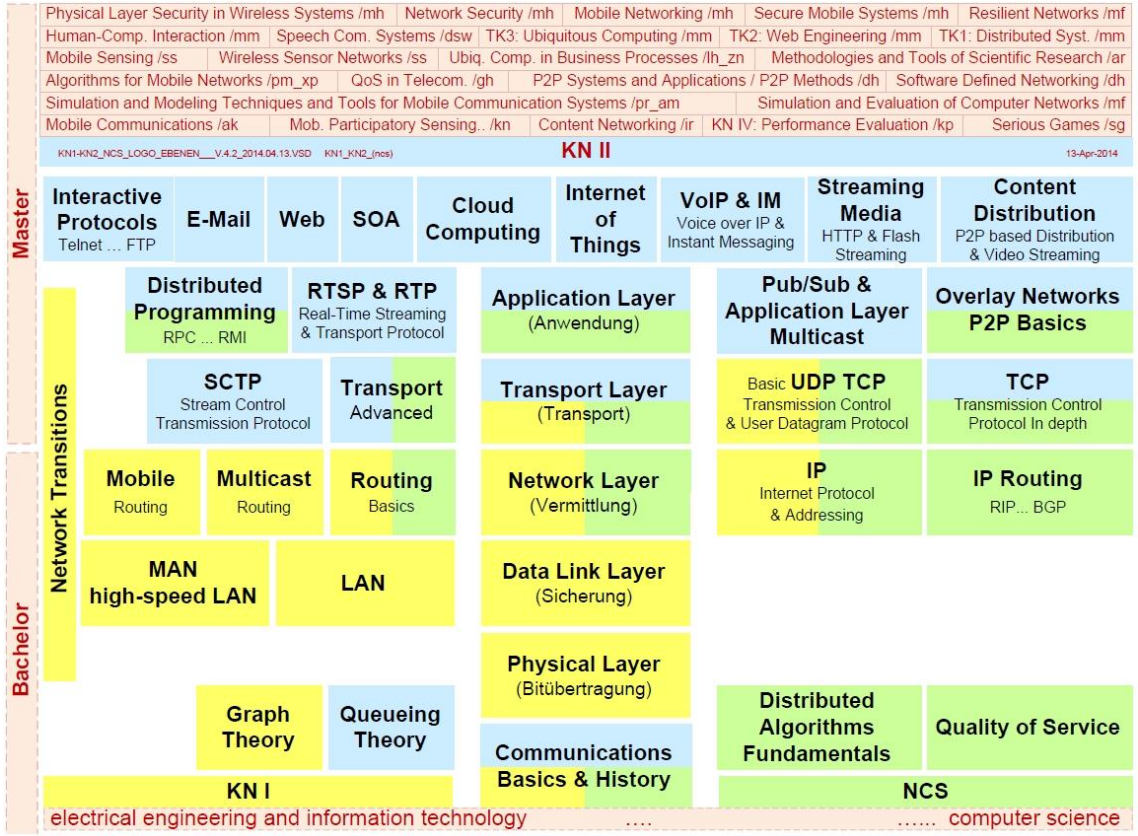
Communication Networks I

Administration - Organizational Details

TECHNISCHE UNIVERSITÄT DARMSTADT



Prof. Dr.-Ing. **Ralf Steinmetz**
KOM - Multimedia Communications Lab

Overview

TECHNISCHE UNIVERSITÄT DARMSTADT

1 Introduction – Who is who

Ralf Steinmetz

- Multimedia Communications (KOM) in Darmstadt (S3|20)
- Member of etit (FB18) and Informatik (FB20)
- httc

Ralf Steinmetz

Viktor Wendel (lecturer)

- Multimedia Communications (KOM) in Darmstadt (S3|20)

Viktor Wendel (lecture)

KN I – Team

Alaa Alhamoud (exercises)

The An Binh Nguyen (Moodle)

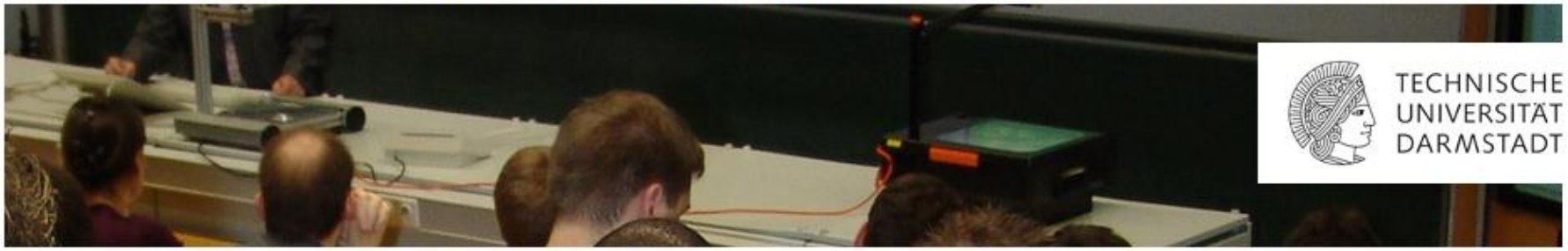
Student assistants

- Shadi Shahood(MOODLE)
- Christian Klos (RECORDINGS)

KOM - Teaching

TECHNISCHE UNIVERSITÄT DARMSTADT

TU | etit & Informatik | KOM - Multimedia Communications Lab | Teaching | Research & Results | News & Events | Internal



