



# PYTHON FOR NETWORK & SYSTEMS ENGINEERS

COURSE GUIDE (V1): JULY - DECEMBER 2021  
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# Python for Network & Systems Engineers

A specialist course

**Audience:** This is a course for network engineers and systems engineers, devops staff, hardware engineers, and back-end developers.

**Overview:** By the end of the course, you will have all the knowledge you need to write and interact with Python code for a variety of purposes, with a particular focus on controlling machines, automating system processes, and interacting with APIs.

**Skills:** You will understand the elegance and power of Python and have had experience using several important standard and third-party libraries, including for parsing text and log files, matching strings with regular expressions, and scripting tasks via SSH connections. You will also have learned about consuming and creating web APIs and some best practices in Python for writing maintainable code.

**Format:** Live instructor-led training (online). Each topic is a mixture of expert instruction, worked examples, and hands-on exercises with help from the instructor(s).

**Expert instructors:** See bios below.

**Duration:** 4 days

**Modules:**

Days 1–4: “Python for Network & Systems Engineers”  
Days 1–2: “Introduction to Python”

**Price:**

Regular course (4 days): AUD \$3,000 (excl GST)  
Modular / partial courses: AUD \$800 (excl GST) per day  
(Discounts are available for groups and past participants of Python Charmers’ courses taking additional modules.)

**Dates (July - December 2021):**

30 August-2 September  
13-16 December

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# Topic outline

## Day 1: Python basics

Day 1 covers how to use Python for basic scripting and automation tasks, including tips and tricks for making this easy:

- Why Python? What's possible?
- The *Jupyter* notebook for rapid prototyping
- Modules and packages
- Python concepts: an introduction through examples
- Essential data types: strings, tuples, lists, dicts
- Worked example: retrieving real-time data from a REST web API
- Raising and handling exceptions

# Topic outline

## Day 2: Handling, analyzing, and presenting data in Python

Python offers amazingly productive tools like Pandas for working with different kinds of data. Day 2 gives a thorough introduction to analyzing and visualizing data easily:

- Reading and writing essential data formats:  
CSV, Excel, SQL, time-series (others on request)
- Indexing and selecting data in *Pandas*
- Data fusion: joining & merging datasets
- Summarization with “group by” operations; pivot tables
- Visualization and statistical graphics with *Seaborn*
- Automated reporting; interactive dashboards *ipywidgets* and *voilà*

# Topic outline

## Day 3: System automation

Day 3 gives you a tour of the amazing standard library and important 3rd-party tools for automating various systems-level tasks with Python:

### Morning:

- Files, bytes, and encodings
- Handling files & paths; dates, times, and IP addresses
- Compressing and uncompressing data (zip, tar, bzip2 etc.)
- Cryptographic hashing of file contents (SHA256, MD5 etc.)

### Afternoon:

- Parsing JSON, YAML, INI config files. [Optional: XML]
- Automatically creating config files via templating with *Jinja2*
- Process and system monitoring with *psutil*
- Automating local commands via *subprocess*
- Creating scripts with command-line arguments



# Topic outline

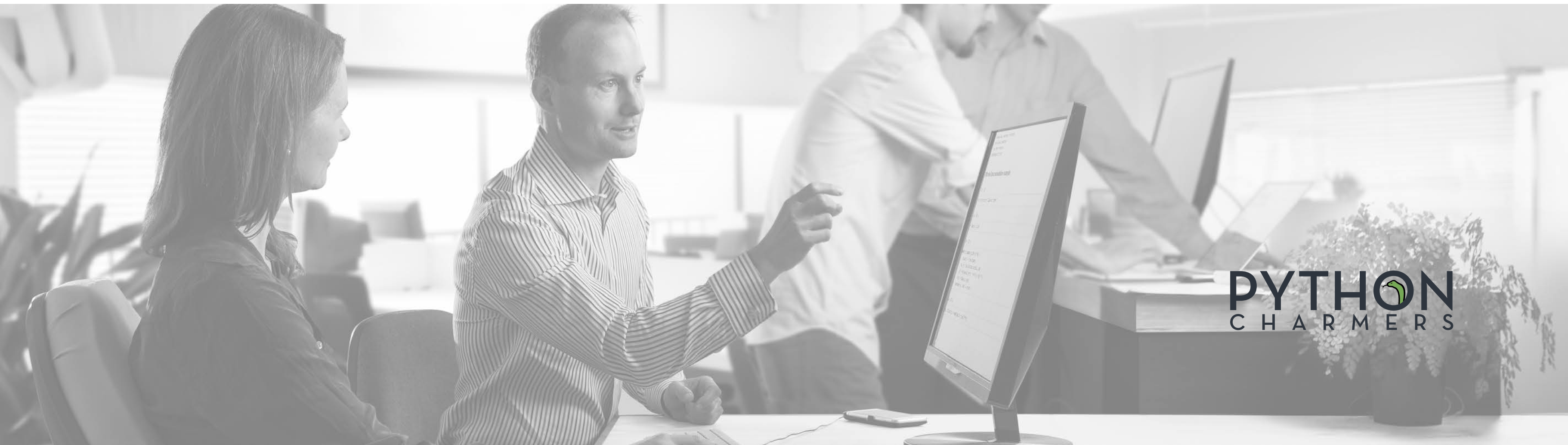
## Day 4: Network automation

Day 4 shows you how to automate various tasks involving networks and control network devices:

- Accessing REST web APIs in more depth (sessions, OAuth, ...)
- Network automation via SSH with *Fabric*
- Automating network device configuration via SSH with *Netmiko*
- Creating REST web APIs with *Flask*; OpenAPI
- Parsing log files (e.g. Cisco IOS) with regular expressions
- Working with DNS from Python; direct socket connections
- Email automation
- Intro to packet manipulation with Scapy, with applications (network discovery, penetration testing)

## Personal help

We are happy to offer on-the-spot problem-solving after each day of the training for you to ask one-on-one questions — whether about the course content and exercises or about specific problems you face in your work and how to solve them. If you would like us to prepare for this in advance, you are welcome to send us background info before the course.



