Python and Data Engineering Fundamentals

Document Structure

Import a package

```
\usepackage{package_name}
```

Create Front Matter

```
\begin{frontmatter}
    Front Matter content
\end{frontmatter}
```

Paper Title

```
\title{Paper Title}
```

Author Name

```
\author[Aff1]{Author name}
```

Affiliations

```
\affiliation [Aff1]{
    program={program name},
    collage={College name},
    University={Ajman University},
    city={Ajman},
    country={United Arab Emirates},
    \email{SI1D@ajmanuni.ac.ae}}
```

Create section

```
\section {title of section}
```

Create subsections

```
\subsection{}
\subsubsection{}
```

End Matter

Add Appendix

```
\appendix
```

Bibliography style

```
\bibliographystyle{elsarticle-num-names}
```

Specify Bibliography file

```
\bibliography{path to .bib file}
```

Text Manipulation

Font style	Latex
Bold	\textbf{enter text here to be bold}
Italic	\textit{enter text here to be italic}
Underlined	\underlined{enter text to be underlined}
Link	\href{url_link}{link_keyword}
Url	\url{url_link}
Color	\textcolor{color_name}{colored_text}
highlight	\colorbox{color_name}{highlighted_text}
footnote	\footnote{enter text here}
Comment	%text to be commented

Font Colors

red	green
blue	cyan
magenta	yellow
black	gray
white	darkgray
lightgray	brown
lime	olive
orange	pink
purple	teal
violet	

Font Sizes

Tiny	{\tiny text_to_be_tiny }
Script size	{\scriptsize text_to_be_scriptsize }
Footnote size	{\footnotesize text_to_be_footnotesize }
small	{\small text_to_be_small }
Normal size	{\normalsize text_to_be_normalsize}
large	{\large text_to_be_large}
huge	{\huge text_to_be_huge}

Font Family

serif (roman)	\textrm{Sample Text 0123}
sans serif	\textsf{Sample Text 0123}
monospace	\texttt{Sample Text 0123}
Times new roman	\usepackage{times}

List

Ordered List	\begin{enumerate} \item List entry one \end{enumerate}
Unordered List	\begin{itemize} \item List entry one \end{itemize}

Special Characters

Special Characters	Symbol	Latex
Hashtag Sign	#	\#
Dollar Sign	$	\$
Percent Sign	%	\%
Underscore	_	_
Ampersand	&	\&
Braces	{}	\{ \}
Circumflex	^	\^{}
Backslash	\	\textbackslash

Paragraph Manipulation

Center a paragraph

```
\begin{center}
    %text to be centered
\end{center}
```

Justify a paragraph

```
\justifying
```

Right alignment of a paragraph

```
\begin{flushright}
    %paragraph to be right aligned
\end{flushright}
```

Left alignment of a paragraph

```
\begin{flushleft}
    %paragraph to be left aligned
\end{flushleft}
```

Math Expressions

Inline math mode

$ The Equation $

\(The Equation \)

\begin{math} The Equation \end{math}

Display math mode

\[The Equation \]

\begin{displaymath} The Equation \end{displaymath}

\begin{equation} The Equation \end{equation}

Symbols & Operators

Special Characters	Symbol	Latex
Alpha	α	$ \alpha $
Beta	β	$ \beta $
Gamma	γ	$ \gamma $
Theta	θ	$ \theta $
Delta	δ	$ \delta $
Epsilon	ε	$ \varepsilon $
Pi	π	$ \pi $
Infinity	∞	$ \infty $
Special Characters	**Symbol**	**Latex**
Less than or equal	≤	$ \leq $
Greater than or equal	≥	$ \geq $
Less than	<	$ < $
Greater than	>	$ > $
Not equal	≠	$ \neq $
Plus minus	±	$ \pm $

Subscript & Superscript (must within any of the math modes)

The case	Latex
Subscript	$ x_i $
Superscript	$ x^i $
Subscript and superscript	$ x^j_i $
	$ x_i^j $
Long subscripts and superscripts	$ x^{jk}_{iz} $

Matrices (must within any of the math modes)

Round brackets Matrix ( )

```
\begin{pmatrix}
    cell11 & cell12 & cell13\\
    cell21 & cell22 & cell23
\end{pmatrix}
```

Square brackets Matrix [ ]

```
\begin{bmatrix}
    cell11 & cell12 & cell13\\
    cell21 & cell22 & cell23
\end{bmatrix}
```

Add dots to the Matrix

Type	Latex
Horizontal dots	\dots
Vertical dots	\vdots
Diagonal dots	\ddots

Commonly used functions (must within any of the math modes)

Function	Latex
Division	\frac
Summation	\sum
Product	\prod
limit	\lim
Integral	\int
roots	\sqrt

Brackets (Types, sizes)

Type	Latex
Parentheses; round brackets ( )	(Content)
Brackets; square brackets [ ]	[Content]
Pipes; vertical bars | |	$\|Content\|$
Braces; curly brackets { }	\{Content\}