Multimedia Communications Lab » Teaching » Current Courses

Teaching

- **Current Courses** »
- Communication Networks I
- Communication Networks II
- Communication Networks III: Mobile Networking
- Communication Networks IV: Performance Evaluation
- Serious Games Lecture
- Ubiquitous Computing in Business Processes
- Distributed Multimedia Systems (MM I)
- Distributed Multimedia Systems: Selected Topics (MM II)
- Advanced Topics in Distributed Systems
- Net Centric Systems
- Algorithms for Mobile Networks
- Content Networking

Current Courses

Course Title	Dual Mode Course	Winter Term	Summer Term	L + E
Lectures on Communications - Overview				
Communication Networks I (KN I) (Prof. Dr.-Ing. Ralf Steinmetz)	dual mode TUD		X	3 + 1
Communication Networks II (KN II) (Prof. Dr.-Ing. Ralf Steinmetz)	dual mode TUD	X		3 + 1
→ Communication Networks III (KN III) (Prof. Dr.-Ing. Matthias Hollick, Prof. Dr.-Ing. Ralf Steinmetz)		X		2+0 or 2+2
Communication Networks IV (KN IV) (Prof. Dr.-Ing. Ralf Steinmetz, Dr.-Ing. Krishna Pandit)			X	2+0
Lectures on Multimedia - Overview				
Ubiquitous Computing in Business Processes		X		2 + 0

KOM – Multimedia Communications Lab

Contact

Prof. Dr.-Ing. Ralf Steinmetz

Technische Universität Darmstadt
Fachgebiet Multimedia Kommunikation
Rundeturmstr. 10
64283 Darmstadt
S3/20

+49 6151 16-6150

KOM - Teaching

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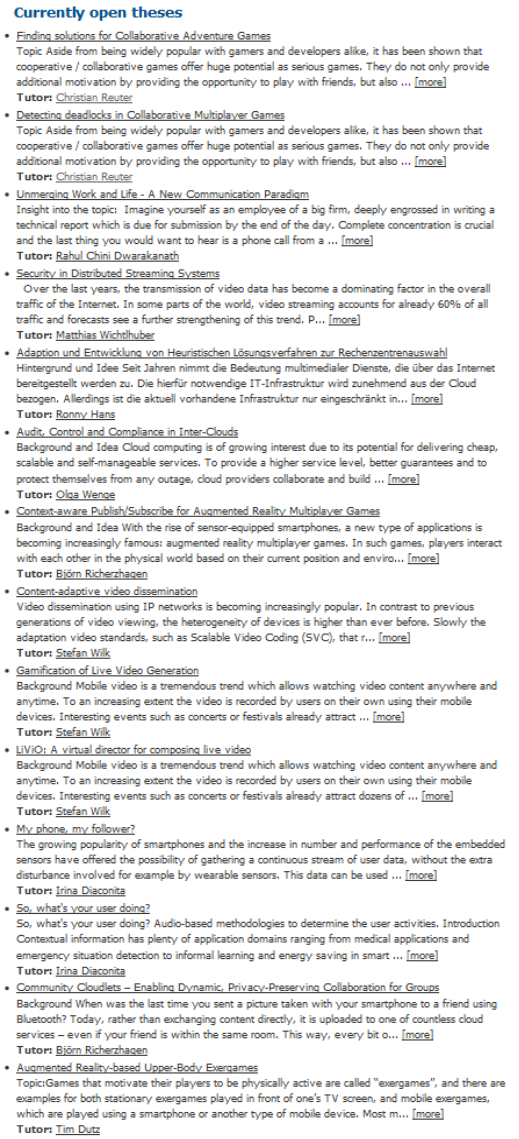
Some topics in the web, on our notice board & upon request

http://www.kom.tu-darmstadt.de/en/teaching/theses/open/

- Robustness of Vehicular Communication Scheduling against Variation of Data Quality
  ThemaDie Internetverbindung wird für Fahrzeuge in Zukunft eine wichtige Rolle spielen, um sowohl Assistenzfunktionen für ein angenehmes und sicheres Fahren als auch Infotainmentfunktionen für den Nutzer zu verwirklichen. Mobilfunknetze allein reichen wegen ungenügendem V... [more]
  Tutor: Tobias Rückelt
- Advertising Context - Utilizing Publish/Subscribe Advertising Mechanisms for Context-aware Mobile Applications
  Motivation Mobile devices introduce significant challenges for traditional communication systems, such as intermittent connectivity with highly variable bandwidth and delay characteristics. Furthermore, they are resource constrained: battery power as well as data plans are l... [more]
  Tutor: Björn Richerzhagen



