NOVA | Northern Virginia Community College

Syllabus

Course Information	
Course:	ITP 270 – Programming for Cybersecurity
Format:	16 Weeks, On-Campus
Section:	001N
Semester:	Fall 2019
Date/Time:	Saturday Afternoons 12:30 – 3:10 PM
Location:	TV Tech. Building (CT), Room: #0209 Annandale (AN) Campus

Instructor	
Name:	Jon Adams
Email:	jadams@nvcc.edu Subject – prefix with: "ITP270:"
Phone:	N/A
Office:	TBD
Office Hours:	Email to schedule an appointment. Available 1hr before or after class.

Course Objectives and NVCC Course Content Summary

Select the link for further details: https://www.nvcc.edu/academic/coursecont/summaries/ITP270.pdf

Course Description

Entails instruction in fundamentals of object-oriented programming using Python 3 and also cybersecurity concepts, such as: encoding vs. encryption, encryption concepts, cryptanalysis, attack/defense tools, and legal concepts that apply to computer security and programming. Emphasizes program construction, algorithm development, coding, debugging, and documentation of console and graphical user interface applications. Lecture 4 hours per week.

## Course Prerequisites/Co-requisites

Prerequisite: ITP 100

Textbook(s) for the Course

Note: This textbook uses the older Python 2 syntax and is meant for more skilled programmers with a security background. So, we will use this book as a reference here-and-there.

Black Hat Python
Python Programming for Hackers and Pentesters

By: Justin Seitz
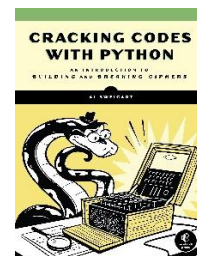ISBN: 9781593275907
Dated: Dec 21, 2014 (Copyright: 2015)
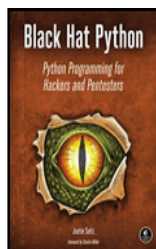
Another excellent textbook that uses the newer Python 3 syntax and is more approachable for beginners is listed below.

Cracking Codes with Python
An Introduction to Building and Breaking Ciphers

By: Al Sweigart
ISBN: 9781593278229
Dated: Jan 23, 2018 (Copyright: 2018)

Required Software

Python 3:

We'll be using the Python 3 language. The latest version as of this writing (January 2019) is Python 3.7.2. Please install it according to your operating system (OS) platform:

- Full download listing with hash sums and PGP/GPG signature verification files: https://www.python.org/downloads/release/python-372/

- Microsoft Windows (64-bit): https://www.python.org/ftp/python/3.7.2/python-3.7.2-amd64.exe

- macOS (64-bit): https://www.python.org/ftp/python/3.7.2/python-3.7.2-macosx10.9.pkg

- Ubuntu Linux 18.04 LTS: Already pre-installed with Python 3! *(Because Linux is for cool people.)*

Integrated Development Environment (IDE): PyCharm Community

You'll generally want to install an IDE as well. This step is not required, but an IDE helps you write computer code. In this class, I'll be using the PyCharm Community (open source), but you may explore other IDEs as well. Here are the download links for PyCharm per platform:

- Microsoft Windows: https://www.jetbrains.com/pycharm/download/download-thanks.html?platform=windows&code=PCC

- macOS: https://www.jetbrains.com/pycharm/download/download-thanks.html?platform=mac&code=PCC

- Ubuntu Linux 16.04+ (Snap package): **sudo snap install pycharm-community –classic**
  - **Run from the command line: /snap/pycharm-community/current/bin/pycharm.sh**
  - **Click the icon that appears on the side of the menu**

- Other Linux distros: https://www.jetbrains.com/pycharm/download/download-thanks.html?platform=linux&code=PCC

Microsoft Windows 7 or 10:

We might deal with some Microsoft Windows attack scenarios depending on the course load. We may be fine using the NOVA lab computers, but it may be easier and less risky in terms of raising any red flags to do these on a personal computer if you have one running on Windows 7 or 10.

