**Python for Everybody Specialization**

**Python Data Structures**

**Course Syllabus**

**Welcome to Python Data Structures,** taught by Charles Severance!

This course will introduce the core data structures of the Python programming language. We will move past the basics of procedural programming and explore how we can use the Python built-in data structures such as lists, dictionaries, and tuples to perform increasingly complex data analysis. This course will cover Chapters 6-10 of the textbook “Python for Everybody”. This course covers Python 3.

**Using this Course in Your Local LMS**

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* If your LMS supports [IMS Learning Tools Interoperabilty®](https://www.imsglobal.org/activity/learning-tools-interoperability) version 1.x, you can login, and request access to the tools on this site. Make sure you indicate whether you need an LTI 1.x key. You will be given instructions on how to use your credentials once you get your key.
* [Download course material](https://www.py4e.com/materials)as an [IMS Common Cartridge®](https://www.imsglobal.org/cc/index.html), to import into an LMS like Sakai, Moodle, Canvas, Desire2Learn, Blackboard, or similar. After loading the Cartridge, you will need an LTI key and secret to provision the LTI-based tools provided in that cartridge.
* If your LMS supports [Learning Tools Interoperability® Content-Item Message](https://www.imsglobal.org/specs/lticiv1p0) you can login and apply for an LTI 1.x key and secret and install this web site into your LMS as an App Store / Learning Object Repository that allows you to author you class in your LMS while selecting tools and content from this site one item at a time. You will be given instructions on how to set up the "app store" in your LMS when you receive your key and secret.
* If your LMS supports neither Content Item, nor Common Cartridge, but does support LTI, you can hand-copy the links from this course material into your LMS one-by-one. We have a [special low-style view of the lessons](https://www.py4e.com/lessons/intro?nostyle=yes) to make this hand-copying as easy as it can be.

[**Courses/web sites using this material**](https://www.py4e.com/courses)

This web site uses the [Tsugi](http://www.tsugi.org/) software to both host the software-based autograders and provide this material so it can easily be integrated into a Learning Management System like [Sakai](http://www.sakaiproject.org/), Moodle, Canvas, Desire2Learn, Blackboard or similar.

**Links to course materials**

* Video Lectures
  + [YouTube Playlist](https://www.youtube.com/playlist?list=PLlRFEj9H3Oj7Bp8-DfGpfAfDBiblRfl5p)
  + [iTunes Video](https://itunes.apple.com/us/podcast/python-for-everybody-video/id1214664324)
  + [Amazon Prime Video](http://amzn.to/2mFrCuh)
* Audio Lectures
  + [iTunes Audio](https://itunes.apple.com/us/podcast/python-for-everybody-audio-py4e/id1214665693)
  + [Google Play Audio](https://play.google.com/music/listen?u=0#/ps/Ijgj3aofh6m73rps4wtdk6djhv4)
* [Lecture Slides and Handouts](https://www.py4e.com/lectures3/)
* [Sample Code ZIP](https://www.py4e.com/code3.zip) ([Individual Files](https://www.py4e.com/code3/))
* [Free Textbook](https://www.py4e.com/book.php)
* All the course content and autograder software is available on [Github](https://github.com/csev/py4e) under a Creative Commons or Apache 2.0 license.

If you are interested in translating the book or other online materials into another language, I have provided some [instructions on how to translate this course](https://github.com/csev/py4e/blob/master/TRANSLATION.md) in my GitHub repository. If you are starting a translation, please contact me so we can coordinate our activities.

**Audio Archive**

Here is an archive of the [live lecture recordings](https://archive.org/details/201509UMSI502Podcasts_201601) from SI502 as taught on campus at the UM School of Information Fall 2015.

**Python for Everybody**

The goal of this book is to provide an Informatics-oriented introduction to programming. The primary difference between a computer science approach and the Informatics approach taken in this book is a greater focus on using Python to solve data analysis problems common in the world of Informatics.

The sample code and data files for the book is here: [Code Samples](https://www.py4e.com/code3/).

[**Other courses / web sites using this book**](https://www.py4e.com/courses)

Book translations:

