Cheatsheet Template v1.0

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1 Text Formatting

1.1 Font Styles

Bold Text
Italic Text
`Monospace Text`
Underlined Text
Slanted Text
Roman Family
Sans Serif Family
Small Caps

1.2 Font Sizes

tiny
scriptsize
footnotesize
small
normalsize
large
Large
LARGE
huge
Huge

2 Lists

2.1 Unordered List

- Item 1
- Item 2
  - Nested Item 1
  - Nested Item 2

2.2 Ordered List

1. First item
2. Second item
   (a) Nested item 1
   (b) Nested item 2

2.3 Description List

Term 1 Description of term 1.
Term 2 Description of term 2.

3 Tables

3.1 Simple Table

Left	Center	Right
1	2	3
4	5	6

3.2 Table with Merged Cells

Merged Column		C
Merged Row	1	2
	3	4

4 Code Listings

4.1 Python Code

Listing 1: Python Example

```python
def hello_world():
    print("Hello, World!")
```

4.2 Java Code

Listing 2: Java Example

```java
public class HelloWorld {
    public static void main(String[] args) {
        System.out.println("Hello, World!");
    }
}
```

4.3 C++ Code

Listing 3: C++ Example

```cpp
#include <iostream>

int main() {
    std::cout << "Hello World" << std::endl;
    return 0;
}
```

5 Figures

5.1 Simple Figure

5.2 Figure with Custom Box Caption

Figure Analysis

The curve shows the Lennard-Jones potential. The minimum of the curve corresponds to the most stable configuration of the particles.

6 Advanced Box Layouts

6.1 Topic Box with List

Complex Topic

This topic box can contain various elements, such as lists:

- Point A
- Point B

6.2 Side-by-Side Box

Side-by-Side

This is the left part. | This is the right part.

7 Mini-Pages

7.1 Two Columns

Left Column
This is the left column inside a minipage.

Right Column
This is the right column inside a minipage.

7.2 Three Columns

Col 1	Col 2	Col 3
Content	Content	Content

7.3 Formula and List Side-by-Side

$$E = mc^2$$

- E: Energy
- m: Mass
- c: Speed of light

7.4 Figure and Text Side-by-Side

This minipage contains text placed next to a figure. The figure shows a potential energy curve, illustrating concepts like binding energy (U_0) and equilibrium distance (r_0).

8 Math Mode Glossary

8.1 Vectors

Vectors are typically denoted in boldface, e.g., $\mathbf{v}$. A column vector is written as:

$$\mathbf{v} = \begin{pmatrix} v_1 \\ v_2 \\ v_3 \end{pmatrix}$$

8.2 Matrices

Matrices are usually denoted by uppercase letters. An example of a 3x3 matrix is:

$$A = \begin{pmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{pmatrix}$$

8.3 Wavefunctions (Quantum Mechanics)

A wavefunction, often denoted by ψ, describes the quantum state of a system. For a particle in a 1D box, the stationary states are:

$$\psi_n(x) = \sqrt{\tfrac{2}{L}} \sin\left(\tfrac{n\pi x}{L}\right)$$

8.4 Euler's Identity

$$e^{i\pi} + 1 = 0$$

Euler's identity, a beautiful equation.

8.5 Navier-Stokes Equation

$$\rho\left(\tfrac{\partial \mathbf{v}}{\partial t} + \mathbf{v} \cdot \nabla \mathbf{v}\right) = -\nabla p + \mu \nabla^2 \mathbf{v} + \mathbf{f}$$

Incompressible flow. Describes the motion of viscous fluid substances.

8.6 Heat Equation

$$\tfrac{\partial u}{\partial t} - \alpha \nabla^2 u = 0$$

Describes the distribution of heat in a given region over time.

8.7 3D Hooke's Law (Isotropic)

$$\begin{pmatrix} \sigma_{11} \\ \sigma_{22} \\ \sigma_{33} \\ \sigma_{23} \\ \sigma_{13} \\ \sigma_{12} \end{pmatrix} = \tfrac{E}{(1+\nu)(1-2\nu)} \begin{pmatrix} 1-\nu & \nu & \nu & 0 & 0 & 0 \\ \nu & 1-\nu & \nu & 0 & 0 & 0 \\ \nu & \nu & 1-\nu & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{1-2\nu}{2} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{1-2\nu}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{1-2\nu}{2} \end{pmatrix} \begin{pmatrix} \varepsilon_{11} \\ \varepsilon_{22} \\ \varepsilon_{33} \\ 2\varepsilon_{23} \\ 2\varepsilon_{13} \\ 2\varepsilon_{12} \end{pmatrix}$$

Stress-strain relationship for linear isotropic materials.

8.8 Von Mises Yield Criterion

$$\sigma_v^2 = \tfrac{1}{2}[(\sigma_{11} - \sigma_{22})^2 + (\sigma_{22} - \sigma_{33})^2 + (\sigma_{33} - \sigma_{11})^2 + 6(\sigma_{12}^2 + \sigma_{23}^2 + \sigma_{31}^2)]$$

Predicts yielding of ductile materials under complex loading.

8.9 Schrödinger Equation (Time-Independent)

$$\hat{H}\psi = E\psi$$

Fundamental equation of quantum mechanics for stationary states.

Author's Notes

This summary was created by **Colin Mettler** for the lecture **XXX** by XXX (spring / autumn semester 202X). You are free to develop this summary further and publish it.

Correctness and completeness cannot be guaranteed. Please forward any corrections, suggestions for improvement or other comments on the content and design to cmettler@ethz.ch.

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Version History

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