Numerical Methods for Partial Differential Equations
A.Y. 2024/2025

Rules for the examination

The exam consists of two parts: a written test and a group project.

Written test

The written test contains both theoretical and practical questions.

Theoretical questions require knowledge of all the topics covered during the course, including strong and weak, continuous and discrete formulations for differential problems, as well as the theoretical properties of the discretization methods.

Practical questions require the use of the students' computer, `deal.II` and Paraview to implement finite element solvers, compute the solution to differential problems, visualize it and discuss it in light of the theory.

The written test has a maximum grade of 26. The test is passed if the obtained grade is greater than or equal to 15. If the test is not passed, it has to be repeated in one of the following exam sessions.

Students are allowed to use the course material during the written exam ("open book" exam modality), including textbooks, lecture notes and any material available through WeBeep or the course's GitHub repository. Communication between students during the test is forbidden.

Group project

Students are required to carry out a group project on the implementation of a finite element solver for an applied or advanced differential problem, not necessarily covered during the course. The project focuses on numerical methods and computational aspects.

Some possible project topics will be made available during the course. Students are free to choose the topic they prefer, and multiple groups can choose the same project. Students can propose alternative project topics of their interest, but they need to discuss them with the course teachers to make sure they are suitable.

Groups are formed by 2 to 4 students. We strongly encourage groups of at least 3 people, given the complexity of the projects. Students are free to choose their group mates.

After choosing the group and the project topic, students should communicate them to the teachers.

Dedicated tutoring sessions will be put in place to discuss the progress of the project with the teachers and ask for advice.

Students are required to deliver a written report of approximately 10 to 15 pages. Moreover, they are required to deliver the source code of their project. The method to deliver report and code will be made available during the course.

The projects will be discussed in an oral presentation of approximately 15 minutes per group. Project discussions will take place during exam sessions, in proximity of the written exam.

Students are allowed to discuss the project regardless of whether they have already passed the written exam. If the project is discussed before passing the written exam, the project grade will be kept on hold until the written exam is passed. If the project is discussed after passing the written exam, students need to enroll in the nearest exam session to allow the final grade to be registered.

The evaluation of the project will be based on the knowledge of the subject, quality of the work, quality of the presentation, oral delivery and discussion. The course teachers reserve the right to attribute different grades to different project members, based on the oral presentation and subsequent discussion.

The project has a maximum grade of 6.

Final grade

The final grade is obtained as the sum of the grades in the written test and in the project. The exam is passed if the final grade is greater than or equal to 18. If the final grade is greater than or equal to 31, the exam is passed with an evaluation of 30 cum laude (30 e lode).