GUI Programming (if time allowed)

From Java book:
- Chapter 6, Methods: ADeeper Look
- Chapter 7, Arrays ArrayLists
- Chapter 10, Creating and using Interfaces
- Chapter 12, GUI Components: Part 1
- Chapter 13, Graphics and Java 2D
- Chapter 17, Java SE 8Lambdas and Streams
- Chapter 18, Recursion
• Chapter 22, GUI Components: Part 2
• Chapter 23, Concurrency (if time allowed)