Currently open theses

- Finding solutions for Collaborative Adventure Games
  Topic Aside from being widely popular with gamers and developers alike, it has been shown that cooperative / collaborative games offer huge potential as serious games. They do not only provide additional motivation by providing the opportunity to play with friends, but also ... [more]
  Tutor: Christian Reuter
- Detecting deadlocks in Collaborative Multiplayer Games
  Topic Aside from being widely popular with gamers and developers alike, it has been shown that cooperative / collaborative games offer huge potential as serious games. They do not only provide additional motivation by providing the opportunity to play with friends, but also ... [more]
  Tutor: Christian Reuter
- Unmerging Work and Life - A New Communication Paradigm
  Insight into the topic: Imagine yourself as an employee of a big firm, deeply engrossed in writing a technical report which is due for submission by the end of the day. Complete concentration is crucial and the last thing you would want to hear is a phone call from a ... [more]
  Tutor: Rahul Chini Dwarakanath
- Security in Distributed Streaming Systems
  Over the last years, the transmission of video data has become a dominating factor in the overall traffic of the Internet. In some parts of the world, video streaming accounts for already 60% of all traffic and forecasts see a further strengthening of this trend. P... [more]
  Tutor: Matthias Wichtlhuber
- Adaption und Entwicklung von Heuristischen Lösungsverfahren zur Rechenzentrenauswahl
  Hintergrund und Idee Seit Jahren nimmt die Bedeutung multimedialer Dienste, die über das Internet bereitgestellt werden zu. Die hierfür notwendige IT-Infrastruktur wird zunehmend aus der Cloud bezogen. Allerdings ist die aktuell vorhandene Infrastruktur nur eingeschränkt in... [more]
  Tutor: Ronny Hans
- Audit, Control and Compliance in Inter-Clouds
  Background and Idea Cloud computing is of growing interest due to its potential for delivering cheap, scalable and self-manageable services. To provide a higher service level, better guarantees and to protect themselves from any outage, cloud providers collaborate and build ... [more]
  Tutor: Olga Wenge
- Context-aware Publish/Subscribe for Augmented Reality Multiplayer Games
  Background and Idea With the rise of sensor-equipped smartphones, a new type of applications is becoming increasingly famous: augmented reality multiplayer games. In such games, players interact with each other in the physical world based on their current position and enviro... [more]
  Tutor: Björn Richerzhagen
- Content-adaptive video dissemination
  Video dissemination using IP networks is becoming increasingly popular. In contrast to previous generations of video viewing, the heterogeneity of devices is higher than ever before. Slowly the adaptation video standards, such as Scalable Video Coding (SVC), that r... [more]
  Tutor: Stefan Wilk
- Gamification of Live Video Generation
  Background Mobile video is a tremendous trend which allows watching video content anywhere and anytime. To an increasing extent the video is recorded by users on their own using their mobile devices. Interesting events such as concerts or festivals already attract ... [more]
  Tutor: Stefan Wilk
- LiViO: A virtual director for composing live video
  Background Mobile video is a tremendous trend which allows watching video content anywhere and anytime. To an increasing extent the video is recorded by users on their own using their mobile devices. Interesting events such as concerts or festivals already attract dozens of ... [more]
  Tutor: Stefan Wilk
- My phone, my follower?
  The growing popularity of smartphones and the increase in number and performance of the embedded sensors have offered the possibility of gathering a continuous stream of user data, without the extra disturbance involved for example by wearable sensors. This data can be used ... [more]
  Tutor: Irina Diaconita
- So, what's your user doing?
  So, what's your user doing? Audio-based methodologies to determine the user activities. Introduction Contextual information has plenty of application domains ranging from medical applications and emergency situation detection to informal learning and energy saving in smart ... [more]
  Tutor: Irina Diaconita
- Community Cloudlets – Enabling Dynamic, Privacy-Preserving Collaboration for Groups
  Background When was the last time you sent a picture taken with your smartphone to a friend using Bluetooth? Today, rather than exchanging content directly, it is uploaded to one of countless cloud services – even if your friend is within the same room. This way, every bit o... [more]
  Tutor: Björn Richerzhagen
- Augmented Reality-based Upper-Body Exergames
  Topic:Games that motivate their players to be physically active are called "exergames", and there are examples for both stationary exergames played in front of one's TV screen, and mobile exergames, which are played using a smartphone or another type of mobile device. Most m... [more]
  Tutor: Tim Dutz

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Thesis at KOM

http://www.kom.tu-darmstadt.de/en/teaching/theses/open/

In general

- Do not hesitate to contact us
- You should definitely know about your skills
- Topic in question should be thriving to act as motivator during your thesis
- Each year the best student work is awarded →

http://www.kom.tu-darmstadt.de/en/teaching/theses/best/

Best Theses

Die Auszeichnungen
Beste Diplomarbeit bzw. Masterarbeit des Jahres und
Beste Studienarbeit bzw. Bachelorarbeit des Jahres
erhalten im Jahr

2014

Beste Bachelorarbeit

Christoph Peusens:
Kontextbezogene Verlaufsvorhersage von Straßeneigenschaften als ortsbezogener Dienst

2013

Beste Masterarbeit

Dimitrij Burlak:
Analyse, Design und Implementierung von algorithmenbasierter Lerngruppen-Optimierung

Beste Bachelorarbeiten

Florian Jomrich:
Crowdsourcing als Möglichkeit der Online Evaluation von Empfehlungssystemen in E-Learning
Milan Schmittner:
Secure and Reliable Distribution of Replicas in Mobile Peer-to-Peer Scenarios

2012

Beste Masterarbeit

Thomas Rodenhausen:
Ranking Resources in Folksonomies by Exploiting Semantic and Context-specific Information

Beste Bachelorarbeiten

Alexander Müller:
Cloud Computing in der Bankenbranche - Sicherheit und Compliance
Till Schmitt:
Entwurf und Umsetzung einer Datenerfassungs-Umgebung mit Strom- und Spannungssensoren sowie deren Anbindung an ein PC-System

2011

Beste Masterarbeit

Sebastian Schmidt:
Language-Independent Semantic Relatedness of Web Resources using Wikipedia as Reference

Beste Bachelorarbeit

Maxim Babarinow:
Konzeption und prototypische Implementierung eines Muster-basierten Ansatzes zur Erstellung von Computerspielen für Sehgeschädigte

2 Background: We (TUD KOM & httc)

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Computer networks = communication networks

- No computer without communications
- Communication systems are ubiquitous
  - Home and business networks
  - Internet,...