VirtualBox + Linxu:

Some exposure to Linux is important to get maximum reward from this course. We may examine how cybersecurity attacks differ on Windows and Linux. To explore Linux, we'll use Ubuntu Linux 18.04 LTS on VirtualBox. Linux is a full operating system like Microsoft Windows or macOS that can run on a computer all by itself. However, we can also use VirtualBox to emulate a *virtual machine* on top of your existing OS.

Assuming you are using Windows/macOS, you'll first install VirtualBox and then you'll install Ubuntu Linux 18.04 LTS. Also, in case you are wondering, yes, you can use other Linux distributions (or *distros* for short), such as: Kali Linux, Debian, CentOS, Linux Mint, and so on. If you are already using Linux, then you don't need VirtualBox.

Kali Linux is built with many specialized security tools and can provide valuable exposure to the broader set of tools used by security practitioners.

For Mac users, VirtualBox is can also be used on your computers as well to run virtual machines.

- VirtualBox: https://www.virtualbox.org/wiki/Downloads
  - When downloading VirtualBox, you want to select the one for your OS. Meaning, if you are using Microsoft Windows, you'll download the VirtualBox *host* for Windows. Therefore, even though we want to install Linux on VirtualBox, do NOT download VirtualBox for Linux.
- Ubuntu Linux: https://www.ubuntu.com/desktop
  - https://www.ubuntu.com/download/desktop/thank-you?version=18.04.1&architecture=amd64
- Kali Linux: https://www.kali.org
  - https://www.kali.org/downloads

Note: macOS is a UNIX system (similar to Linux), but we won't spend much time on how attacks differ on macOS because of time constraints and because Linux is more vital for cybersecurity fundamentals. The reason is because most Internet-connected servers and embedded systems (e.g., Roku) use Linux, not macOS. However, macOS is still worthwhile of studying for computer security concerns, because many people and organizations use these platforms.

Computer Labs

We will have in-class computer labs quite often. They are meant to reinforce the lecture and to prepare you for the take-home assignments since the only true way to learn a programming language is by writing code yourself. You will make many mistakes and you may not know how to fully complete the lab assignments, but this is to be expected for those new to computer programming. Because of this reality, you will receive a 100% for each lab assignment even if your program does not fully work, as long as it is obvious you tried your best or raised your hand for assistance quite often to attempt to complete the in-class programming challenge.

Course Grading, Examinations, & Grades Composition

Grading can comprise of factors such as student participation, discussions, assignments, and exams.
Your final grade is based on the following scale (the grade rounds up, such that a 69.8% will become a 70%):

A: 100 – 90   **B:** 89 – 80   **C:** 79 – 70   **D:** 69 – 60   **F:** 59 – 0

GRADE CATEGORIES	Percent
Proctored Exams	40%
Non-Proctored Labs & Homework	60%
Total	**100%**

Proctored Exams	Percent
Midterm Exam	15%
Final Exam	25%
Total	**40%**

Non-Proctored Labs and Homework	Percent
Homework	20%
Labs	20%
Quizzes	20%
Total	**60%**

Schedule (16-week) and Graded Assessments:

- In-Class Lab Assignments: Work begins in-class, but they are due before **midnight**.

- Homework Assignments: Instructions given in-class, with each due before **12:00 PM** before the next class begins.

Week	Lecture Material	Assessment	Materials

1
8/24
	• **Cancelled** – Please Review Week 1 Materials on Canvas
	   o PyCharm Tutorial
	   o Installing Ubuntu with Virtual Box
	   o Installing Kali with Virtual Box
		None	**It is recommended to read ahead. All handouts to be provided ahead of class.**

2
8/31
	• Introduction to the Course
	   o Syllabus Review & Course Goals
	   o Python Command Line & IDE
	• Python2 vs Python3
	• Modules and Importing them
	   o VirtualEnv
	   o Pip
	• Basic Data Types
	• Statements and Expressions
	• Strings & String Formatting
		Install packages Lab
		Week 2 Lab
		Google Strings Lab
			Handouts:
			• Real Python VirtualEnv Overview
			• Python Types
			• Python Built-in Functions
			• Python Flow Control
			• Python IO (String formatting)

