Module Name
Qualitative Methods in Theoretical Physics

Type of Module	**Module Code**
Advanced Module	AM-QuMe

Identification Number	**Workload**	**Credit Points**	**Term**	**Offered Every**	**Start**	**Duration**
MN-CS- QuMe	270 h	9 CP	1. – 3. Semester	variable	both	1 Semester

1	**Course Types**	**Contact Time**	**Private Study**	**Planned Group Size**
	a) Lecture	60 h	90 h	b) 30 Students
	b) Exercise	30 h	90 h	

2 Module Objectives and Skills to be Acquired

Understanding the use of qualitative methods (dimensional analysis, symmetries, use of small parameters and simple models etc.) in mechanics, hydrodynamics, electrodynamics, statistical mechanics, quantum field theory and astrophysics.

3 Module Content

- Buckingham theorem
- Navier-Stokes equation, Reynolds numbers, turbulence
- Classical wave equations (Maxwell, Weyl)
- Qualitative methods in quantum mechanics
- Screening of charge in QED and QCD,
- Weakly interacting quantum gases
- Astrophysics

4 Teaching Methods

Lectures and Exercises

5 Prerequisites (for the Module)

Formal: none

Regarding the Contents: Training in theoretical physics at the B.Sc. level

6 Type of Examination

oral examination

7 Credits Awarded

The module is passed and credit points are awarded if the 30-45-minute oral final exam is passed.

8 Compatibility with other Curricula

The course is part of the Master of Science Physics

9	**Proportion of Final Grade** 9/114
10	**Module Coordinator** T. Nattermann
11	**Further Information** **Recommended literature:** B.A. Migdal, Qualitative Methods in Quantum Theory, Addison-Wesley 1989 P.W. Bridgman, Dimensional Analysis, Yale University Press 1922 G.I. Barenblatt, Scaling, Cambridge University Press 2003 T. Nattermann, lecture notes