

Course Outline

Introduction to Software Development Seminar 1

Course ID	Prerequisites	Course Duration	Lecture Hours Per Week	Lab Hours Per Week	Passing Grade
SD101	None	16 Weeks	1	1	Pass or Pass Outstanding

COURSE DESCRIPTION

This weekly seminar course seeks to connect students with real world software development professionals at all levels in industry. The course also serves as a platform to present the latest trends and emerging software technologies to students. Each week a guest speaker or teacher will present on a new topic. Following the presentation, the presenter will provide a short activity or challenge to students to complete and submit for review. Wherever possible, students will partake in field trips to local software companies to learn their culture and gain exposure to the software industry.

COURSE MATERIAL/TEXT/RESOURCES:

Handouts and resources will be provided by industry guest speakers and teachers on an as needed basis.

LEARNING OUTCOMES

Module 1: Industry Topics

Description: In this module, students will attend a weekly seminar presented by an industry guest speaker or a teacher. At the conclusion of each presentation, the speaker will issue a challenge to students relevant to what was presented. Students must complete at least ten of these challenges.

#	Learning Outcomes (Mastery Skills):	ACHIEVEMENT
1	Complete an industry challenge on the topic of an emerging software technology.	Fail, Pass, Pass Outstanding
2	Complete an industry challenge on the topic of soft skills in software development.	Fail, Pass, Pass Outstanding
3	Complete an industry challenge on the topic of a software tool or framework.	Fail, Pass, Pass Outstanding
4	Complete an industry challenge on the topic of python development.	Fail, Pass, Pass Outstanding
5	Complete at least ten industry challenges.	Fail, Pass, Pass Outstanding

STUDENT PROGRESS AND ASSESMENT

ASSESSMENT	ACHIEVEMENT
Module 1 Learning Outcomes (Mastery Skills)	Fail, Pass, Pass Outstanding

***Passing this course requires at least a pass on all modules. A Pass Outstanding in the course is awarded where the student achieves a Pass Outstanding on all modules.**



Course Outline

Introduction to Programming with Python

Course ID	Prerequisites	Course Duration	Lecture Hours Per Week	Lab Hours Per Week	Passing Grade
SD102	None	16 Weeks	4	4	Pass or Pass Outstanding

COURSE DESCRIPTION

This introductory course teaches students the foundational skills of programming in the Python programming language through a three-phase process involving programming robots for simulated search and rescue operations. Phase 1) The pair programming of the Karel Robot in a virtual search and rescue simulation; Phase 2) In small teams program a physical wheeled robot based on the RaspberryPi platform to complete a simulated ground-based search and rescue simulation; Phase 3) In medium sized teams program a drone to complete an air-based search and rescue simulation. At the completion of the course, students will be able to solve problems with the basic programming staples (conditions, loops, and Boolean logic), manage input and output of dynamic data (input from robotic sensors, and output to motors, consoles, and other devices), abstract problems into solvable, programmable chunks and apply the best practices of general programming style and code documentation.

COURSE MATERIAL/TEXT/RESOURCES:

Title	Edition/Date	Author	Publisher	ISBN
Python Fundamentals	2019	Paul J. Deitel	Pearson	N/A

*Course material is accessible through the O'Reilly online learning platform.

LEARNING OUTCOMES

Module 1: Programming the Karel Robot for Virtual Search and Rescue

Description: In this module students begin to write their very first computer programs in the context of a notional search and rescue operation using the virtual Robot Karel. Karel functions on a 2D grid of arbitrary size which contains a variety of objects and obstacles. Students must program the behavior of Karel to search through a virtual burning building to find a missing person and report that location to the notional fire department.

