

Mathematics Prep-Course for Scientific Computing

Winter Semester 2022/23
Jörg Liesen (19.09.2022)

The goal of this course is to provide a basic training in rigorous mathematical reasoning for the wide range of students with non-mathematical Bachelor degrees who enter the Scientific Computing master program at TU Berlin. The course will be held online via Zoom. It will start on October 4, 2022, and end before the start of the lecture period of the Winter Semester 2022/23 (which is on October 17, 2022).

Taking part in the course is not mandatory, but highly recommended for all starting Scientific Computing students, even those with a mathematical Bachelor degree. Students who successfully participate in the course will receive 3 credit points that can be recognized without a grade as an elective module (according to §5 (6) of the Scientific Computing Study and Examination Regulations of July 7, 2021).

Further details:

- Lecturer: Prof. Dr. Jörg Liesen, liesen@math.tu-berlin.de
- **First lectures: October 4, 2022, from 9:30 until 10:30 CET, and from 11:00 until 12:00 CET.**
- **In order to get the Zoom link for the course, students should send an email to the lecturer, preferably by October 3, 2022.**
- There usually will be two lectures in the morning (CET). Further details about the schedule will be given in the first lecture.
- Successful participation is based on attendance and successful solving of exercises. Details will be announced during the course.

Content:

1. *Introduction to the Scientific Computing Program and this Prep-Course*
2. *Mathematical logic*
3. *Sets, maps and relations*
4. *The architecture of mathematics*

5. *Direct proofs, and proofs by contrapositive and contradiction*
6. *Proofs with cases, and mathematical induction*
7. *Mathematical style, reading and writing mathematics*

Main References:

- Ethan D. Bloch, *Proofs and Fundamentals. A First Course in Abstract Mathematics*, 2nd ed., Springer, 2011
- Ulrich Daepf and Pamela Gorkin, *Reading, Writing, and Proving. A Closer Look at Mathematics*, 2nd ed., Springer, 2011
- Jörg Liesen and Volker Mehrmann, *Linear Algebra*, Springer, 2015