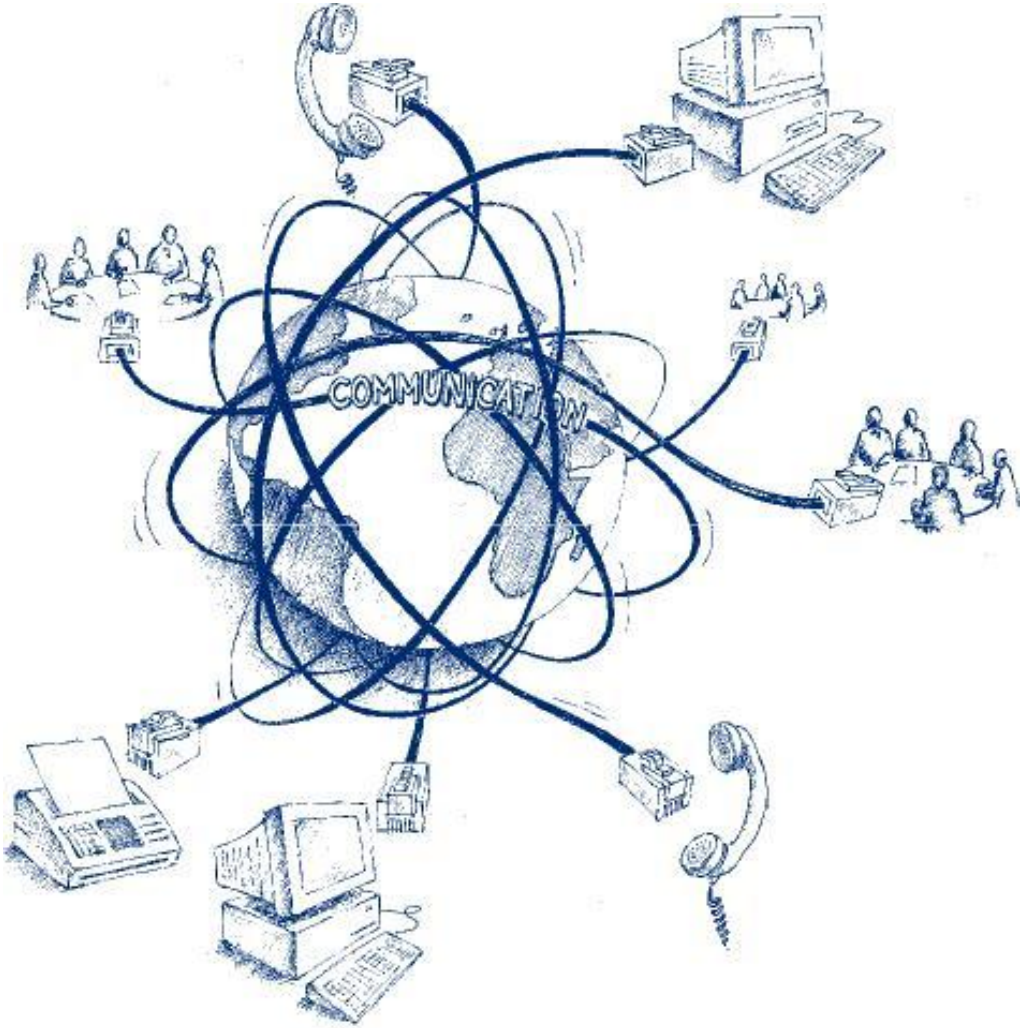
Objective of the lecture:

- Basic knowledge, actually for all students of EE IT, CS, Business/Industrial EE./CS
- Services, Protocols, Layers, etc. & as base for Lifelong Learning

Further: Establishment of scientific core competence at TUD

- Centers@Darmstadt
  - Httc
  - (Research Cluster) Future Internet
- and further joint activities with
  - IBM, NEC, NSN, Siemens, Telekom, …
  - SME: kimeta, werdenktwas, …
- international close cooperation and exchange with universities, e.g.
  - Lancaster, Madrid (UC3M & IMDEA Networks), Oslo, Vienna
  - Ottawa, Santiago de Chile, Urbana Champaign, …

KOM Research - Goals
Adaptive Seamless Multimedia Communications



Source: http://www.sycor-asia.com/opencms/as/products_services/complementary_services/Telecommunication/

KOM Research - Tagcloud
Seamless Multimedia Communications

Fields of Research at KOM

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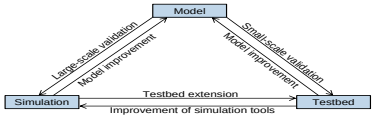
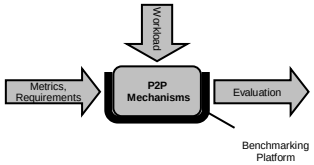
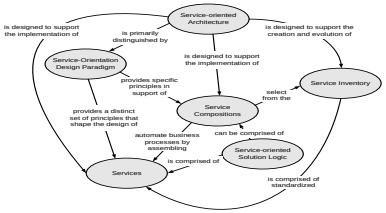


