



Doctoral Course

**“Advanced Digital Technology in Maritime Applications”**

Prof. Volker Bertram

*DNV – Det Norske Veritas, Hamburg, Germany*

*volker.bertram@dnv.com*

**Short Abstract:**

The course addresses state-of-the-art technologies for digital design and operation of ships and other maritime vessels (such as marine robots). The focus lies not just on establishing a basic understanding of the terminology and fundamentals of technologies forming Industry 5.0 and driving the digital transformation of the maritime world, but also on critical distance, perception of limitations and the often-found differences between the original vision and current state-of-the-art of technologies. Pros and cons of different alternative approaches will sharpen the understanding of where different technologies are most suitable and likely to evolve respectively where research initiatives are expected in the next decades.

Lecture will focus on the state of the art and extrapolate for the foreseeable future. Examples taken from (largely maritime) industry practice illustrate how technologies are used now in state of the art and research frontier applications.

**Course Contents in brief:**

(topic – hours #)

Introduction & Coming to terms with ships	2
Global Trends & Future Blue Industry	2
Ship Design in the 5.0 Era	1
Ship Structure Lifecycle	1
Digital Twins in Maritime Industry Practice	2
Formal Optimization	2
Demystify AI	2
Cyberships – Autonomous Technology for Ships	2
Virtual & Augmented Reality	1
Ship hull management as evolving field for robotics	1

**Total # of hours of lecture:** 16

**References:**

- [1] Assorted publications in COMPIT ([www.compit.info](http://www.compit.info))
- [2] Assorted publications in HIPER ([www.hiper-conf.info](http://www.hiper-conf.info))

Slides from the Teacher will be made available

---

**CV of the Teacher**

See attached CV and list of publications

**Final Exam:** written with closed Q/A

**Room and Schedule**

Room: *Aula Riunioni del Dipartimento di Ingegneria dell'Informazione, Via G. Caruso 16, Pisa – Ground Floor*

Schedule: 8.30 to 13.30 AM, from day March 23 to day March 27

# Curriculum Vitae

## Volker Bertram



1960	born in Hamburg, Germany
1980-1985	study of naval architecture at University of Hamburg
1983/1984	study of naval architecture at University of Michigan Fulbright scholarship <b>M.S.E.</b> with highest distinction
1985	<b>Dipl.-Ing.</b> (very good) at University of Hamburg
1990	<b>Dr.-Ing.</b> of the Institut für Schiffbau (IfS), magna cum laude Siemens Award for best doctoral thesis
1991	Kurt-Hartwig Siemers Award for best doctoral thesis from University of Hamburg associate at McKinsey&Co.
1991-1993	R&D manager at Hamburg Ship Model Basin HSVA
1993-1999	assistant professor (ship design) at IfS/TU Hamburg
1994	<b>Dr.Ing.habil.</b> (ship hydrodynamics) at TU Berlin
1995	sabbatical at Mitsubishi Heavy Industries R&D Center, Nagasaki
1996	<b>full academic professor rights</b> (ship hydrodynamics) at IfS
1999	researcher at Italian ship model basin INSEAN, Rome
1999	visiting professor at Danish Technical University, Lyngby
2000-2002	research group manager at HSVA
2003-2008	‘enseignant chercheur’ (tenured professor) at ENSTA-Bretagne, Brest/France
Since 2008	Senior Project Manager at DNV, Hamburg office

Visiting professor at World Maritime University, Malmö/Sweden – Ship Design  
Extraordinary professor at Stellenbosch University, Department of Mechatronics

## Further activities

Organiser (and editor) of four international conference series:

- COMPIT (IT Applications in Maritime Industries),
- NuTTS (CFD for maritime structures),
- HIPER (Future Technologies for Ships and Shipping),
- HullPIC (Hull Performance monitoring)
- PortPIC (Robotic in-water inspection and cleaning)

Co-organiser and moderator of the Maritime Future Summit at SMM

## Publications

More than 400. One book on ship design with Prof. Schneekluth (1998), one book on ship hydrodynamics (2000, 2<sup>nd</sup> edition in 2011), covering experimental and numerical techniques.