

<b>Modul – No.</b>	<b>788</b>	<b>Mandatory</b>	
<b>Module name</b>	<b>IT System Performance Analysis</b>		
Module coordinator	Prof. Dr.-Ing. Thomas Hühn		
Title	IT System Performance Analysis		
Title of examination	IT System Performance Analysis		
Semester	2		
Course Type	Language	Lecture and exercise	English
SWS/ ECTS/ Workload	2/2/0	5	150
Requirements for attendance	None		

## 1. Content and objectives

### Course Description & Learning Outcomes:

This lecture is designed to empower students to design and perform computer systems monitoring, troubleshooting and performance analysis. Based on the Linux communication stack, this course provides a deeper knowledge about the fundamental techniques and tools used to analyse the performance of computer systems and their advantages and disadvantages involved. Students will be introduced to the different concepts of performance debugging, monitoring and statistical analysis by the example of Linux network performance issues triggered in productive Internet Service Provider (ISP) infrastructure. Upon completion of this course, students should be able to:

- show experience and enhancement of the following key skills - Independent learning problem solving, expand knowledge independently and computer systems performance analysis skills,
- design efficient measurement experiments to collect performance data over a network,
- analyze, evaluate and visualize system performance data with relevant statistics.

### Objectives:

After completing this course, students will be able to:

- Select appropriate Linux tools to monitor and debug network stack issues across layers
- Define monitoring targets, select valid metrics and account potential sources of error
- Build experimental testbed setups to validate assumptions
- Apply statistical methods to perform data and traffic analysis
  - Histograms, boxplots, time domain aggregation, Correlation analysis. (e.g. ANOVA)
- Evaluate passive vs. active performance measurements
- Decentralized monitoring challenges to synchronize and merge measurements
- Setup & coding actual network experiments (C, bash, awk, Python)
- Statistical Data Analysis and visual representation with GNU R

### Recommended Literature:

- Raj Jain: "The Art of Computer Systems Performance Analysis: Techniques for Experimental Design, Measurement, Simulation, and Modeling", New York, 1991
- David J. Lilja: "Measuring Computer Performance: A Practitioner's Guide.", Cambridge, 2000

## 2. Methods of instructions

Lecture, tutorials, exercises and assignments.

## 3. Requirements for attendance

Bachelor degree in computer science & interest to investigate further

## 4. Usability of this module

Mandatory for all master students of „Computer Engineering for IoT Systems“ this lecture is appropriate for students coming from business administration as well.

## 5. Requirements for assessment

50 % written exam

50 % assignments

## 6. ECTS credits

5 ECTS credits

## 7. Frequency of offer

Every summer term

## 8. Work load

150 h of total work load, from:

- 60h lecture participation (online or in presence)
- 60h experimentation & self-study
- 30h exam preparation

## 9. Duration of module

1 semester