Simulation, Analytical Modeling



Benchmarking

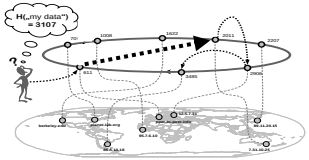


Service-oriented Computing

Knowledge & Educational Technologies

Usability

Testbeds



Self-organizing Systems & Overlay Communications

Mobile Systems & Sensor Networks

Multimedia Technologies & Serious Games

Evaluation Methodologies

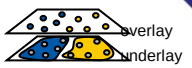
Research Areas

Foundations

Projects

Monitoring

QoS



Cross Layer

SOCIAL LINK

Software-Cluster

neurolcare

ISPRAT

software campus

Adventure
The Plug-and-Play Virtual Factory

efinancelab

LOEWE

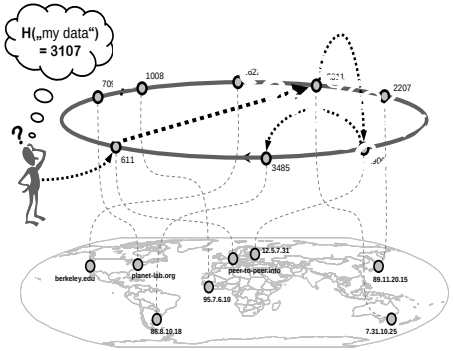
NOLEA

inDAgo

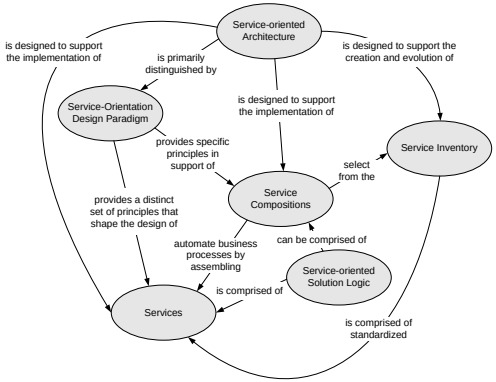
KOM Research Areas

- Knowledge & Educational Technologies
- Multimedia Technologies & Serious Games
- Mobile Systems & Sensor Networks
- Self-organizing Systems & Overlay Communications
- Service-oriented Computing

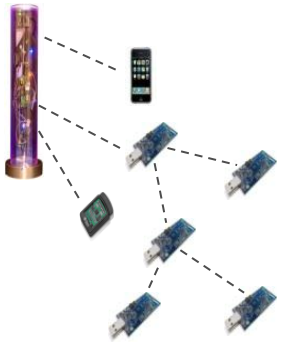
Knowledge & Educational Technologies



Self-organizing Systems & Overlay Communications



Service-oriented Computing



Mobile Systems & Sensor Networks

Multimedia Technologies & Serious Games

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Lecture language: English

- International Master ICE
- Importance of fluent English in technical and business environments
- Content in English
  - Lecture
  - Hand-outs
  - Exercises, recordings
  - Exam
- But you can always aks questions in German, too!

Type of event

- On-campus
- Off-campus (kn1-online)
- Traditional lecture
- But much more
  - KN1 Moodle
  - etc.
- Comprises
  - Lectures On-Campus
  - Regular Tutorials On-Campus
  - Recordings Off-Campus
  - KN1 Moodle Off-Campus

3.1 Changes to Previous Term

As before

- Everything in English
- Lectures & tutorial on-campus
- Hand-outs, recordings, off-campus
- Exam
- Lecture administration and information with Moodle
- Bonus system (see later)

Actual Changes of Content

- Some slides and topics have been reordered
- Some slides have changed

Please interact!

- Ask questions
- Participate in Polls
- Don‘t be afraid of giving wrong answers

KN1 topics are (partly) State-of-the-Art

- Actual issues in communication networks
- With essential knowledge in Darmstadt
- i.e. some topics may change from year to year
  - New Findings and technologies
  - Some topics become less relevant

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Offline repository of lectures

- Recorded during actual lecture
- Slides + Annotations + Voice

Organization

- Individual handling
- Available via KN1 moodle (usually after 1-2 days)
- Live + (online) recording to be done
- Some recording already available (past terms)

