

**MATLS 2H04A: MEASUREMENTS AND COMMUNICATION****Instructor**

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**Teaching assistants**

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|---------------------|-----------------|---------------------|
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**Course description**

Methods of technical communication, involving oral and written practice; basic experimental skills of acquiring, analyzing and presenting data, as well as practical determining of mechanical properties, microstructure and chemical composition of structural materials.

**Learning Outcomes**

- Effectively communicate technical information in oral and written form. Write professional technical reports, using acceptable format, graphics and referencing (citations).
- Identify essential characteristics of a technical problem. Design an effective approach utilizing engineering tools and fundamental knowledge to solve a problem.
- Gain practical knowledge of finite element analysis and its application to structural design optimization problems.
- Effectively operate within a team environment.

**Course structure**

12 weeks: lectures/tutorials 1 – 2 hr/week, 3 labs 6 hrs each, 1 group project

**Lectures** (week 1–5):

- technical reports, writing skills
- creating effective presentation and communication
- data analysis, plotting, basic statistics

**Labs** (week 2–11):

- steel metallography and Fe-C phase diagram
- mechanical properties
- chemical analysis

**Tutorials/project** (week 5–13):

- “Dome” project proposal
- CAD tools for 3D modelling
- finite element (FEM) analysis
- solving optimization problems using CAD-FEM techniques
- 3D printing and testing of the Dome design

**Evaluation**

| Activities                        | Contribution to the final grade (%) |
|-----------------------------------|-------------------------------------|
| Labs                              | 60                                  |
| Lectures/tutorials attendance     | 10                                  |
| “Dome” design                     | 10                                  |
| Final “Dome” project presentation | 20                                  |

Overdue submissions are accepted until the feedback is released to the class, but there is a penalty factor

$$\exp(-\text{number of full days overdue} \times 0.5) .$$

For example, the lab report graded as 80% with 2 days overdue will receive

$$80\% \times \exp(-2 \times 0.5) = 30\% .$$

MSAF is required for labs and other academic work missed.

**Prerequisites and relevance to other courses**

The lab sessions of the course build on the understanding of materials, microstructure and properties developed in MATLS 1M03. Preparation of lab reports is now linked to the development of communication skills. Further communication skills development will take place in the capstone courses MATLS 4Z06.

**Recommended texts/software**

- W. D. Callister Jr, *Materials Science and Engineering – An Introduction*, (Wiley, 2003).
- John Bowden, *Writing a Report*, (How To Books, 2011), 9th edition.
- Autodesk Inventor will be used for CAD design and FEM analysis.