3 9/7	• Functions • Conditionals and Booleans • Tuples and Lists • Loops and Iteration (flow control) • Exceptions	Week 3 Lab HW2	Handouts: • Python User-Defined Functions • Python Flow Control • Python Types
4 9/14	• Dictionaries • Sets • Mutability • Files and Text Processing	Week 4 Lab HW3	Handouts: • Python Types • Python Flow Control • Python IO

5
9/21
	Quiz #1 (Weeks 2-4)
	• Advanced Functions
	   o Advanced Argument Passing
	   o Lambda
	• Object Oriented Concepts
		Quiz
		Week 5 Lab
			Handouts:
			• Python User-Defined Functions
			• Real Python How to Use Lambdas

6 9/28	• Object Oriented Programming • JSON	Week 6 Lab HW4	Handouts: • Byte of Python OOP Chapter • Data Camp Python OOP • Real Python - Python OOP
7 10/5	• Object Oriented Programming II • Midterm Recap	Week 7 Lab	Handouts: • Byte of Python OOP Chapter • Data Camp Python OOP • Real Python - Python OOP • Midterm Study Guide

Week/Date	Topics	Assignments	Readings
8 10/12	Midterm Examination	Exam	
9 10/19	• Networking and Sockets Overview • Client/Server Programming o Concept: Network Scanning	Labs HW5	BHP, Chapter 2 Handouts: • TBD

10
10/26
	• Networking and Sockets Overview
	   o Overview: DNS, HTTP, SMTP
	   o Concept: Network Service Enumeration
		Labs
		HW6
			BHP, Chapters 2
			Handouts:
			• TBD

11
11/2
	• Regular Expressions
	   o Concept: Log Sanitization
	• SQLite
	   o Applications
		Labs
		HW7
			Handouts:
			• Python Regular Expressions
			• Google Developers Python2 Regular Expressions
			• Softex Regex Cheatsheet w/ Examples
			• TBD SQLLiteDB Handout
			• TBD SQLLite Python Handout

12
11/9
	Quiz #2 (Weeks 9-11)
	• Web Scraping/Hacking
	• Select Course Project
	   o Browser Logs Analysis
	   o Enhanced Network Scanner
	   o Enhanced Password Cracker
	   o Port Scan Detector
		Quiz #2
		Labs
			BHP, Chapter 5
			Handouts:
			• TBD

13
11/16
	• Cyber Concepts – Reconnaissance
	   o Network Scanning
	   o Network Sniffing
	• Cyber Concepts – Scanning
	   o Cross Site Scripting (XSS)
		Labs	BHP Chapter 3
			Handouts:
			• TBD

14
11/23
	• Cyber Concepts – Access and Maintaining
	   o Password Cracking
	• Cyber Concepts – Covering Tracks
	   o Logs, Audit Files, Shell History, etc
		Labs	BHP, Chapter 10
			Handouts:
			• TBD

11/30	11/30 – No Class/ThxGiving		
15 12/7	• Work on Projects • All HW Due	Labs	
16 12/14	Final Exam – Present Projects • Presentation consists of Introduction (What you chose, Why, and Your Approach), Live or Staged Demo, Review of Code		

Please note: The instructor reserves the right to adjust the above schedule.

Last Day to Drop with Refund: September 5th, 2019
Last Day to Drop without 'F':   October 29th, 2019

(See: https://www.nvcc.edu/calendars/academic/fall19.html)

Incomplete Grades

A grade of "I" (Incomplete) is given only when a student has completed the majority of the course (60% or more) and becomes unable to attend class or to complete course requirements near the end of the course due to a mitigating circumstance. Also, read the NOVA Withdrawal Policy for further grade information.

Mitigating Circumstances

Mitigating circumstances are defined as unavoidable situations that can be verified and documented. Examples would include situations like the serious illness of the student, the serious illness or death of a family member, family financial problems, a change in employment hours, or temporary absence from the area because of employment.

Attendance Policy

Attendance is expected in both in-class meetings and participation in Blackboard. Students are expected to attend every scheduled face-to-face class meeting and to enter Blackboard weekly. When absence from class becomes necessary, please attempt to inform the instructor ahead of time. Students are responsible for all material missed in class due to an absence. Any instruction missed and not subsequently completed either in-class or on Blackboard will necessarily affect the grade of the student regardless of the reason for the absence.