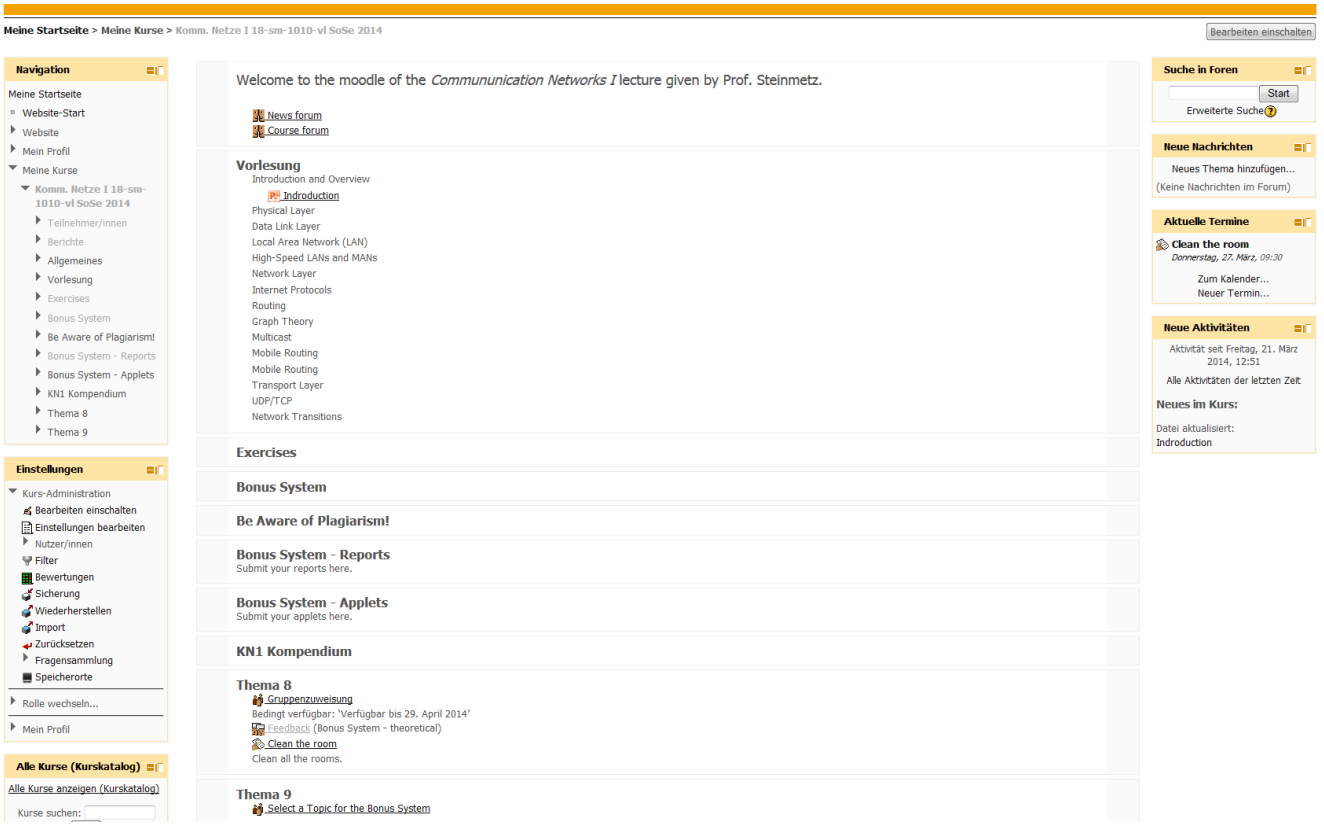
3.4 KN1 Moodle - Off-Campus

How to find

- https://moodle.tu-darmstadt.de/ (Login with TU-ID)
- Course: Komm. Netze I 18-sm-1010-vl SoSe 2015
- https://moodle.tu-darmstadt.de/course/view.php?id=5268
  - Use the key “cn1ss2015” for self-registration

What to find there

- Teaching materials
  - slides,
  - recordings,
  - exercises,
  - solutions, …
- Discussion forums
- Feedback
- Bonus system



Tutorial

- Each week, planned Dates: see KN1 Moodle (usually Thursday after lecture)
- Questions regarding to the lecture and the exercises
- Interactive!

Exercises

- Optional
- Hands-on experience
- Style: like in the exam
- "handed out" with sample solutions
- Questions can be discussed in the weekly tutorial

Hints

- e.g. more than 90% of really active students in one term scored better than 2.0
- WHY ? ... work on the exercises BEFORE they are discussed

3.6 Bonus System

Goal(s)

- To study (i.e. to learn) during the period of the lecture
- To enhance your knowledge on specific lecture topics
- To enhance the content of the lecture
  - KN1 compendium

Mechanisms

- Incentive system
- Advantage for successful & active participation
- Participation via KN1 Moodle
- Bonus to the exam result
  - 0.0 to 0.3
  - Only if exam result at least 4.0

Picture taken from de.toonpool.com

Bonus System

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Task

- Develop an application/a simulation
  - Topics provided by us
  - If you have a nice idea, which is related to the content of the lecture but not listed in the offered topics, discuss with the teaching assistant team to get approval

Applications/Simulations

- Develop an own solution for one of the provided topics/approved self-proposed topic
- SVN can be provided by us
- Nice to have: multi-platform (an application that runs on windows, linux, mac, smart phones etc.)
- A two-pages documentation is required which explains the functionality, features of the application
- (further details on Moodle)

Be Aware of Plagiarism!