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## Other information

**Format:** Courses are conducted online via video meeting using Python Charmers' cloud notebook server for sharing code with the trainer(s).

**Computer:**

- **Hardware:** we recommend  $\geq 8$  GB of RAM and a webcam.  
Preferably also multiple screens and a quiet room (or headset mic).
- **Software:** a modern browser: Chrome, Firefox, or Safari (not IE or Edge);  
and Zoom.
- **Coding:** we have a cloud-based coding server that supports running code  
and sharing code with the trainer(s).

**Timing:** Most courses will run from 9:00 to roughly 17:00 (AEDT) each day, with breaks of 50 minutes for lunch and 20 minutes each for morning and afternoon tea.

**Certificate of completion:** We will provide you a certificate if you complete the course and successfully answer the majority of the exercise questions.

**Materials:** You will have access to all the course materials via the cloud server.

We will also send you a bound copy of the course notes, cheat sheets, and a USB stick containing the materials, exercise solutions, and further resources.

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# Instructor bio



**Dr Edward Schofield**

Ed has consulted to or trained over 2500 people from dozens of organisations in data analytics using Python, including A\*STAR, Atlassian, Barclays, Cisco, CSIRO, Dolby, Harvard University, IMC, Singtel Optus, Oracle, Shell, Telstra, Toyota, Verizon, and Westpac. He is well-known in the Python community as a former release manager of *SciPy* and the author of the widely used *future* package. He regularly presents at conferences in data science and Python in Australia and internationally.

Ed holds a PhD in machine learning from Imperial College London. He also holds BA and MA (Hons) degrees in mathematics and computer science from Trinity College, University of Cambridge. He has 20+ years of experience in programming, teaching, and public speaking.



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# Instructor bio



**Henry Walshaw**

Henry has almost 15 years of experience in Python application development and has trained hundreds of people in how to use Python from organizations including AGL, the Australian Bureau of Meteorology, ESRI, the NSW Department of Finance, National Australia Bank, and Telstra.

Henry's core technical expertise relates to the development and analysis of large scale spatial datasets (primarily using Python), and communicating this understanding to both subject matter experts and the general public.

Before joining Python Charmers, Henry worked in both government and industry — at Geoscience Australia, the Victorian Department of Sustainability and Environment, and the Environmental Protection Agency (EPA); as a consultant with Sinclair Knight Merz (SKM), a manager at we-do-IT, and as CTO of a startup. He holds a Bachelors in Computational Science.



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# Instructor bio



**Dr Robert Layton**

Robert is the author of the book “Data Mining in Python”, published by Packt. He provides analysis, consultancy, research and development work to businesses, primarily using Python. Robert has worked with government, financial and security sectors, in both a consultancy and academic role. He is also a Research Fellow at the Internet Commerce Security Laboratory, investigating cybercrime analytics and data-mining algorithms for attribution and profiling.

Robert is a contributor to the Python-based *scikit-learn* open source project for machine learning and writes regularly on data mining for a number of outlets. He is also the author of the website “[LearningTensorflow.com](http://LearningTensorflow.com)”. He has presented regularly at a number of international conferences in Python, data analysis, and its applications.



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### **About Python Charmers®**

Python Charmers is the leading provider of Python training in the Asia-Pacific region, based in Australia and Singapore. Since 2010, Python Charmers has given over 500 training courses and bootcamps to over 5,000 delighted people from organizations such as AGL, Atlassian, Barclays, CSIRO, Cisco, Deloitte, Dolby, IMC, pwc, Singtel Optus, Shell, Sportsbet, Telstra, Toyota, Verizon, Westpac, and Woolworths. Python Charmers specializes in teaching programming and data science to scientists, engineers, data analysts, quants, and computer scientists in the Python language.

Python Charmers' trainers boast years of Python experience and deep roots in the open source community, as both speakers at events and contributors to well-known open source projects, including *NumPy*, *SciPy*, *Scikit-Learn*, *Pandas*, and *Python-Future*.

**Testimonials:** Testimonials from past participants of similar bootcamps and training courses are available at

<https://pythoncharmners.com/testimonials/>

**Questions:** We are happy to customise this program further on request. Please let us know if you would like to discuss this or have any other questions.

**Contact:**

Phone: +61 1300 963 160

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Web: [pythoncharmners.com](https://pythoncharmners.com)

The logo for Python Charmers, featuring the word "PYTHON" in a large, bold, sans-serif font, with a small green Python snake icon integrated into the letter "O". Below "PYTHON" is the word "CHARMERS" in a smaller, all-caps, sans-serif font.

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