CSE 481 SYLLABUS

This course introduces you to how to design, write, and scale massively concurrent distributed systems. Systems that can handle millions of requests per second.

1. OBJECTIVES

- Explain and apply the concept that the purpose of computation is insight, not numbers.
- Make rational, sensible choices between differing ways to compute solutions to problems.
- Articulate sources of common computational errors that arise in massively parallel systems and their solutions.
- Apply the principles of feedback and scalability when designing computations.
- Create rationally designed, massively parallel cloud systems.
- Have an increased understanding of how functional programming is used in industry.

2. PREREQUISITES

You must have successfully completed the following courses:

- CSE 121e Erlang Language
- CSE 382 Patterns in Functional Programming

It is very strongly suggested that you have successfully completed the following courses:

- CSE 381 Algorithms and Complexity
- CSE 251 Parallelism and Concurrency

You must have *some* working knowledge of:

- Computational parallelism and concurrency
- Basic data structures (sets, lists, maps, trees, graphs, etc.)

3. REQUIREMENTS

You are required to obtain

Date: April 11, 2023.

3.1. **Texts.**

- **Programming Erlang: Software for a Concurrent World**.*Joe Armstrong*,2nd Edition, Pragmatic Programmers
- **Designing for Scalability with Erlang/OTP: Implement Robust, Fault-Tolerant Systems** .*Cesarini and Vinoski*,1st Edition, O'Reily

Both of these are available online and for free through the BYUI library. Do a Search for them. You can also choose to purchase them online if you want a hard copy.

3.2. **Documents.** As provided by the instructor.

3.3. **Software.**

- The Erlang compiler and runtime
- Rebar3
- Cowboy
- Riak
- A text editor of your choice

3.4. **Hardware.**

- A laptop that can run the required software reasonably fast.
- One or more Digital Ocean Droplets and other DO components. (Instructor will show you how to get them for free.)

4. Behavioral Requirements

You are required to. . .

- attend class, as personal assessments will happen in class each day that are not reproducible outside of class.
- read assigned portions of the course materials *before* each class.
- complete all team and personal tasks to deepen your understanding of selected topics.

4.1. **Obtaining the Tasks.** The tasks are available from the Course GitHub repository.

4.2. **Late Work.** Late work is accepted *only if* the reason is extraordinary, and acceptance is reached through private and prolonged negotiation. Also, you must come talk to me in person in my office (or in a zoom meeting if remote) — NOT by email, nor any other means of communication.

4.3. **Grades.** In each of our three personal meetings, you will present your course and project trackers. You will also present a letter based grade-to-date claim. Afterwards I will give you my thoughts on the strength of your claim. The last claim that you make, taking into account any feedback from me, will be your final grade for the course. All of your claims must must be evidence based. That means you must bring the evidence with you, in your portfolio, that supports your claim.

4.4. **Letter-Based-Grades.** You are required to use the definition of the grades from the University Catalog:

A represents outstanding understanding, application, and integration of subject material and extensive evidence of original thinking, skillful use of concepts, and ability to analyze and solve complex problems. Demonstrates diligent application of Learning Model principles, including initiative in serving other students. Note: To claim this grade, throughout the 4 week period being reviewed, you *must* have consistently done things similar to what you see in the list below and recorded evidence of this behavior in your portfolio. Examples of the required types of behaviors are:
  - teaching and/or helping others in the class but not in your group,
  - applying what you've learned in this class in your job or another class you are currently taking, and
  - doing work not assigned such as writing code using what you are learning that has not been assigned, etc.

B represents considerable/significant understanding, application, and incorporation of the material which would prepare a student to be successful in next level courses, graduate school or employment. The student participates in the Learning Model as applied in the course.

C represents sufficient understanding of subject matter. The student demonstrates minimal initiative to be prepared for class. Sequenced courses could be attempted, but mastering new materials might prove challenging. The student participates only marginally in the Learning Model.

D represents poor performance and initiative to learn and understand and apply course materials. Retaking a course or remediation may be necessary to prepare for additional instruction in this subject matter.

5. University Policies

To review University policies regarding disabilities, sexual harassment, etc., or to arrange for a tutor from the Academic Support Center, select **Modules** in the iLearn course, scroll to the Student Resources module, and select the appropriate link.

6. Other

This document may be modified by the instructor at any time without notification.