Department of Electrical Engineering & Computer Science
COP 4020 001 – Programming Languages
Fall 2018

Lecturer: Rick Leinecker
Email: Richard.Leinecker@ucf.edu

Lecture Meetings: Tuesday and Thursday 4:30 PM – 5:45 PM in HEC 125

Office Hours: Tuesday and Thursday 2:30PM-4:15PM in HEC 357

Prerequisites: COP 3503, COT 3960, and Passing the Foundation Exam

Credit Hours: 3

Teaching Assistant: BingBing Rao
Robin.Rao@knights.ucf.edu
For questions regarding assignment and test grading, contact TA

Required textbooks:
Learn You A Haskell (http://learnyouahaskell.com/)
Learning F# (https://fsharp.org/learn.html)
Learn R Programming (https://www.tutorialspoint.com/r/)
Learning C# (http://www.introprogramming.info/english-intro-csharp-book/read-online/)

COP 4020 Learning Objectives and Outcomes
This page specifies the learning objectives and outcomes for the course. Objectives are skills that students will exhibit 3 to 5 years after the course; that is, they are long range goals. Outcomes are skills that students are measured against during the course. In essence, the objectives are a (requirements) specification we refine into the more detailed outcomes, which we try to achieve by the instruction given in the course.

General information about this course, including more traditionally presented learning objectives and outcomes, and the course's syllabus are found on separate web pages.

Learning Objectives
The learning objectives below are set for computer science bachelor's degree as a whole, and the statements of these outcomes are quoted (or modified) from the department's learning outcomes web site (in particular, the "Educational Objectives" for "Computer Science"). The purpose of the following is to tie this course in with the department's document. Thus the presentation is organized by the department's objectives, and within each of these, the impact on the course's objectives is stated. Links to this course's learning objectives look like [QuicklyLearn].

Objective 1 [CSObj1]
"CS graduates participate as effective and productive team members or team leaders in the development of large computer and software systems covering a broad range of engineering and scientific applications in their chosen careers."

Impact: Team design [TeamDesign] is an enrichment objective for COP 4020, since the class is not primarily about language design, which is a more advanced topic.

Objective 2 [CSObj2]
"CS graduates demonstrate the knowledge and skills to do advanced studies and research in computer science and related engineering and scientific disciplines."

Impact: This is an important objective that leads to all the course's essential objectives [QuicklyLearn] [Master] [Evaluate].

Learning Outcomes
The learning outcomes below are set for computer science bachelor's degree as a whole, and the statements of these outcomes are quoted (or modified) from the department's learning outcomes web site (in particular, the "Program Outcomes" for "Computer Science"). The purpose of the following is to tie this course's outcomes into the department's document. Thus the presentation is organized by the department's outcomes, and within each of these, the impact on the course's outcomes is stated. Links to this course's learning objectives, which describe assessment for that outcome, look like [QuicklyLearn]. For more on assessment, see also the course assessment plan. (Also linked are outcomes from ABET's CAC criteria, which look like (c).)

Outcome 1 [CSOut1]
"All graduating CS majors, by the time of their graduation, shall be able to: Apply knowledge of computing and mathematics appropriate to the discipline; specifically to include the application of mathematics, science and engineering to solve and reason about computational problems."

Impact: This is an important outcome that impacts COP 4020 and leads to the essential outcomes [Concepts], [UseModels], [EvaluateModels], and [MapToLanguages], which should be consulted for assessment. Related CAC outcomes: (a).

Outcome 2 [CSOut2]
"All graduating CS majors, by the time of their graduation, shall be able to: Analyze a problem, and identify and define the computing requirements appropriate to its solution."

Impact: This is not an outcome for COP 4020 and will not be directly assessed. However, it is somewhat related to outcome [EvaluateModels]. Related CAC outcomes: (b).

Outcome 3 [CSOut3]
"All graduating CS majors, by the time of their graduation, shall be able to: Design, implement and evaluate a computer-based system, process, component, or program to meet desired needs and budget, by applying best practices in software development processes, methods, and tools."

Impact: This is not an outcome for COP 4020 and will not be directly assessed. However, it is somewhat related to outcomes [EvaluateModels] and [MapToLanguages]. Related CAC outcomes: (c).

Outcome 4 [CSOut4]
"All graduating CS majors, by the time of their graduation, shall be able to: Function effectively on teams to accomplish a common goal."

Impact: the course grading policies allow students to work in teams. However, since this is not required, due to the nature of the material, it is also not assessed. Related CAOutcomes: (d).

Outcome 5 [CSOut5]

"All graduating CS majors, by the time of their graduation, shall be able to: Demonstrate an understanding of professional, ethical, legal, security, and social issues and responsibilities."

Impact: This is not an outcome for COP 4020 and will not be directly assessed. Related CACoutcomes: (e).

