

Guidelines for the Numerical Optimization Project

(response to be sent by email to florian.messerer@imtek.de until 2 pm, Jan 7, 2020)

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As explained at the beginning of the course, you have the possibility of doing a project to get an additional 3 ECTS. In the following you will receive some information regarding the scope of the project and our expectations.

If you are interested in doing a project please *let us know via email until 2 pm, January 7* (i.e., before the Q&A session). The email should contain the title of your project, the corresponding authors and a short description of your concept. For application-oriented projects the latter should comprise a description (in words) of your objective, constraints and decision variables. For algorithm-oriented projects the idea of the algorithmic scheme should be briefly discussed.

If you would like to form a group, but do not have group mates yet, let us know until December 15. We will then put you in contact with each other.

1. Make sure that you are properly registered for the project as required by your examination office (registration for the Studien- or Prüfungsleistung (SL / PL)).
2. The project can be done in groups of two or three people.
3. Projects can be either application- or algorithm-oriented. For application-based projects you formulate and solve a self chosen optimization problem that has a real-world interpretation. The focus should be on the mathematical description of your problem, its numerical solution and the interpretation of the results. For algorithm-based projects, you choose a scheme for the solution of optimization problems. The focus is then on the implementation of the scheme and an investigation of its performance, using several test problems / benchmarks. They should illustrate the properties of the algorithm, but need not have a real-world interpretation.
4. The main result is a written report in (approx. 6 pages) submitted as a PDF file. We strongly recommend using \LaTeX ¹. You can consider using the official IEEE template for conferences that can be downloaded here:
www.ieee.org/conferences_events/conferences/publishing/templates.html
5. The report must be a new document, that is solely written by the author(s).
6. The report includes a short, interesting title, the name(s) of the author(s) and an abstract. The content should be clearly structured in sections. It should start with an introduction and conclude with a short summary and critical discussion of the results.
7. The report should contain at least one (selfmade) sketch of the modeled system or implemented algorithm.
8. The report must cite all external sources as references at the end and other people's contributions must be acknowledged. Using other people's ideas and help is allowed, even encouraged. But not citing or acknowledging them properly is fraud.
9. Figures and tables should have a short caption and be referenced in the text properly, e.g., "the results are shown in Fig. 1". Use the Latex commands `\caption`, `\label` and `\ref`.

¹If you have not learned Latex yet, see this report as an opportunity. It will certainly pay off for your master's thesis

10. Plots contain physical units (if applicable) and axis descriptions.
11. Mathematical or physical variables shall consist of one letter only and be printed in italics. This is automatic in Latex, e.g., a_i as a_i . Physical units and sub- or superscripts that refer to words are in normal roman letters (use `\mathrm` when in Latex `mathmode`, e.g., x_{initial} as x_{initial} or $\frac{\text{kg}}{\text{m}^3}$ as $\frac{\mathrm{kg}}{\mathrm{m}^3}$). Write, e.g., $m = 5 \text{ kg}$ (and not $m = 5kg$ or $m = 5\text{kg}$).
12. On **February 11, 2020**, during the lecture, a **short presentation** of 10 to 15 minutes² shall be given by the authors to the teacher and the class. The slides can be based on material taken from the report and may contain additional content, e.g., videos, if required.
13. After the presentation you have some time to update your results based on the feedback. The **deadline** for the submission of the **written report** is:

March 6, 2020, at 23:59, sent by email to florian.messerer@imtek.de

14. The **project grade** is based on the form and content of the **report**, the originality and quality of the **results**, the oral **presentation**, the quality of the slides, and the answers to any questions.

²The exact time will be announced when the number of projects is known