Disclaimer

I reserve the right to modify the syllabus contents, policies, and course schedule assignments if I determine that such a change will improve the effectiveness of the course presentation without unfairly penalizing student assessment.

➢ All assignments should be submitted no later than midnight on the assigned due date. Assignments turned in late will be graded as late with a 5% penalty for each day that the assignment is late, up to 40% off.

➢ A grade of zero will be calculated into your final grade for any exams or assignments not submitted.

➢ Exams may be paper or blackboard-generated with multiple choice, fill-ins, essays, true or false, or any other chosen format. All tests are a closed book, with all personal technologies put away. However, personal, hand-written notes (on paper) ARE allowed! This is to encourage you to take good programming notes, which you may end up using for your future career or follow-on schooling. The test must be completed within a set timeframe and must be taken in the class, on the scheduled date. In the event of a system failure, the backup method for taking a test will be at the discretion of the instructor. In the event of inclement weather, the exam may be administered at home, but that is at the discretion of the instructor.

➢ In-class **labs** may be worked together with other classmates, as long as each person is genuinely trying to comprehend the material. If it becomes clear that you are simply waiting for a classmate to do the work for you, then you will not be allowed to work with others in the future.

➢ Students must complete each **homework assignment** and take each **exam** without the help of others. Please become familiar with the Academic Integrity Policy of Northern Virginia Community College. The policy can be found at http://www.nvcc.edu/students/handbook/conduct.html. I will strictly adhere to this policy.

  o The first time a student is caught cheating (giving help to another or receiving help from another) on an exam or an assignment, the student will receive a 0% for the respective exam or assignment.

  o If a cheating incident happens again, the student will receive an F in the course.

➢ There is a make-up exam in this course that is only given at the end of the semester, except for valid emergencies, which will be verified. An excused absence is typically defined as death in immediate family, or a student's emergency admission to the hospital, which must be verified. I will exercise judgment as to whether an absence is excused for all other situations and documentation will be required. If you miss an exam or project, a zero grade is recorded in the grade book. The makeup exam is a comprehensive exam covering all the material of the course.

➢ Electronic devices must be on silent or vibrate.

➢ Plagiarizing is dishonest and a form of cheating. Consequently, plagiarized work will receive an **"F,"** or a zero. In addition, such a practice may prevent students from passing a course and may result in other disciplinary action. (Taken directly from NOVA's website on plagiarism). If I find that you have plagiarized any work you will receive a zero grade, if it happens again you will be reported to academic affairs for it to appear on your transcript.

"NOVA is a place for learning and growing. You should feel safe and comfortable anywhere on this campus. In order to meet this objective, you should: a) let your instructor, his/her supervisor, the Dean of Students or Provost know if any unsafe, unwelcome or uncomfortable situation arises that interferes with the learning process (Campus Police-703-764-5000); b) inform the instructor within the first two weeks of classes if you have received a special needs or a disability accommodation that may affect your performance in this course

Academic Integrity

Academic integrity requirements are found in the NOVA Catalog.

Attendance/Student Participation/Tardiness Policy

Review the student attendance/student participation guidelines Attendance & Student Participation

Safety & Emergency Preparedness

Select the link for detailed information on college Safety & Emergency Preparedness

A student with Special Needs

Select the link for updated information on DSS Support Services

NVCC Policy Statement

Select the link for information pertaining to IT Policies, Procedures, & Plans

Inclement Weather & Closing

Select the link for information on Inclement Weather & Closing
If classes are canceled due to Inclement Weather or other closures, I will post assignments via the "Announcements" tab on our class's Blackboard.

NOVA Alert

To receive alerts and emergency notifications register for NOVA ALERT

Note: In the event of class cancelation we will continue with class assignments and lessons using online resources. Thus, students are responsible for monitoring their email and checking the class Blackboard page for assignments and lessons material.

Important Dates

Important dates corresponding with your semester are located in the Academic Calendar.