Dynamically adjustable brackets

```
\left[ Content \right]
```

Piecewise function (must within any of the math modes)

```
\begin{cases}
   Function1 & Condition1\\
   Function2 & Condition2 \\
   Function3 & Condition3 \\
\end{cases}
```

Figures

Basic Syntax

```
\begin{figure}[b]
  \centering
  \includegraphics[width=\linewidth, height=8cm]{path to the image}
  \caption{The Ajman University Main Campus}
  \label{fig:au_campus}
\end{figure}
```

Import Statement	\includegraphics{path to image}
Caption	\caption{insert caption here}
Referencing	\label{fig:figure label}
Positioning	\begin{figure}[position] \centering % image settings \end{figure}
Resizing using Scale	\includegraphics[scale=1.5]{path to image}
Resizing using height and weight attributes	\includegraphics[width=5cm, height=4cm]{path to image}
Rotating	\includegraphics[angle=45]{path to image}

Latex Units & Length

Abbreviation	Definition
pt	A point (default length unit). Is 0.2515 mm
cm	a centimeter
mm	a millimeter
in	an inch
ex	The height of an x in the current font
em	The width of an m in the current font
\linewidth	width of the line in the current environment
\columnwidth	width of the column
\textwidth	width of the text
\textheight	height of the text

Subfigures

Basic Syntax

```
\begin{figure}
   \centering
   \begin{subfigure}[b]{0.3\textwidth}
      % figure 1 attributes
   \end{subfigure}
   \hfill
   \begin{subfigure}[b]{0.3\textwidth}
      % figure 2 attributes
   \end{subfigure}
   \hfill
   \begin{subfigure}[b]{0.3\textwidth}
      % figure 3 attributes
   \end{subfigure}
     \caption{Three simple graphs}
     \label{fig:three graphs}
\end{figure}
```

Table

Basic Syntax

```
\begin{table}[]
   \centering
   \begin{tabular}{align1 align2}
      cell11& cell12  \\
      cell21& cell22
   \end{tabular}
   \caption{Caption}
   \label{tab:my_label}
\end{table}
```

Note: the alignment can be "c" for center, "l" for Left and "r" for right.

Horizontal Line

```
\hline
```

Multicolumn

```
\multicolumn{number cols}{align}{text}
```

Multirow

```
\multirow{number rows}{width}{text}
```

Horizontal Line from specified column "i" to column "j"

```
\cline{i-j}
```

Set the Column Width

```
\begin{tabular}{align1 align2 ArrayAlign{width}}
        Table content
\end{tabular}
```

Note: ArrayAlign can be "m" for middle, "p" top and "b" for bottom.

Adjust the table width

```
\begin{adjustbox}{width=\textwidth}
        The tabular environment
\end{adjustbox}
```

Table rotation

```
\begin{lanscape}
        The table and the tabular environments
\end{lanscape}
```

Table Style

Cell color

```
\cellcolor{color}
```

The Cell color intensity (Before the cell)

```
\cellcolor{color ! intensity}
```

Row color (Before the first cell in the row)

```
\rowcolor{color}
```

Multirow coloring (Before the tabular environment)

```
\rowcolors{The starting row index}{odd rows color}{even rows color}
```

Column color (before the columns alignments)

```
>\columncolor{color}
```

Algorithms

Basic Syntax

```
\begin{algorithm}
\caption{Algorithm with caption}
\label{alg:generic}
\begin{algorithmic}
      \State $i \gets 10$
      \While {$ i > 10 $}
        \State statement
        \If {condition}
          \State statement
        \Else
          \State statement
        \EndIf
      \EndWhile
\end{algorithmic}
\end{algorithm}
```

Chemical Formulae

```
\ce{ the chemical formulae }
```

Reaction Arrows

The type	Latex
To the right	\ce{ A -> B}
Double ended	\ce{ A <--> B}
Reversible	\ce{ A <=>B}

Text Above and Bellow

```
\ce{ A -> [{Text Above}][{Text Bellow}]  B}
```

Precipitate and Gas

Precipitate

Use the lowercase of the letter v `\ce{ A -> Bv}`

Gas

Use the power of symbol "^" `\ce{ A -> B^}`

Physical State of matter

The state	Latex
Liquid (l)	\ce{ A -> B(l)}
Gas (g)	\ce{ A(g) -> B}
Solid (s)	\ce{ A -> B(s)}
Aqueous (aq)	\ce{ A (ag) -> B}

Subscript, charge, coefficient

The topic	Latex
Subscript	\ce{ A2}
Subscript for compound	\ce{ (AB)2}
Charge (Case1)	\ce{ A-}
Charge (Case2)	\ce{ A^2-}
Charge for compound	\ce{ [AB]^2-}
Subscript and Charge	\ce{ A3^2-}
Coefficient	\ce{ 2A3^2-}

References

Cross-referencing	Citation
\ref{label_name}	\cite{cite_name}

Presentations

Create new frame	Add a Frame title
\begin{frame} Frame content \end{frame}	\frametitle{text}