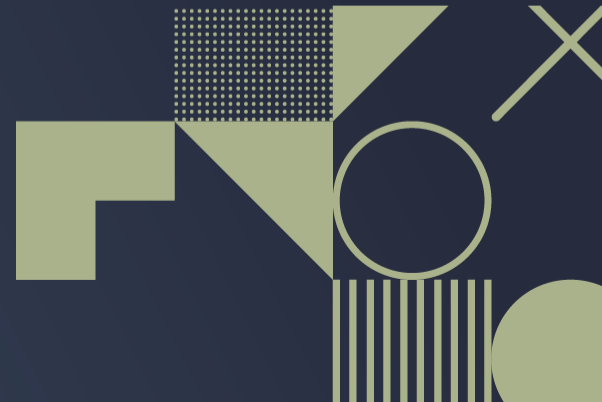




# The Internat. CSE Master Program at TUM

Training Science and Engineering Graduates in Scientific Computing and HPC

Michael Bader, Hans-Joachim Bungartz



# Computational Science and Engineering

International Master's Program at the Technical University of Munich

## Basic Facts

- “International” program: medium of instruction is English
- Offered since winter 2001/02, 4 semesters, 120 credits
- Currently  $\approx$  50 students per year  
(esp. Bachelor/Master graduates in science and engineering)

## What's special/specific about CSE@TUM

- Led by Department of Informatics  
(one of few IN-hosted CSE programs in Germany/Europe)
- Thus: stronger focus on “computational” and HPC topics
- One of the key challenges:  
***How to make HPC and SE experts out of engineering/science Bachelors?***



TUM Uhrenturm

# HPC & Software in the CSE Curriculum

## Compulsory Courses: ↪ Challenge #1: “the big leap”

Sem.	A: Computer Science	B: NumericalAnalysis	C: Scientific Computing
1st	<b>Advanced Programming (5)</b>		Scientific Computing I (5) <b>Scientific Computing Lab (6)</b>
2nd	<b>Parallel Programming (5)</b>		Scientific Computing II (5) CSE Seminar (5)
3rd			<b>Master Lab Course CSE (10)</b>
Σ	10 Credits	–	<b>31 Credits</b>

## Elective Courses:

Sem.	A: Computer Science	B: NumericalAnalysis	C: Scientific Computing
1st	Fundamental Algorithms (5) <b>Computer Architecture (5)</b>	Numerical Programming I (8)	
2nd		Numerical Programming II (8)	
3rd	<b>Patterns in Software Engineering (5)</b> Scientific Visualisation (5)	<b>Numerical Algorithms for HPC (8)</b>	
Σ	<b>10 Credits (“2 out of 4”)</b>	<b>16 Credits (“2 out of 3”)</b>	–

# HPC & Software in the CSE Curriculum

## Compulsory Courses:

Sem.	A: Computer Science	B: NumericalAnalysis	C: Scientific Computing
1st	<b>Advanced Programming (5)</b>		Scientific Computing I (5) <b>Scientific Computing Lab (6)</b>
2nd	<b>Parallel Programming (5)</b>		Scientific Computing II (5) CSE Seminar (5)
3rd			<b>Master Lab Course CSE (10)</b>
Σ	10 Credits	–	<b>31 Credits</b>

## Elective Courses: ~> Challenge #2: “the big doubt”

Sem.	A: Computer Science	B: NumericalAnalysis	C: Scientific Computing
1st	Fundamental Algorithms (5) <b>Computer Architecture (5)</b>	Numerical Programming I (8)	
2nd		Numerical Programming II (8)	
3rd	<b>Patterns in Software Engineering (5)</b> Scientific Visualisation (5)	<b>Numerical Algorithms for HPC (8)</b>	
Σ	<b>10 Credits (“2 out of 4”)</b>	<b>16 Credits (“2 out of 3”)</b>	–

# HPC & Software in the CSE Curriculum

## Compulsory Courses: $\rightsquigarrow$ Challenge #3: “the big hope”

Sem.	A: Computer Science	B: Numerical Analysis	C: Scientific Computing
1st	<b>Advanced Programming (5)</b>		Scientific Computing I (5) <b>Scientific Computing Lab (6)</b>
2nd	<b>Parallel Programming (5)</b>		Scientific Computing II (5) CSE Seminar (5)
3rd			<b>Master Lab Course CSE (10)</b>
$\Sigma$	10 Credits	–	<b>31 Credits</b>

## Elective Courses:

Sem.	A: Computer Science	B: Numerical Analysis	C: Scientific Computing
1st	Fundamental Algorithms (5) <b>Computer Architecture (5)</b>	Numerical Programming I (8)	
2nd		Numerical Programming II (8)	
3rd	<b>Patterns in Software Engineering (5)</b> Scientific Visualisation (5)	<b>Numerical Algorithms for HPC (8)</b>	
$\Sigma$	<b>10 Credits (“2 out of 4”)</b>	<b>16 Credits (“2 out of 3”)</b>	–