

# **Computational Analysis of Physical Systems (Lecture 2)**

Basic constructions in Python  
(Conditions & Loops)

# “if” statement-1

```
a=input("Enter the number")
```

```
if a<5:
```

```
    print "The number is less than 5"
```

```
print "Thank you for using Python"
```

## “if” statement-2

If an **if** clause consists only of a single line, it may go on the same line as the header statement:

```
var = 100
```

```
if ( var == 100 ) : print "Value of is 100"
```

```
print "Good bye!"
```

# Comparison Operators

<b>==</b>	<b>(EQUAL)</b>
<b>!=</b>	<b>(NOT EQUAL)</b>
<b>&gt;</b>	<b>(GREATER THAN)</b>
<b>&lt;</b>	<b>(LESS THAN)</b>
<b>&gt;=</b>	<b>(GREATER THAN OR EQUAL TO)</b>
<b>&lt;=</b>	<b>(LESS THAN OR EQUAL TO)</b>

# “if” statement-3

```
a=input("Enter the number")
```

```
if a<5:
```

```
    print "The number is less than 5"
```

```
elif a==5:
```

```
    print "The number is 5"
```

```
else:
```

```
    print "The number is greater than 5"
```

```
print "Thank you for using Python"
```

## “if” statement-4

```
num1=input("Enter number1")
```

```
num2=input("Enter number2")
```

```
if num1<num2 and num1<0:
```

```
    print “num1 is less than num2 and it is negative”
```

```
print "Good bye!"
```

# Logical Operators

<b>and</b>	<b>If both the operands are true then then condition becomes true : (a and b)</b>
<b>or</b>	<b>If any of the two operands are non zero then then condition becomes true : (a or b)</b>
<b>not</b>	<b>Use to reverses the logical state of its operand. If a condition is true then Logical NOT operator will make false : not b</b>

a,b=2,3

if not(a==b):

print'they are not equal'

# “for” statement-1

“Range” command:

range(1,10) : [1, 2, 3, 4, 5, 6, 7, 8, 9]

range(1,10,3) : [1, 4, 7]

range(1,10,0.5) :

Traceback (most recent call last):

File "<interactive input>", line 1, in <module>

TypeError: range() integer step argument expected, got float.

a=range(1,10,2) : [1, 3, 5, 7, 9]

len(a) : 5

range(3) : [0, 1, 2]



## “for” statement-2

```
for i in range(1,11):  
    print i
```

```
for i in range(1,11,2):  
    print i
```

# “for” statement-3

```
languages = ['C++','Fortran','Python']
```

```
for index in range(len(languages)):
    print 'I learnt',languages[index]
```

# “for” statement-4 (nested for)

```
for i in range(1,4):  
    for j in range (1,4):  
        print i,"times",j,"equals to",i*j
```

# “while” statement (for + if)

```
count = 1
```

```
while (count < 11):
```

```
    print 'The count is:', count
```

```
    count = count + 1
```

```
print "Good bye!"
```

# “continue” command

```
for number in range(0,10):  
    if number == 5:  
        continue  
    print 'Current number :', number
```

# “break” command

```
for number in range(0,10):  
    if number == 5:  
        break  
    print 'Current number :', number
```

# Example - 1

```
for num in range(10,20):  
    for i in range(2,num):  
        if num%i==0:  
            j=num/i  
            print '%d equals %d * %d' %(num,i,j)
```

## Example - 2

```
var = 100
if var < 200:
    print "Expression value is less than 200"
    if var == 150:
        print "Which is 150"
    elif var == 100:
        print "Which is 100"
    elif var == 50:
        print "Which is 50"
elif var < 50:
    print "Expression value is less than 50"
else:
    print "Could not find true expression"
```



# Exercise 1

$n!$

# Exercise 1 - Solution

```
n=input("n=? ")  
facto=1  
for i in range(1,n+1):  
    facto=facto*i  
print "n!=",facto
```

# Exercise 2

Fibonacci numbers without a vector

**1, 1, 2, 3, 5, 8, 13, 21, ...**

$$F(n) = \begin{cases} 0 & n = 0 \\ 1 & n = 1 \\ F(n-1) + F(n-2) & n > 1 \end{cases}$$

# Exercise 2 - Solution

```
number=input("Which Fibonacci number? ")
```

```
if number==0:
```

```
    fibo=0
```

```
else:
```

```
    a,b=0,1
```

```
    for i in range(1,number):
```

```
        a,b=b,a+b
```

```
    fibo=b
```

```
print "The number you need is ",fibo
```