Outcome 6 [CSOut6]
"All graduating CS majors, by the time of their graduation, shall be able to: Communicate effectively with a range of audiences; in particular, graduating majors shall demonstrate effective oral and written communication skills while disseminating technical information about computing technology and its applications."

Impact: This is an enrichment outcome for COP 4020 [Writing] and will not be directly assessed. Related CACoutcomes: (f).

Outcome 7 [CSOut7]
"All graduating CS majors, by the time of their graduation, shall be able to: Analyze the local and global impact of computing on individuals, organizations and society."

Impact: This is not an outcome for COP 4020 and will not be directly assessed. Related CACoutcomes: (g).

Outcome 8 [CSOut8]
"All graduating CS majors, by the time of their graduation, shall be able to: Recognize the need for continuing professional development and shall demonstrate the knowledge of research tools and professional resources necessary to accomplish this end."

Impact: This is not an outcome for COP 4020 and will not be directly assessed. Related CACoutcomes: (h).

Outcome 9 [CSOut9]
"All graduating CS majors, by the time of their graduation, shall be able to: Use current techniques, skills, and tools necessary for computing practices."

Impact: This is not an outcome for COP 4020 and will not be directly assessed. However, it is somewhat related to outcomes [EvaluateModels] and [MapToLanguages]. Related CACoutcomes: (i).

Outcome 10 [CSOut10]
"All graduating CS majors, by the time of their graduation, shall be able to: Apply mathematical foundations and computer science theory, in particular principles of algorithmic design and complexity analysis, in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices."

Impact: This is not an outcome for COP 4020 and will not be directly assessed. However, it is somewhat related to outcome [Concepts]. Related CACoutcomes: (j).

Outcome 11 [CSOut11]
"All graduating CS majors, by the time of their graduation, shall be able to: Apply design and development principles in the construction of software systems of varying complexity."

Impact: This is not an outcome for COP 4020 and will not be directly assessed. However, it is somewhat related to outcomes [EvaluateModels] and [MapToLanguages]. Related CACoutcomes: (k).

Outcome 12 [CSOut12]

"All graduating CS majors, by the time of their graduation, shall be able to: Demonstrate their knowledge of, and ability to apply, programming fundamentals in at least three programming languages."

Impact: This is an important outcome that impacts COP 4020 and leads to the essential outcomes [Concepts], [UseModels], [EvaluateModels], and [MapToLanguages], which should be consulted for assessment. Related CAC outcomes: (b) (c) (i) (k).

Outcome 13 [CSOut13]
"All graduating CS majors, by the time of their graduation, shall be able to: Demonstrate their knowledge and understanding of, and their ability to apply the concepts and design principles relating to: data structures, computer architecture and organization, programming languages, operating systems, and networks."

Impact: This is an important outcome that impacts COP 4020 and leads to the essential outcomes [Concepts], [UseModels], [EvaluateModels], and [MapToLanguages], which should be consulted for assessment. Related CAC outcomes: (b) (c) (i) (j) (k).

Impact: This is also related to an enrichment outcome for COP 4020 [Tradeoffs] [EvaluateResearch]. However, this will not be directly assessed.

Proposed Schedule:

Language	Topic
Haskell	Intro to Functional Programming / List Comprehensions
Haskell	Recursion / Types and Type Classes
Haskell	Higher order functions / Modules
Haskell	Input and output / Test 1
F#	List Comprehensions / Recursion
F#	Sequences and Collections / Async and Parallel
F#	.NET and Interoperability / Test 2
R	Introduction to the language / variables / loops / control
R	Vectors / Lists / Matrices / Arrays / Factors
R	Big Data / Analytics
R	Statistics and Graphic / Test 3
C#	Introduction to the language / LINQ and the functional aspects of C#
C#	LINQ
C#	LINQ / Multithreading
C#	Final Exam

Grading will be as follows: 4 tests – 15% each
9 Assignments – 40% total

Test Schedule: September 13 - Haskell
October 4 – F#
November 1 – R
December 6 – C#

Attendance: Attendance is not required but is highly recommended.

Grading Scale:

94-100	A
90-93.99	A-

87-89.99	B+
84-86.99	B
80-83.99	B-
77-79.99	C+
74-76.99	C
70-73.99	C-
67-69.99	D+
64-66.99	D
60-63.99	D-
0-59.99	F

Academic Dishonesty: UCF's Golden Rule http://goldenrule.sdes.ucf.edu/ will be strictly applied.

Important Dates:

Classes Begin:	August 20
Labor Day Holiday:	September 3
Veterans Day Holiday:	November 12
Thanksgiving Holiday:	November 22-25
Last Day of Class:	November 29
Final Exam:	December 6

Makeups:

Projects and discussions are not accepted late since you have them in advance
Tests can only be made up under hardships with the permission of the instructor