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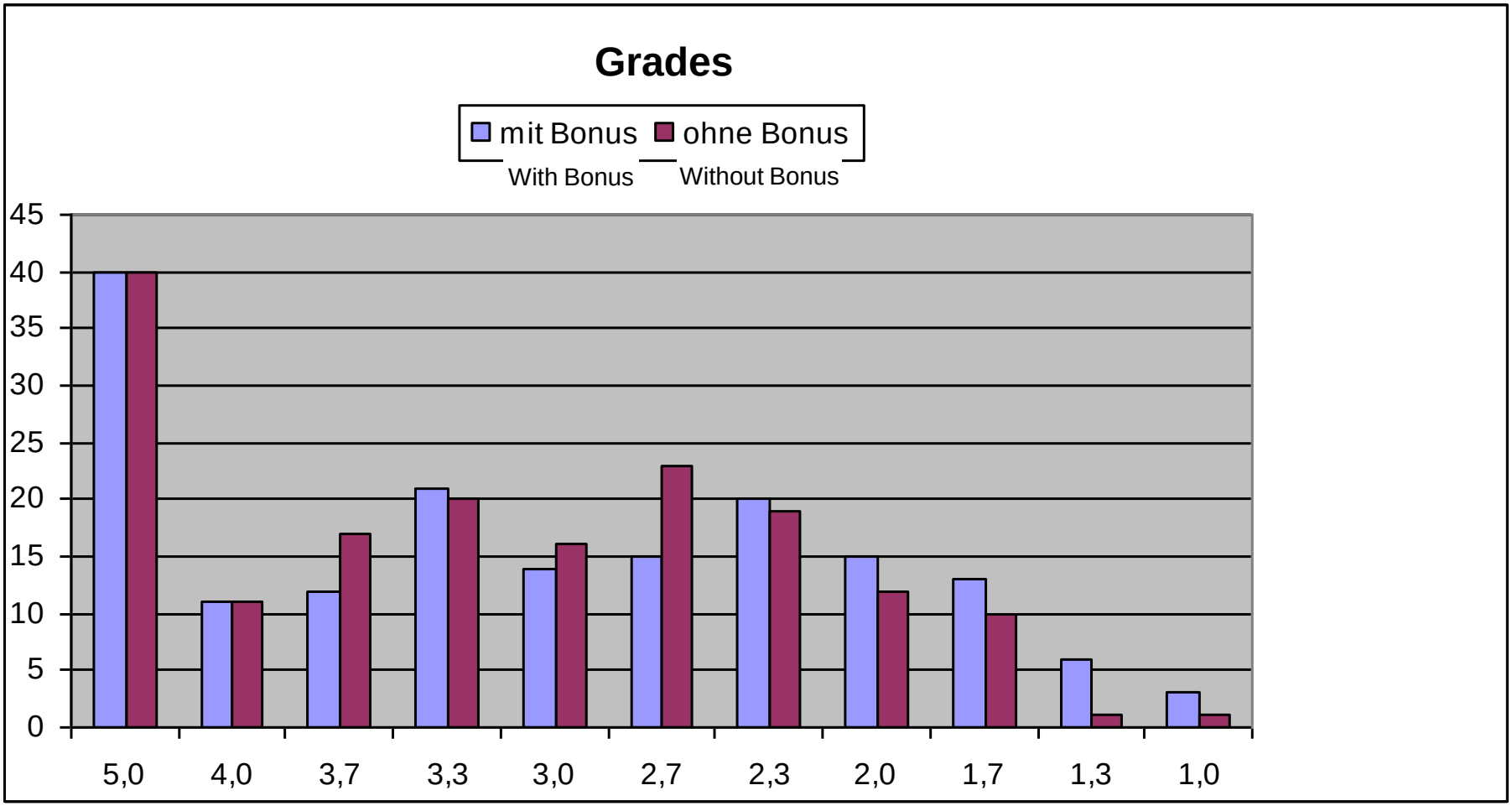
Grade statistics from a previous term



4.1 Exam

TECHNISCHE UNIVERSITÄT DARMSTADT

Exam Date

- 5. Aug. 2015, 12.00h-14.00h (planned)
- Usually "Wednesday in the third week after the end of the term"
- Check infos at:
  - KOM ... Teaching ... Current Courses … Exams
  - http://www.kom.tu-darmstadt.de/teaching/current-courses/communication-networks-i/general-information/
  - KN1 Moodle

Remark

- No "Schein" required
  - No admission control for exam anymore, therefore:
  - Self-rating gains importance
- Written exam after each term
  - (Assuming to be more than 25 participants)
  - No aids and appliances allowed (apart from dictionary and non-programmable calculator)

  → **need for registration via Tucan**

Erasmus and Guest Students

- If you need an early exam date (because you leave before the regular exam date), let us know ASAP (at the latest end of april)!
- We will schedule an early exam accordingly

4.2 Services – Office Hours

Ralf Steinmetz **S3|20 120**

- Directly after each lecture
- By previous arrangement:
  - Steinmetz.Office@KOM.tu-darmstadt.de)
- Or for further questions via email
  - Ralf.Steinmetz@KOM.tu-darmstadt.de

Viktor Wendel **S3|20 105**

- Directly after each lecture

Alaa Alhamoud **S3|20 205**

The An Binh Nguyen **S3|20 208**

- Or arrangement and further questions via email
  - kn1@KOM.tu-darmstadt.de

4.3 Overview of Facilities

TECHNISCHE UNIVERSITÄT DARMSTADT

		English	German
Lecture	Handouts / Slides	X	
	Presentation	X	
	Recordings	X	
KN1 Moodle	Knowledge Collection	X	
Exercises	Handouts	X	
	Classroom, On Campus	X	
Discussion	KN1 Moodle	X	
Books		X	X
Exams		X	

Actual & Further Information in the Web

TECHNISCHE UNIVERSITÄT DARMSTADT

Course homepage

- http://www.kom.tu-darmstadt.de

Menu item TEACHING (information of all courses)

- http://www.kom.tu-darmstadt.de/teaching/

Menu item KN1

- http://www.kom.tu-darmstadt.de/teaching/current-courses/communication-networks-i/general-information/

Moodle

- https://moodle.tu-darmstadt.de/ (Login with TU-ID)

KN1 Moodle

- https://moodle.tu-darmstadt.de/course/view.php?id=5268

Access to PCs and Network Facilities

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e.g. in the student/multimedia/internet labs at KOM (S3|20)

- Rooms 108, 208
- headphones may be rented (free of charge) at httc
- → contact before any KN1 team member for the respective access

Wireless LAN

- available at e.g. basement of S3|06
- access as described by the computing center HRZ

Slides

- Copy of slides, as guideline, to annotate (no lecture notes)
  - at the beginning of semester ONLINE as PDF at KN1 Moodle
- Updated during the semester
  - 1-2 days after respective lectures and
  - at the end of semester updated version

