



**Graduate course EM - JMBC**

***Solution Methods in Computational  
Mechanics***

**3 Nov 2021 – 4 Nov 2021**

**Department of Mathematics and Computer Science  
Centre for Analysis, Scientific Computing and Applications  
Eindhoven University of Technology**

## General

Partial differential equations (PDEs) are ubiquitous in mechanics, describing a wide range of phenomena like stresses in a solid or waves. In this course we will address some numerical methods for PDEs. In particular, we will discuss discretisation methods for PDEs and time integration methods for the resulting ODE systems. The following topics are included:

- Classification of second order PDEs
- Finite difference methods for the Poisson equation (central differences, compact scheme)
- Finite volume methods for generic elliptic PDEs
- Advanced time integration methods for parabolic equations
- Discretisation methods for the wave equation (second and fourth order schemes)
- Riemann solvers for hyperbolic systems

The discretisation and time integration methods will be analysed in terms of accuracy and stability. We like to emphasize that finite element methods are not covered in this course. The course will include a number of computer sessions with MATLAB, in which the participants can put in practice the numerical methods introduced. The required prior knowledge is elementary numerical analysis.

Coordinator: Jan ten Thije Boonkkamp, Martijn Anthonissen (TUE)

For more information, contact:

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## Local organization

The course is organized by the Centre for Analysis, Scientific Computing and Applications of the Eindhoven University of Technology

## Lecturers

- J.H.M. ten Thije Boonkkamp
- M.J.H. Anthonissen

## Lecture notes

Lecture notes will be distributed during the course.

## Course assessment

Credits (1 EC) for this EM courses will be awarded on the basis of successful completion of a course assessment. Details regarding the assessment procedure will follow

## Fee/Registration

The course is free for registered members of the graduate school Engineering Mechanics and for the research members of the contributing research groups. The course fee for non EM members is € 100 for students and € 400 for other participants. They will receive an invoice after accepted registration. Participants need to register by completing the on line registration form that can be found at <http://www.engineeringmechanics.nl/courses> and returning it **before October 18<sup>th</sup>, 2021** to the Secretariat of the Graduate School Engineering Mechanics, Eindhoven University of Technology. Members of the Graduate School Engineering Mechanics receive priority in case of over-subscription.

## Further information

For more information on the contents of the course, contact:

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Further information about the educational programme and other activities of the Graduate School on Engineering Mechanics can be found at: [www.engineeringmechanics.nl](http://www.engineeringmechanics.nl)