

COURSE CODE: CHE 315

CREDIT LOAD: 2 UNITS

**COURSE TITLE:
COMPUTER PACKAGES IN CHEMICAL
ENGINEERING I**

**NAME OF COURSE LECTURER
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COURSE OUTLINE

- *Getting Started with MATLAB**
 - *MATLAB Desktop Basics**
- *MATLAB Language Fundamentals**
- *Matrices and Arrays with MATLAB**
 - *Mathematics with MATLAB**
 - *Graphics with MATLAB**
- *Programming with MATLAB**

COURSE OBJECTIVES/EXPECTATION

The Student Should:

- *Understand Basics of MATLAB**
- *Solve Mathematical problems using MATLAB**
- *Present Functions and Solutions as 2D and 3D plots in MATLAB**
- *Write and Run Simple Programs in MATLAB**

RECOMMENDED TEXTS

- *MATLAB Documentation (See MATLAB Help)**
- *Basics of MATLAB and Beyond – Andrew Knight**
- *Essential MATLAB for Engineers and Scientists – Brian Hahn and Daniel T. Valentinne**

GETTING STARTED WITH MATLAB

- *MATLAB® is a high-level language and interactive environment for numerical computation, visualization, and programming.

- *There are more than a million Engineers and Scientists in industry and academia that use MATLAB, the language of technical computing.

KEY FEATURES OF MATLAB

- *High-level language for numerical computation, visualization and application development.**
- *Interactive environment for iterative exploration, design, and problem solving.**
- *Mathematical functions for linear algebra, statistics, optimization, numerical integration and solving ordinary differential equations**
- *Built-in graphics for visualizing data and tools for creating custom plots**

MATLAB DESKTOP

When you start MATLAB®, the desktop appears in its default layout. The desktop includes these panels:

1. Current Folder — Access your files.
2. Command Window — Enter commands at the command line, indicated by the prompt (`>>`).
3. Workspace — Explore data that you create or import from files.
4. Command History — View or rerun commands that you entered at the command line.

As you work in MATLAB, you issue commands that create variables and call functions.

For example, create a variable named 'a' by typing this statement at the command line: `a=1`.

MATLAB DESKTOP CONT'D

MATLAB R2013b

HOME PLOTS APPS

FILE VARIABLE CODE SIMULINK ENVIRONMENT RESOURCES

Current Folder: C:\Users\OSOKA\Documents\MATLAB

Command Window: fx >>

Workspace:

Name	Value	Min	Max
------	-------	-----	-----

Command History:

```
anova1([y x2])
anova1([y x1.*x2])
regstats(y,[x1 x2],'linear')
anovan(y,[x1 x2 x1.*x2],'linear')
regstats(y,[x1 x2],'linear')
x1=[29 27.85 28.8 30.85 30.15 30.5 29 27.85]
x2=[73.3 38.95 43.25 51.6 72.6 62.1 73.3 38.95]
y=[5.3 3.8 5.3 6.8 5.8 6.3 5.3 3.8 5.3 6.8]
anovan(y,[x1 x2],'linear')
help anova1
```

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Ready

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MATLAB Language Fundamentals

- *Variables
- *Operators
- *Functions
- *Commands
- *Numbers/Data Types
 - *Strings
- *Statements

Variables

Variable Names: A valid variable name starts with a letter, followed by letters, digits, or underscores. MATLAB® is case sensitive, so A and a are not the same variable. The maximum length of a variable name is the value that the *namelengthmax* command returns.

You cannot define variables with the same names as MATLAB keywords, such as *if* or *end* or Command. For a complete list, run the *iskeyword* command.

OPERATORS

Arithmetic

Addition, subtraction, multiplication,
division, power, rounding

Relational Operators

Value comparisons

Logical Operations

True or false (Boolean) conditions

Set Operations

Unions, intersection, set membership

Bit-Wise Operations

Set, shift, or compare specific bit fields

OPERATORS EXAMPLES

Arithmetic: +, -, *, /, \, ^, .*, ./, .\, .^, ceil, fix, floor, rem, mod, round, prod, sum, diff.

Relational Operators: <, <=, >, >=, ==, ~=

Logical Operations: &, ~, |, all, any, find.
False, true.

OPERATORS PRECEDENCE

1. Parentheses ()
2. Transpose (.'), power (.^), complex conjugate transpose ('), matrix power (^)
3. Unary plus (+), unary minus (-), logical negation (~)
4. Multiplication (.*), right division (./), left division (.\), matrix multiplication (*), matrix right division (/), matrix left division (\)
5. Addition (+), subtraction (-)
6. Colon operator (:)
 7. Less than (<), less than or equal to (<=), greater than (>), greater than or equal to (>=), equal to (==), not equal to (~=)

FUNCTIONS

Functions are MATLAB text that can be used for computation to generate numerical results or answers.

EXAMPLES: sin, cos, tan, exp, atan, sind, cosd, tand.

COMMANDS

Functions are MATLAB text that can be used to change the look of the MATLAB Desktop or Environment without necessarily generating numerical results or answers. It is also used to Launch into MATLAB Toolboxes.

EXAMPLES: `clc`, `clear`, `cftool`, `rstool`,
`regstats`

NUMBERS/DATA TYPES

Numeric classes in the MATLAB® include signed and unsigned integers, and single- and double-precision floating-point numbers. MATLAB stores numeric values as double-precision floating point. One may store number, or array of numbers, as integers or single-precision. Integer and single-precision arrays offer more memory-efficient storage.

The range for double is:

-1.79769e+308 to -2.22507e-308

and 2.22507e-308 to 1.79769e+308

The range for single is:

-3.40282e+38 to -1.17549e-38

and 1.17549e-38 to 3.40282e+38

STRINGS

A character string is a sequence of any number of characters enclosed in single quotes. You can assign a string to a variable.

```
>> otherText = 'You're right'
```

```
>> otherText =
```

```
You're right
```

STATEMENTS

A statement may contain a Variable name, number or string, an operator and function.

```
>> f = 71;
```

```
>> c = (f-32)/1.8;
```

```
>> tempText = ['Temperature is ', num2str(c), 'C']
```

```
>> y=sin(3*pi)/2
```



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