

MATLAB[®] for Python[®] Users

The MATLAB language is designed primarily for math-intensive scientific computing. MATLAB combines a desktop environment tuned for iterative analysis with a programming language that expresses matrix and array mathematics directly. Understanding the philosophy and API design can help while learning MATLAB.

» General Behavior

Python Syntax	MATLAB Syntax	Purpose	MATLAB Examples
#	%	Comment	<code>%hello</code>
<code>print</code>	Do not terminate with;	Print output	<code>x</code>
/	...	Continue to next line	<code>x = 1+...2;</code>
<code>os</code>	!	Operating system command	<code>! echo hi</code>
<code>+ - * /</code>	<code>+ - * /</code>	Mathematical operators	<code>x = 1+2</code>
<code>**</code>	<code>^</code>	Exponent	<code>x = y^2</code>
<code>* / **</code>	<code>.* ./ .^</code>	Element-wise operators	<code>x = [1 2].*</code> <code>[3 4]</code>
<code>not, and, or</code>	<code>~ & </code>	NOT, AND, OR logical operators	<code>if x<2 & x>2</code>
<code>del</code>	<code>clear</code>	Clear variable from memory	<code>clear x y</code>
<code>clear</code>	<code>clc</code>	Clear command window	<code>clc</code>

» Referencing

MATLAB Syntax	Purpose	Example
<code>()</code>	Index (copy-on-write)	<code>x(1,1)</code>
<code>[]</code>	Create array	<code>x = [1 2 3]</code>
	Join arrays	<code>z = [x ; y]</code>
<code>{}</code>	Create cell arrays	<code>x = {42; "hello world"}</code>
	Extract contents from a container	<code>x{1,1}</code>
<code>.</code>	Access class property or method	<code>obj.Data</code>
	Reference table or struct field	<code>t.FieldName</code>

- Beginning element has an index of 1.
- Indexing is left and right inclusive.
- Indexing options include N-D indexing (row,col), linear indexing (element number), and logical indexing (conditional statement).

» Functions

Creating functions	You can declare functions within a function file. Input arguments are captured in parentheses.	<code>function z = foo(x,y)</code> ... <code>end</code>
	Multiple outputs are captured with square brackets.	<code>function [a,b] = foo(x,y)</code> ... <code>end</code>
Calling functions with input arguments and name-value pairs		<code>y = foo(x,y,"Name",Value)</code>

» Data Types

Similar data types:

Python	MATLAB
float	double, single
complex	complex single, complex double
int	(u)int8, (u)int16, (u)int32, (u)int64
float(nan)	NaN
float(inf)	inf
str	str, char
bool	logical
dict	struct
list, tuple	cell
pandas.dataframe	table

MATLAB defaults to store all numeric values as double-precision floating-point numbers. Python stores some numbers as integers and others as floating-point numbers. In MATLAB, for $x=4$ and $y=4.0$, x is always equal to y .

» Control Flow

Statement	Example
for	<pre>for i = 1:10 ... end</pre>
if	<pre>if x<3 ... elseif x == 2 else ... end</pre>
while	<pre>while x<3 ... end</pre>
switch-case	<pre>switch switch_arg ... case case_arg ... end</pre>
try-catch	<pre>try ... catch ... end</pre>

» Objects

Define a class

```
classdef MyClass
    properties
        MyProp
    end
    methods
        function obj = MyClass(val)
            end
        function y = MyMethod(obj,x)
            end
    end
end
```

Use a class

- Save the class definition with the same name as the class `MyClass.m`
- Create an object of the class
`a = MyClass`
- Access the properties
`a.MyProp`
- Call methods to perform operations
`b = MyMethod(a,val)`
- To pass-by-reference, create a "handle" class
`classdef myclass < handle`
...
`end`