* English - [Python for Everbody: Exploring Data in Python3](https://amzn.to/29w0lsX)
  + Printed book on [Amazon India](https://www.amazon.in/dp/9352136276) (low-cost shipping within India thanks to [Shroff Publishing](http://www.shroffpublishers.com/books/9789352136278/))
  + [Kindle edition](http://amzn.to/29LrtC0) of the book
  + Free: [PDF](http://do1.dr-chuck.com/pythonlearn/EN_us/pythonlearn.pdf), [HTML](https://www.py4e.com/html3), [EPUB](http://do1.dr-chuck.com/pythonlearn/EN_us/pythonlearn.epub)
  + [HTML with examples in Jupyter Notebooks from LibreTexts.org](https://eng.libretexts.org/Textbook_Maps/Computer_Science/Map%3A_Python_for_Everybody_(Severance))
  + [Interactive HTML from Trinket.io](https://books.trinket.io/pfe/index.html)
* Spanish - [Python para todos: Explorando la información con Python 3](https://amzn.to/3axKzHv)
  + Translated book, autograders, resources, and web site at [https://es.py4e.com](https://es.py4e.com/book)
  + [Github repo](https://github.com/csev-es) - Contributors: [Juan Carlos Perez Castellanos](https://github.com/don-charlie-pc), [Juan Dougnac](https://github.com/jdougnac), [Daniel Merino Echeverría](https://github.com/danielmerino), Jaime Bermeo Ramírez and [Fernando Tardío](https://github.com/ftardio).
* Italian [Python per tutti: Esplorare dati con Python3](https://amzn.to/2qGksK6)
  + Free [PDF](http://do1.dr-chuck.com/pythonlearn/IT_it/pythonlearn.pdf), [EPUB](http://do1.dr-chuck.com/pythonlearn/IT_it/pythonlearn.epub)
  + [Book source on github](https://github.com/vittore/py4e/), (Thanks to [Alessandro Rossetti](https://www.linkedin.com/in/alessandrorossetti/) and [Vittore Zen](https://www.linkedin.com/in/vittorezen/))
* Portuguese - [Python Para Todos: Explorando Dados com Python 3](https://amzn.to/2S6GpA6)
  + Free: [PDF](http://do1.dr-chuck.com/pythonlearn/PT_br/pythonlearn.pdf), [EPUB](http://do1.dr-chuck.com/pythonlearn/PT_br/pythonlearn.epub)
  + [Book source on github](https://github.com/ras-ufcg/py4e) and [translation team](https://github.com/ras-ufcg/py4e/blob/master/RAS_Team_Members.txt) (Thanks to [Yuri Loia de Medeiros](https://twitter.com/yuriloia)).
* Polish - [Python dla wszystkich: Odkrywanie danych z Python 3](https://amzn.to/38M2zjt) ([from Amazon.pl](https://www.amazon.pl/gp/product/8396017603) and [from Amazon.de](https://www.amazon.de/gp/product/8396017603))
  + [Polish verson of web site - py4e.pl](https://py4e.pl/)
  + [HTML](https://py4e.pl/html3), [PDF (format A4)](https://py4e.pl/translations/PL/py4e-pl-a4-latest.pdf), [PDF (format for print)](https://py4e.pl/translations/PL/py4e-pl-print-latest.pdf), [EPUB](https://py4e.pl/translations/PL/py4e-pl-latest.epub), [MOBI](https://py4e.pl/translations/PL/py4e-pl-latest.mobi)
  + [Github Repository](https://github.com/andre-wojtowicz/py4e-pl)
  + Contributors: [Andrzej Wójtowicz](https://github.com/andre-wojtowicz) (Adam Mickiewicz University in Poznań, Poland)
* Greek
  + [Greek version of the web site - gr.py4e.com](https://gr.py4e.com/)
  + [Printed Book](https://disigma.gr/products/python-gia-olous?variant=47526224527708)
  + Free PDF (in progress): PDF
  + [Github repository](https://github.com/csev-gr/py4e)
  + Thanks to: [Konstantia Kiourtidou](https://twitter.com/KonstantiaQ)
* German
  + Free: [PDF](http://do1.dr-chuck.com/pythonlearn/DE_de/pythonlearn.pdf), [EPUB](http://do1.dr-chuck.com/pythonlearn/DE_de/pythonlearn.epub)
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  + Translation by: [Electronics Go](https://electronics-go.com/team/) | [Team members](https://www.py4e.com/translations/AR/ar/contributors_23_01_01.html)
* Russian
  + [Russian versions of the slides](https://www.py4e.com/lectures3/ru/index.htm) from [Violetta Fomkina](https://www.linkedin.com/in/violetta-fomkina-9451372/).
* Korean (commercial translation) [데이터를 다루며 배우는 파이썬](http://www.yes24.com/Product/Goods/77401048?Acode=101)
* Chinese - In progress
  + Free: [PDF](http://do1.dr-chuck.com/pythonlearn/ZH_cn/pythonlearn.pdf), [EPUB](http://do1.dr-chuck.com/pythonlearn/ZH_cn/pythonlearn.epub)
  + [Book source on github](https://github.com/RodenLuo/py4e-cn) - (Thanks to Deng Luo)
  + There is an in-China copy of the videos available at <https://www.bilibili.com/video/av46649799>

If you are insterested in starting a translation of the book, I have some instructions for [getting started](https://github.com/csev/py4e/blob/master/TRANSLATION.md).

Chapters 2-10 are heavily adapted from the open book titled: "[Think Python: How to Think like a Computer Scientist](http://www.greenteapress.com/thinkpython/thinkCSpy/)" by [Allen B. Downey](http://allendowney.com/) and [Jeff Elkner](http://www.elkner.net/). The [Python 2 version](http://www.py4inf.com/) of the book is still available.

**Using Python to Access Web Data**

**Notes Regarding the Use of BeautifulSoup**

The sample code for this course and textbook examples use BeautifulSoup to parse HTML.

**Using BeautifulSoup 4 with Python 3.10 or Python 3.11**

*Instructions for Windows 10*:

* pip install beautifulsoup4
* if the bs4.zip file was downloaded or you have a bs4 folder, delete it

*Instructions for MacOS*:

* pip3 install beautifulsoup4
* if the bs4.zip file was downloaded or you have a bs4 folder, delete it

**Using BeautifulSoup 3 (only for Python 3.8 or Python 3.9)**

If you want use our samples "as is", download our Python 3 version of BeautifulSoup 3 from

<http://www.py4e.com/code3/bs4.zip>

You must unzip this into a "bs4" folder and have that folder as a sub-folder of the folder where you put our sample code like:

<http://www.py4e.com/code3/urllinks.py>