Studiengang: *Program:*	**Master of Science Maschinenbau** *Master of Science in Mechanical Engineering*	● FACH HOCHSCHULE LÜBECK University of Applied Sciences

1	**Module:** *Modul:*	**Toolbox for Fluid Mechanical Design** *Toolbox für strömungstechnisches Design*	**English** *Englisch*

	Semester *Semester*	**Dauer** *Duration*	**Status** *Status*	**Turnus** *Regular cycle*
	2. Semester	1 Semester	elective	anual

Kreditpunkte *Credits*	**Aufwand** *Workload*	**Kontaktzeit** *Contact-hours*	**Selbststudium** *Student's efforts*	
5 ECTS	150hrs	3hrs/week = 45hrs lecture 1h/week = 15hrs laboratory	50h preparations 40h Laboratory	

2	**Beschreibung** *Description*

A variety of responses to fluid mechanical design tasks can be given. A problem can be solved with 3DCFD applications, wind tunnel experiments, laboratory experiments, prototype testing or semi-empirical methods using theory in combination with numerical methods and experimental results. Depending on the type of task, cost, manpower, deadlines, details and accuracy of result needed different methods are most suitable to the corresponding design task. Very often a combination of methods is needed. This course is thus presenting a toolbox for fluid mechanical problems in design containing 3DCFD, wind-tunnel experiments and underlying measurement techniques, prototype testing and semi-empirical methods. The designer should be aware of the different choices of methods available and choose the most suitable method and very often a combination of methods for the specific design task. To understand the methods a profound knowledge in underlying theory on a master course level is needed. Thus each method is presented with a profound theoretical background.

3	**Lernziele** *Learning Outcomes*

- Awareness of different choices of tools for solving fluid mechanical problems
- Application of 3D CFD – methods on design tasks
- Application of computational methods using simplified models
- Overview over experimental techniques
- Combinations of methods
- Profound knowledge on underlying theory

4	**Schlüsselqualifikationen** *Key qualifications*

Sozialkompetenz	Methodenkompetenz	Selbstkompetenz / Personenkompetenz	Interkulturelle Kompetenz	Medienkompetenz
X	X	X		X

5	**Lehrveranstaltung/ -methoden** *Course type and methods*

Lecture
- Course in class room
- Theory related exercises

Laboratory/ project
- Computational fluids laboratory
- Demonstration of experimental techniques

6	**Vorbedingungen / Vorkenntnisse** *Prerequisites*

- Fluid Mechanics
- Mathematics (multidimensional integrals, differential calculus, partial differential equations)
- Thermodynamics (state variables, entropy , material equations)
- Basic knowledge of mechanics (balance of forces, point mechanics)

7	**Arbeitsmittel / Literatur** *Required material / Literature*

- Literature or course packs according to recommendations in class

	Detailinformationen						
8	**Inhalte**						
	Course topics						
	Awareness of different choices of tools for solving fluid mechanical problems						
	3D CFD – methods						
	Simplified computational flow models						
	Overview over experimental techniques						
	Method combination						
9	**Prüfungsform**						
	Assessment						
	Project with presentation and oral examination						
10	**Voraussetzung für die Vergabe von Kreditpunkten**						
	Requirements for granting of credits						
	• Successful completiton of project						
	• Successful passing of oral examination						
	• Successful participation on laboratory						
11	**Weiterführende Veranstaltungen**						
	Related courses						
	• none						
12	**Zuordnung**						
	Classification						

Mathematik & Naturwissenschaft	Ingenieur-wissenschaften	Ingenieur-anwendungen	Entwicklung & Konstruktion	Werkstoffe	Wirschaft, Management, Sprachen	Anderes
X	X	X				X

13	**Modulbeauftragter / Lehrpersonen**
	Responsible person / Lecturers
	Prof. Dr. Warnack / Prof. Dr. Warnack