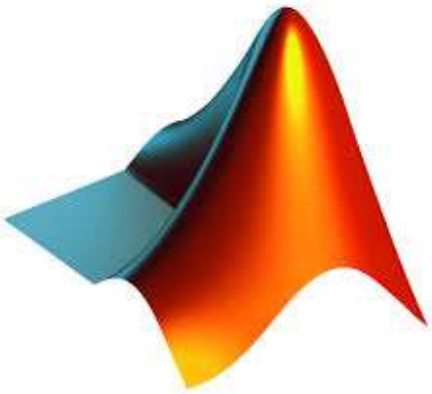
University of Anbar
College of Science
Department of Physics

# MATLAB

**For the 2nd stage, Second Course**



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# Syllabus

- **Some Common functions**
- **Importing and Exporting Data**
- **The load and save commands**
- **Exporting text (ASCII) data**
- **fprintf() Function**
- **Control flow**
- **Probability**
- **Symbolic and Numerical Integration**
- **Differentiation**
- **Calculus in Symbolic Math Toolbox**
- **Complex Numbers**
- **Complex Conjugate and Absolute Value**
- **Polar Form**
- **Functions in MATLAB**
- **Plot Types**
- **Three-Dimensional Plots**

**Sources:** 1. Essential MATLAB for Engineers and Scientists by Brian H. Hahn and Daniel T. Valentine, 2. www.Mathworks.com

## Some Common functions

A short list of some of the more common ones follows. Use *helpwin* at the command line to see a list of categories of functions, with links to descriptions of the functions.
Alternatively, go to the Help browser by clicking the Help icon (?) in the Home tool bar. Search for Alphabetical List of Functions.
Note that if the argument of a function is an array, the function is applied element by element to all the values in the array, e.g.,

```
>> sqrt([1 2 3 4])
Ans=
      1.0      1.4142   1.7321      2.0000
```

## Time and dates functions.

Write help *timefun* in the command window

```
Current date and time.
  date       - Current date as date string.
  clock      - Current date and time as date vector.
```

```
Timing functions.
  cputime        - CPU time in seconds.
  tic            - Start stopwatch timer.
  toc            - Stop stopwatch timer.
  etime          - Elapsed time.
  pause          - Wait in seconds.
```

**clock**

time and date in a six-element vector, e.g., the statements

```
>> t=clock;
>> fprintf( '%02.0f:%02.0f:%02.0f\n ', t(4), t(5),t(6))
08:54:56
```

result in 08:54:56. Note how the hours, minutes, and seconds are left-filled with zeros if necessary.

```
>> fprintf( '%02.0f:%02.0f:%02.0f\n ',t(1),t(2),t(3), t(4), t(5),t(6))
2019:02:25
 09:49:20
```

**date**

date in a string in dd-mmm-yyyy format, e.g.,

```
>> date
ans = 25-Feb-2019

>> calendar
                Feb 2019
    S     M    Tu     W    Th     F     S
    0     0     0     0     0     1     2
    3     4     5     6     7     8     9
   10    11    12    13    14    15    16
   17    18    19    20    21    22    23
   24    25    26    27    28     0     0
    0     0     0     0     0     0     0
```

**cumsum**(x)
cumulative sum of the elements of x, e.g.,
**>>cumsum(1:4)**
[1 3 6 10].

max(x)
maximum element of vector x.
>> x=[10 2 6 4 3]
max(x)
10
Q: solve the above function using loops?

mean(x)
mean value of elements of vector x.
5

min(x)
minimum element of vector x.
2

pow2(x)
$2^x$.
>> pow2(5)
ans = 32

prod(x)
product of the elements of x.

>> prod(x)
ans = 1440

>>primes(10)

ans = 2 3 5 7

```
>>isprime(10)
ans =     0
>>gcd(26,14)                    Greatest Common Divisors
ans =     2
>>lcm(6,15)                     Least common multiple
ans =    30
>>factor(30)
ans =     2     3     5
>>factorial(7)
ans =        5040
```