# Fairfield University — CS 354

Course Syllabus for CS 354: *Theory of Programming Languages*

Spring 2020

## Time

3:30pm — 4:45pm on Mondays and Thursdays

## Room

Bannow 131

## Instructor

| | |
|---|---|
| **Name**: | Murray Patterson |
| **Email**: | mpatterson@fairfield.edu |
| **Office**: | Bannow 105 |

## Office Hours

After class, or by appointment

## Recommended Textbooks

Programming in Haskell, *2nd Edition*. Graham Hutton, Cambridge University Press, 2016.

**ISBN-13**: 978-1316626221

## References

- Programming Languages: Principles and Practice, *3rd Edition*. Kenneth C. Louden and Kenneth A. Lambert, Cengage Learning, 2012.

  **ISBN-13**: 978-1-111-52941-3
  **ISBN-10**: 1-111-52941-8

- Prolog Wikibook: https://en.wikibooks.org/wiki/Prolog

## Course Content

Fairfield University Blackboard — https://fairfield.blackboard.com/

# Course Overview

Welcome to Fairfield University's CS 354! The objective of this course is to provide a better understanding of programming languages and their design. Various concepts and principles underlying the design and use of modern programming languages are considered, mainly functions and logic, but also syntax, semantics, data & program control, as well as abstraction and modularity. We will take a detailed look into a pure functional programming language called *Haskell*, and a logic programming language called *Prolog*. The course will have a theoretical and mathematical nature, but will also involve a practical component, namely writing programs in the above two languages.

# Course Outcomes[1]

Students successfully obtaining credit in this course will have an ability to:

1. Analyze a complex computational problem and to apply principles from various disciplines to identify computational solutions. (Bloom's Taxonomy levels 1 & 4 — Knowledge & Analysis)

2. Design, implement in Haskell and Prolog, and evaluate a computational solution to meet a given set of requirements / specifications. (Bloom's Taxonomy levels 2 & 3 — Comprehension & Application)

3. Communicate effectively in a variety of professional contexts. (Bloom's Taxonomy level 2 — Comprehension)

4. Recognize professional responsibilities and make informed judgments in the practice of applying Haskell and Prolog to real-world problems. (Bloom's Taxonomy levels 2 & 6 — Comprehension & Evaluation)

5. Function effectively as a member or leader of a team engaged in the design and implementation of a system for solving a computational problem. (Bloom's Taxonomy levels 3 & 6 — Application & Evaluation)

6. Apply theoretical background (algorithms, etc.) and software development fundamentals in Haskell and Prolog to produce computing-based solutions. (Bloom's Taxonomy level 3 & 5 — Application & Synthesis)

# Course Structure

- **Lecture** — Classes will be conducted in traditional lecture format.

- **In-class programming assignments (labs)** — Hands on small scale programming tasks in class to initiate a working knowledge of current material. Professor will test if your code is producing the correct results and grade the assignments.

- **Homework** — Weekly programming assignments building on the week's lecture content. Professor will test if your code is producing the correct results and grade the assignments.

- **Readings** — Course textbook pages, relevant articles and additional supporting content will be assigned for students to read.

- **Discussions** — Opportunities to share questions about key concepts, homework assignments, and more.

---

[1]https://tinyurl.com/y6myuceg

# Exams

There will be a midterm and a final exam in this course. The exams will be questions, problems, or programming assignments which cover lectures, homework assignments, and readings.

# Grade Scale

| Grade | Numerical Value | Point Equivalent |
|-------|-----------------|------------------|
| A     | 4               | 93—100           |
| A-    | 3.67            | 90—92            |
| B+    | 3.33            | 87—89            |
| B     | 3               | 83—86            |
| B-    | 2.67            | 80—82            |
| C+    | 2.33            | 77—79            |
| C     | 2               | 73—76            |
| C-    | 1.67            | 70—72            |
| D     | 1               | 60—69            |
| F     | 0               | 0—59             |

# Grading (*subject to change*)

- Attendance and Participation (10%)
- In-class Assignments / Labs (10%)
- Homework Assignments (30%)
- Midterm Exam (25%)
- Final Exam (25%)

