Data Analysis with Python for Medical Physicists

28th – 30th May 2020
Malta
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Course Overview

Course Aim
The aim of this course is for participants to learn skills in Python that a medical physicist should know. By the end of the course, participants will be competent to implement data analysis using this programming language and use them in different applications.

Target Group
Attendants should be clinical or academic medical physicists who are interested in learning and develop new skills in the programming language, Python. Individuals who have limited to no background of Python, or would like to refresh their skills are encouraged to apply.

Local Organizers
Malta Association of Medical Physics (V/O 1715)

Course Lecturer
Eric Pace, Medical Physics Expert, Medical Imaging Department, Mater Dei, Malta.
Course Content

- Overview of programming basics and control flow
- Classes and methods as the building blocks of object oriented programming. Explain how these may be applied in the context of managing typical medical physics data. This will help develop skills beyond a simple linear execution of code.
- Reading unstructured data that is often produced by CT, MRI and other modalities
- Structure data in a more machine readable format for storage and retrieval – this assists in preparing data for fast insertion into databases (although databases themselves will not be discussed)
- Using an Integrated Development Environment (IDE) such as PyCharm
- Introduce the concept of panels as a wrapper over matrix data. Medical physicists often have columnar data (2D matrix) which needs to be cleaned, filtered, processed and plotted.
- Plotting of data as line, bar, box and scatter plots.
- Use PyDICOM package to work with DICOM files (extract information from DICOM headers and write any modifications back to DICOM files).

This course will not:

- Explore the use of databases and SQL
- Cover numerical methods or statistical techniques

Methods of assessment
At the end of the course participants have an option to participate in an exam.

Teaching methods
3 days of lectures and practical sessions. The course is practice based participants will also have the opportunity to practice during the course in which they can discuss any questions or problems that they may have in a friendly environment.

Accreditation
This course will be accredited by European Board for Accreditation in Medical Physics (EBAMP).

Course Fee
Early Registration Fee (until 31st January, 2020) - €300

Late Registration Fee (from 1st February onwards) - €350
How to Apply
Visit www.mamp.org.mt/courses/python to register online. Payment should be made within 10 days from registration to the following bank address:

Bank Name: Bank of Valletta

Account Holder Name: Malta Association of Medical Physics

IBAN: MT59 VALL 2201 3000 0000 4002 6129 488

Bank’s BIC: VALLMTMT

Location: Siggiewi, Malta
Scientific Programme
The course will start on Thursday morning, 28\textsuperscript{th} May 2020 at 09:00, registrations starting at 08:30. Course will finish on Saturday 30\textsuperscript{th} May around 14:00. The draft programme can be found below.

Day 1-Thursday, 28\textsuperscript{th} May

<table>
<thead>
<tr>
<th>Time</th>
<th>Lecture</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:30 - 09:00</td>
<td>Registration</td>
</tr>
<tr>
<td>09:00 - 10:00</td>
<td>Introduction to basic concepts in Python – data types, data structures, string manipulation</td>
</tr>
<tr>
<td>10:00 - 10:30</td>
<td>Coffee Break</td>
</tr>
<tr>
<td>10:30 - 12:00</td>
<td>Structured Programming</td>
</tr>
<tr>
<td>12:00 - 13:00</td>
<td>Lunch Break</td>
</tr>
<tr>
<td>13:00 - 15:00</td>
<td>Working with files – Reading/writing CSV, EXCEL, JSON, Building and traversing directories (e.g. from medical physics QA Excel reports; data output from DoseWatch or other dose platforms)</td>
</tr>
<tr>
<td>15:00 - 15:30</td>
<td>Coffee Break</td>
</tr>
<tr>
<td>15:30 – 16:00</td>
<td>The integrated development environment – breakpoints, debugging, variable inspection, runtime configurations</td>
</tr>
<tr>
<td>16:00 – 17:00</td>
<td>Data extraction from unstructured files using regular expressions (with e.g. from PET/CT data)</td>
</tr>
</tbody>
</table>

Day 2-Friday, 29\textsuperscript{th} May

<table>
<thead>
<tr>
<th>Time</th>
<th>Lecture</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00 - 10:00</td>
<td>Data Processing 1 – Series, DataFrames, building DataFrames from files</td>
</tr>
<tr>
<td>10:00 - 10:30</td>
<td>Coffee Break</td>
</tr>
<tr>
<td>10:30 - 12:00</td>
<td>Data Processing 2 – Filters and queries, sorting, data aggregation, pivot tables, table joins</td>
</tr>
<tr>
<td>12:00 - 13:00</td>
<td>Lunch Break</td>
</tr>
<tr>
<td>13:00 - 17:00</td>
<td>Practicals (with open coffee from 15:00 onwards)</td>
</tr>
</tbody>
</table>

Day 3-Saturday, 30\textsuperscript{th} May

<table>
<thead>
<tr>
<th>Time</th>
<th>Lecture</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00 - 10:00</td>
<td>Visualisation – Plotting from DataFrames, plot adjustments</td>
</tr>
<tr>
<td>10:00 - 10:30</td>
<td>Coffee Break</td>
</tr>
<tr>
<td>10:30 - 12:00</td>
<td>Dicom file manipulation – Reading/writing DICOM, modifying DICOM tags, extending to batch DICOM modifications</td>
</tr>
<tr>
<td>12:00 - 13:00</td>
<td>Lunch Break</td>
</tr>
<tr>
<td>13:00 - 14:00</td>
<td>Optional exam</td>
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</tbody>
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Venue and Accommodation

Course Venue
The course will take place at the following address:

Dolmen Hotel Malta,
St Pauls Bay
Malta
SPB 2402

More information can be found here.
Transport to/from airport

To arrive at Dolmen Hotel you can either catch a bus or use taxis. The cheapest option is a bus.

Catch Bus Route X3 as soon as you exit the Arrivals Terminal of the airport and disembark at the final Bus Stop (which is a Bus Terminus). The hotel is opposite the Bus Terminus. The trip should take around 1 hour but it may take longer during rush hour. More information can be found [here](#).

Taxis are also another option, especially if you land at the airport between 22:30 and 04:30. The following taxi services are a few options, although there are more taxi services:

- Ecabs (download app)
- BOLT (download app)
- Any.cab

Accommodation

Participants are asked to book their own accommodation. MAMP will not be providing any accommodation for this course. Nonetheless, should you wish to stay at the Dolmen Hotel, MAMP arranged for a discount at the Dolmen Hotel. You can redeem this discount by contacting us before booking the accommodation.
Insurance and cancellation

MAMP does not accept liability for individual medical, travel or personal insurance. Participants are strongly advised to take out their own personal insurance policies.

In case an unforeseen event would force MAMP to cancel the meeting, the Association will reimburse the participants fully the registration fees. MAMP will not be responsible for the refund of travel and accommodation costs. In case of cancellation, full refund of the registration fee minus 10% for administrative costs may be obtained up to three months before the course and 30% of the fee up to one month before the course. No refund will be made if the cancellation request is postmarked less than one month before the start of the course.