#	Learning Outcomes (Mastery Skills):	ACHIEVEMENT
1	Present in a technical briefing a generalized plain English solution to a notional search and rescue situation using the Karel search and rescue robot.	Fail, Pass, Pass Outstanding
2	Develop a pseudo-code solution to the generalized case of a notional search and rescue situation using the Karel search and rescue robot.	Fail, Pass, Pass Outstanding
3	Develop and test software (using variables, type casts, I/O, control statements, functions, sequences, and dictionaries appropriate) for the Karel search and rescue robot which is able in every case to locate a fictional victim in the search and rescue simulation.	Fail, Pass, Pass Outstanding
4	Present a detailed technical overview of a software solution to the Karel search and rescue scenario which demonstrates proficiency in applying variables, type casts, I/O, control statements, functions, sequences, and dictionaries.	Fail, Pass, Pass Outstanding

***Passing this module requires at least a pass on all Learning Outcomes (Mastery Skills). A Pass Outstanding is awarded where student achieves a Pass Outstanding on at least 50% of the Learning Outcomes (Mastery Skills).**



Module 2: Programming a wheeled RaspberryPi based Robot for as Search and Rescue Simulation

Description: In this module, students work with a wheeled Robot based on the RaspberryPi platform. Students will work in small development teams to program the wheeled robot for a search and rescue simulation. The simulation itself will be a physical obstacle course set up for the robot to traverse.

#	Learning Outcomes (Mastery Skills):	ACHIEVEMENT
1	Present in a technical briefing a generalized plain English solution to a notional search and rescue situation using a wheeled search and rescue robot based on the RaspberryPi platform.	Fail, Pass, Pass Outstanding
2	Develop a pseudo-code solution to the generalized case of a wheeled robot in the search and rescue simulation.	Fail, Pass, Pass Outstanding
3	Develop and test a piece of software (using the knowledge from module one plus: strings, files and exceptions, parsing and the robotics API) for the RaspberryPi wheeled search and rescue robot, which is able in every case to locate a fictional victim in the search and rescue simulation.	Fail, Pass, Pass Outstanding
4	Present a detailed technical overview of your software solution to the wheeled RaspberryPi search and rescue scenario, which demonstrates proficiency in applying the knowledge from module one plus: strings, files and exceptions, parsing and the robotics API.	Fail, Pass, Pass Outstanding

***Passing this module requires at least a pass on all Learning Outcomes (Mastery Skills). A Pass Outstanding is awarded where student achieves a Pass Outstanding on at least 50% of the Learning Outcomes (Mastery Skills).**



Module 3: Programming an Aerial Drone-based Robot for a Search and Rescue Simulation

Description: In this module, students will work in medium sized development teams to program an aerial drone for a search and rescue simulation. The course concludes with teams competing in a physical obstacle course with their drones.

#	Learning Outcomes (Mastery Skills):	ACHIEVEMENT
1	Present in a technical briefing a generalized plain English solution to a notional search and rescue situation using an aerial drone search and rescue robot.	Fail, Pass, Pass Outstanding
2	Develop a pseudo-code solution to the generalized case of an aerial drone in the search and rescue simulation.	Fail, Pass, Pass Outstanding
3	Develop and test a piece of software (using the knowledge from modules one and two applied to the new aerial context) for the aerial drone search and rescue robot, which is able in every case to locate a fictional victim in the search and rescue simulation.	Fail, Pass, Pass Outstanding
4	Present a detailed technical overview of your software solution to the aerial robot search and rescue scenario, which demonstrates proficiency in applying the knowledge from modules one and two in the new context.	Fail, Pass, Pass Outstanding

***Passing this module requires at least a pass on all Learning Outcomes (Mastery Skills). A Pass Outstanding is awarded where student achieves a Pass Outstanding on at least 50% of the Learning Outcomes (Mastery Skills).**

STUDENT PROGRESS AND ASSESMENT

ASSESSMENT	ACHIEVEMENT
Module 1 Learning Outcomes (Mastery Skills)	Fail, Pass, Pass Outstanding
Module 2 Learning Outcomes (Mastery Skills)	Fail, Pass, Pass Outstanding
Module 3 Learning Outcomes (Mastery Skills)	Fail, Pass, Pass Outstanding

***Passing this course requires at least a pass on all modules. A Pass Outstanding in the course is awarded where the student achieves a Pass Outstanding on all modules.**



Course Outline

Essential Skills for Software Development

Course ID	Prerequisites	Course Duration	Lecture Hours Per Week	Lab Hours Per Week	Passing Grade
SD103	None	16 Weeks	5	5	Pass or Pass Outstanding

COURSE DESCRIPTION

This introductory course is an amalgamation of many key “point skills” needed as a foundation of knowledge for the software developer. Each week a new skill or concept is introduced and covered in detail through individual study, class lessons, and small team activities. The key skills covered in this course include: Agile software development, GIT, pair programming, JIRA, technical writing and presentations, linux, bash, essential mathematical skills and the Cloud9 IDE.