# Course Schedule (*subject to change*)

|         | Topic | Reading |
|---------|-------|---------|
| **Week 1** | Introduction & Syllabus / System set-up | Chapter 1 |
| **Week 2** | First steps | Chapter 2 |
| **Week 3** | Types and classes | Chapter 3 |
| **Week 4** | Defining functions | Chapter 4 |
| **Week 5** | List comprehensions | Chapter 5 |
| **Week 6** | Recursive functions | Chapter 6 |
| **Week 7** | Higher-order functions | Chapter 7 |
| **Week 8** | **Midterm Exam** | |
| **Week 9** | Prolog: Introduction | Wikibook |
| **Week 10** | Prolog: Rules and Recursive Rules | Wikibook |
| **Week 11** | Prolog: Variables, Math and Lists | Wikibook |
| **Week 12** | Concurrent Programming | Modelling concurrent processes |
| **Week 13** | Concurrent Programming | Java threads |
| **Week 14** | Wrap-up & Exam Review | |
| **Finals** | Final Exam | |

## Attendance Policy

As a student at Fairfield University, you are expected to attend every scheduled class session. Class attendance is important and will be taken by your instructor at the beginning of each lecture. Please inform the instructor in advance, preferably by e-mail, if you must be absent from a class. Excessive absences (as judged by the instructor) may lower your grade up to failing the class.

## Classroom Participation

Students are expected to help promote the learning environment and respecting their classmates by being on-time and prepared for each class. During lectures, refrain from any unnecessary talk unrelated to the course material. In your own interest, while in class **DO NOT** use cell phones, Internet browsers, chats, or any computer software and tools for personal matters (*i.e.*, texting, checking emails, social media, paying bills, etc.). Any such activity will result in at least expelling the student from the class and being marked as absent for the lecture.

## Missed Classes

Student are responsible for obtaining material distributed in class in days when she/he was absent. This can be done through contacting a classmate who was present, by contacting the instructor, or through the course website. There are no make-up exams unless the student missed the exam due to a pre-arranged, documented excused absence. Only official excuses will be accepted. **Any uncoordinated, unexcused missed exam will result in a score of zero for that exam**.

## Late Assignments

Assignments are due at the beginning of class on the due date. Late submission will be assessed a penalty of 20% with no more than two days allowed.

## Academic Integrity

Unless stated otherwise by your instructor, **individual work** is expected. Anything you turn in with your name on it must be your own work — that is, written or coded by you and not copied from anyone or anywhere else. If you use materials that you have obtained on the Internet, *e.g.*, `https://stackoverflow.com`, from a book, etc., you must include an appropriate reference. To use such materials without proper attribution is a form of plagiarism. Team projects must be original! By registering in this course, each one of you is explicitly agreeing to abide by and adhere to the Fairfield University agreement on academic integrity.

## Academic Dishonesty

Cheating and other types of academic dishonesty in this course will result in a grade of zero for the project, paper, or examination in question, and may result in an F for the course itself. When appropriate, expulsion may be recommended. A notation of the event will be made in the student's file in the School of Engineering dean's office.

## Students with Disabilities

Fairfield University School of Engineering complies with the American with Disabilities Act and Section 504 of the Rehabilitation Act. Any student who may require accommodation under such provisions should contact the Office of Accessibility Disability & Support Services.

## Health and Well-being

Fairfield University provides mental health services to support the academic and personal success and well-being of students. Counseling & Psychological Services offers free, confidential psychological services to help students manage personal challenges that may interfere with your well-being. Fairfield University is committed to advancing the mental health and wellbeing of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services — by experienced, professional psychologists and counselors, who are attuned to the needs of college students — are available.

For more information contact `counseling@fairfield.edu` or by calling (203) 254-4000 ext 2146.

## Course Withdrawal

There are deadlines for withdrawal during the semester. If you are thinking of withdrawing, timely action is necessary. Please check Fairfield University's policy on course withdrawals. Students who simply "drop out" of class, *i.e.*, stop showing up without formally withdrawing from the course will receive a grade of F for the course.

Any requests for special consideration relating to attendance, projects, examinations, etc., must be discussed with and approved by the instructor in advance. It is the student's responsibility to check any change in the due dates of the projects/home works, date of tests, etc. **You are required to observe the University and Departmental policies on academic honesty**.