COURSE MATERIAL/TEXT/RESOURCES:

There is no textbook for this course.

LEARNING OUTCOMES

Module 1: How to Study and Learn

Description: In this module, students will discover strategies for studying effectively, which will help them throughout their entire journey as a student in this program.

#	Learning Outcomes (Mastery Skills):	ACHIEVEMENT
1	Create a personalized study plan with strategies for success in the software development program.	Fail, Pass, Pass Outstanding

***Passing this module requires at least a pass on all Learning Outcomes (Mastery Skills). A Pass Outstanding is awarded where student achieves a Pass Outstanding on at least 50% of the Learning Outcomes (Mastery Skills).**

Module 2: Computers and General Computing

Description: In this module, students will review core concepts of computing to gain enough familiarity with their computers and operating systems to engage in the upcoming course work effectively.

#	Learning Outcomes (Mastery Skills):	ACHIEVEMENT
1	Demonstrate an ability to open up a terminal in the Mac OS operating system and use basic Bash shell commands and Unix programs.	Fail, Pass, Pass Outstanding
2	Demonstrate an ability to access core course materials for other courses using the web interfaces for Microsoft teams.	Fail, Pass, Pass Outstanding
3	Present in a technical briefing on what a computer is, what the basic components are, and what the role of each component is.	Fail, Pass, Pass Outstanding

***Passing this module requires at least a pass on all Learning Outcomes (Mastery Skills). A Pass Outstanding is awarded where student achieves a Pass Outstanding on at least 50% of the Learning Outcomes (Mastery Skills).**

Module 3: Git

Description: In this module, students will find a basic introduction to the git command line tool. This will allow them to pull down and submit code for their work in later modules and other courses.

#	Learning Outcomes (Mastery Skills):	ACHIEVEMENT
1	Demonstrate an ability to clone a git repository, add a file to the repository, and create a commit for that file with a relevant message, and push the changes back to the repository.	Fail, Pass, Pass Outstanding

***Passing this module requires at least a pass on all Learning Outcomes (Mastery Skills). A Pass Outstanding is awarded where student achieves a Pass Outstanding on at least 50% of the Learning Outcomes (Mastery Skills).**

Module 4: Bash

Description: In this module, students will get a formal introduction to the core command line utilities and tools which will help them configure virtual servers, write code, and perform other related tasks necessary in upcoming modules and future courses.

#	Learning Outcomes (Mastery Skills):	ACHIEVEMENT
1	Students should be able to navigate through the file system using ls and cd, delete files with rm, edit files with nano, make directories using mkdir all in the terminal.	Fail, Pass, Pass Outstanding

***Passing this module requires at least a pass on all Learning Outcomes (Mastery Skills). A Pass Outstanding is awarded where student achieves a Pass Outstanding on at least 50% of the Learning Outcomes (Mastery Skills).**



Module 5: AWS and Cloud9

Description: In this module, students will be introduced to the AWS platform and will gain experience using the Cloud9 IDE as a development environment.

#	Learning Outcomes (Mastery Skills):	ACHIEVEMENT
1	Demonstrate an ability to log into Cloud9 and write a simple program in python using it.	Fail, Pass, Pass Outstanding
2	Demonstrate the ability to setup and run a simple piece of code on a basic EC2 instance.	Fail, Pass, Pass Outstanding
3	Demonstrate the ability to host a static file using a S3 bucket.	Fail, Pass, Pass Outstanding

***Passing this module requires at least a pass on all Learning Outcomes (Mastery Skills). A Pass Outstanding is awarded where student achieves a Pass Outstanding on at least 50% of the Learning Outcomes (Mastery Skills).**

Module 6: Essential Math

Description: In this module, students will review essential mathematical concepts that are a prerequisite to tackling certain types of programming problems. In particular, students will review some essential algebraic, geometric, and trigonometric equations and problems.

#	Learning Outcomes (Mastery Skills):	ACHIEVEMENT
1	Solve word problems using algebra and trigonometry.	Fail, Pass, Pass Outstanding
2	Solve basic logic and discrete math problems.	Fail, Pass, Pass Outstanding
3	Graph polynomial, exponential, logarithmic, and basic trigonometric functions (sin, cos, tan).	Fail, Pass, Pass Outstanding

***Passing this module requires at least a pass on all Learning Outcomes (Mastery Skills). A Pass Outstanding is awarded where student achieves a Pass Outstanding on at least 50% of the Learning Outcomes (Mastery Skills).**

Module 7: Technical Writing

Description: In this module, students will be introduced to some of the best practices involved in writing technical documents. This will prepare students for future modules and courses in which the ability to write proper technical documentation will be an essential skill.

#	Learning Outcomes (Mastery Skills):	ACHIEVEMENT
1	Write a technical report, following best practices, on some of the topics discussed in the previous modules.	Fail, Pass, Pass Outstanding

***Passing this module requires at least a pass on all Learning Outcomes (Mastery Skills). A Pass Outstanding is awarded where student achieves a Pass Outstanding on at least 50% of the Learning Outcomes (Mastery Skills).**

Module 8: Technical Presentations



Description: In this module, students will be introduced to some of the best practices involved in giving technical presentations. This will prepare students for future modules and courses in which the ability to present technical information in a concise and informative way to a variety of audiences will be an essential skill.

#	Learning Outcomes (Mastery Skills):	ACHIEVEMENT
1	Give a technical presentation, following best practices, on some of the topics discussed in the previous modules.	Fail, Pass, Pass Outstanding

***Passing this module requires at least a pass on all Learning Outcomes (Mastery Skills). A Pass Outstanding is awarded where student achieves a Pass Outstanding on at least 50% of the Learning Outcomes (Mastery Skills).**

Module 9: Agile

Description: In this module, students will be briefly introduced to the concept of Agile software development. Students will learn about some of the tools and methodologies that they will be using in their upcoming project courses and will learn about proper procedures for things like meetings, tracking project progress, and assigning work.

#	Learning Outcomes (Mastery Skills):	ACHIEVEMENT
1	Demonstrate an ability to log into and navigate Jira at a level of proficiency that is sufficient to access core course and assignment materials for other courses using the Jira platform.	Fail, Pass, Pass Outstanding
2	Act as both a team member and a SCRUM master in a notional standup meeting.	Fail, Pass, Pass Outstanding

***Passing this module requires at least a pass on all Learning Outcomes (Mastery Skills). A Pass Outstanding is awarded where student achieves a Pass Outstanding on at least 50% of the Learning Outcomes (Mastery Skills).**

STUDENT PROGRESS AND ASSESMENT

ASSESSMENT	ACHIEVEMENT
Module 1 Learning Outcomes (Mastery Skills)	Fail, Pass, Pass Outstanding
Module 2 Learning Outcomes (Mastery Skills)	Fail, Pass, Pass Outstanding
Module 3 Learning Outcomes (Mastery Skills)	Fail, Pass, Pass Outstanding
Module 4 Learning Outcomes (Mastery Skills)	Fail, Pass, Pass Outstanding
Module 5 Learning Outcomes (Mastery Skills)	Fail, Pass, Pass Outstanding
Module 6 Learning Outcomes (Mastery Skills)	Fail, Pass, Pass Outstanding
Module 7 Learning Outcomes (Mastery Skills)	Fail, Pass, Pass Outstanding
Module 8 Learning Outcomes (Mastery Skills)	Fail, Pass, Pass Outstanding
Module 9 Learning Outcomes (Mastery Skills)	Fail, Pass, Pass Outstanding

***Passing this course requires at least a pass on all modules. A Pass Outstanding in the course is awarded where the student achieves a Pass Outstanding on all modules.**