Comment to the slides

- All suggestions for improvement welcome!
  - (hopefully only little) errors, better diagrams
  - suggestions for content by you

4.5 References - Literature

More than 70 % from

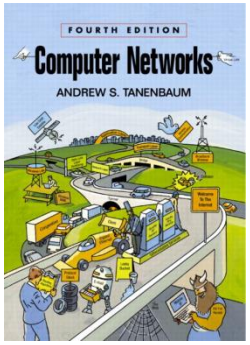
- book by Tanenbaum
- slides are based on the following book
- Andrew S. Tanenbaum: Computer Networks, actual Edition, Prentice Hall
  - german translation more or less OK

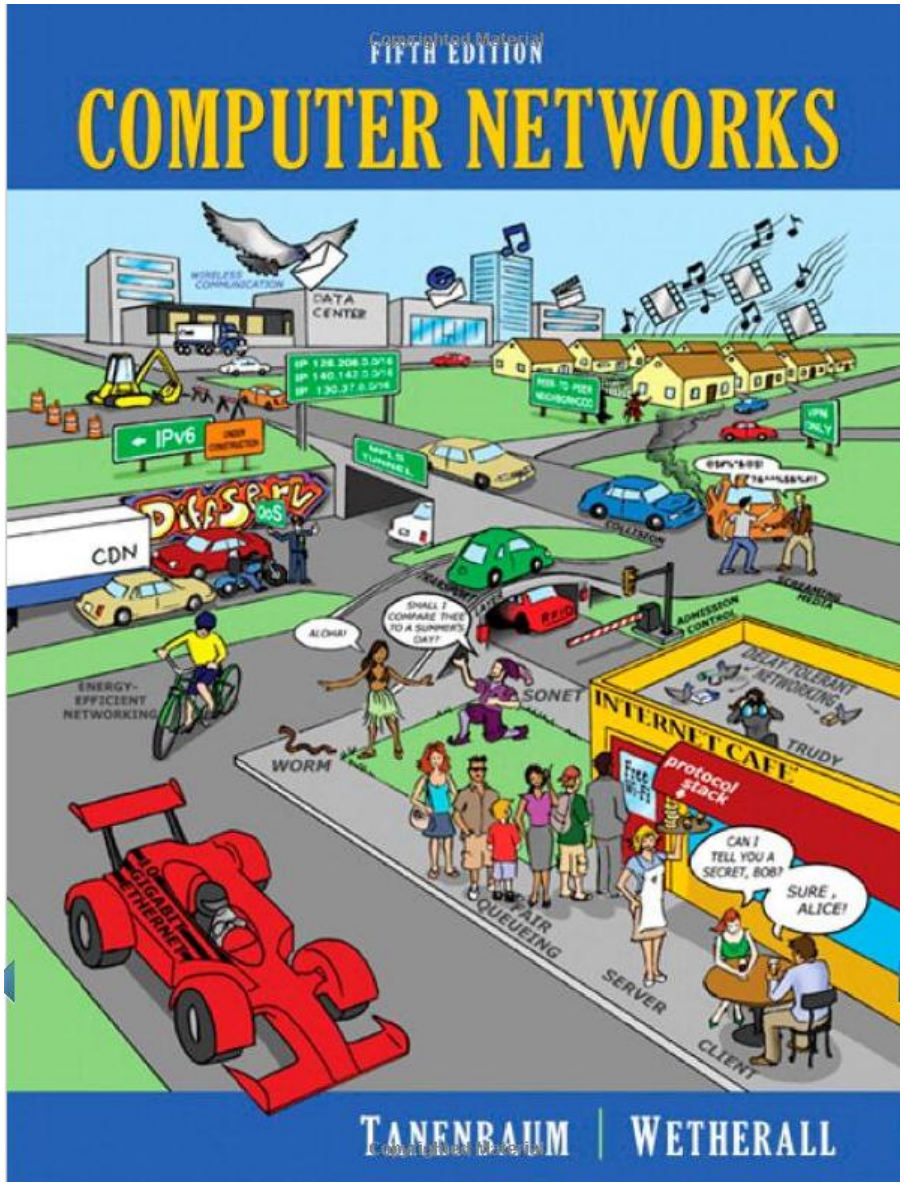
Additional publications as mentioned at the respective lecture-recording and

- http://authors.phptr.com/tanenbaumcn4/
- Andrew S. Tanenbaum: Computer Networks 5.th edition, Prentice Hall, 2011
- Larry L. Peterson, Bruce S. Davie: Computer Networks: A System Approach, 2nd Edition, Morgan Kaufmann Publishers, 1999
- Larry L. Peterson, Bruce S. Davie: Computernetze, Ein modernes Lehrbuch, 2. Auflage, Dpunkt Verlag, 2000
- James F. Kurose, Keith W. Ross: Computer Networking: A Top-Down Approach Featuring the Internet, 2nd Edition, Addison Wesley-Longman, 2002

Books of 4th edition available at

- secretary's office, S3|20 Room 122
- 10 € deposit
- enough books available





4.6 Schedule

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Lecture Time

- Mondays 11:40-13:20 in S202|C205
  - lecture
- Thursday 11:40-13:20 in S103|226
  - lecture & exercise (usually)

Exercises

- Thursday second half of the lecture
- Not every Thursday!
- planned dates, see KN1 Moodle
- https://moodle.tu-darmstadt.de/course/view.php?id=5268

Exam

- Planned date: 05. August, 2015
- Please check information in the www / KN1 Moodle

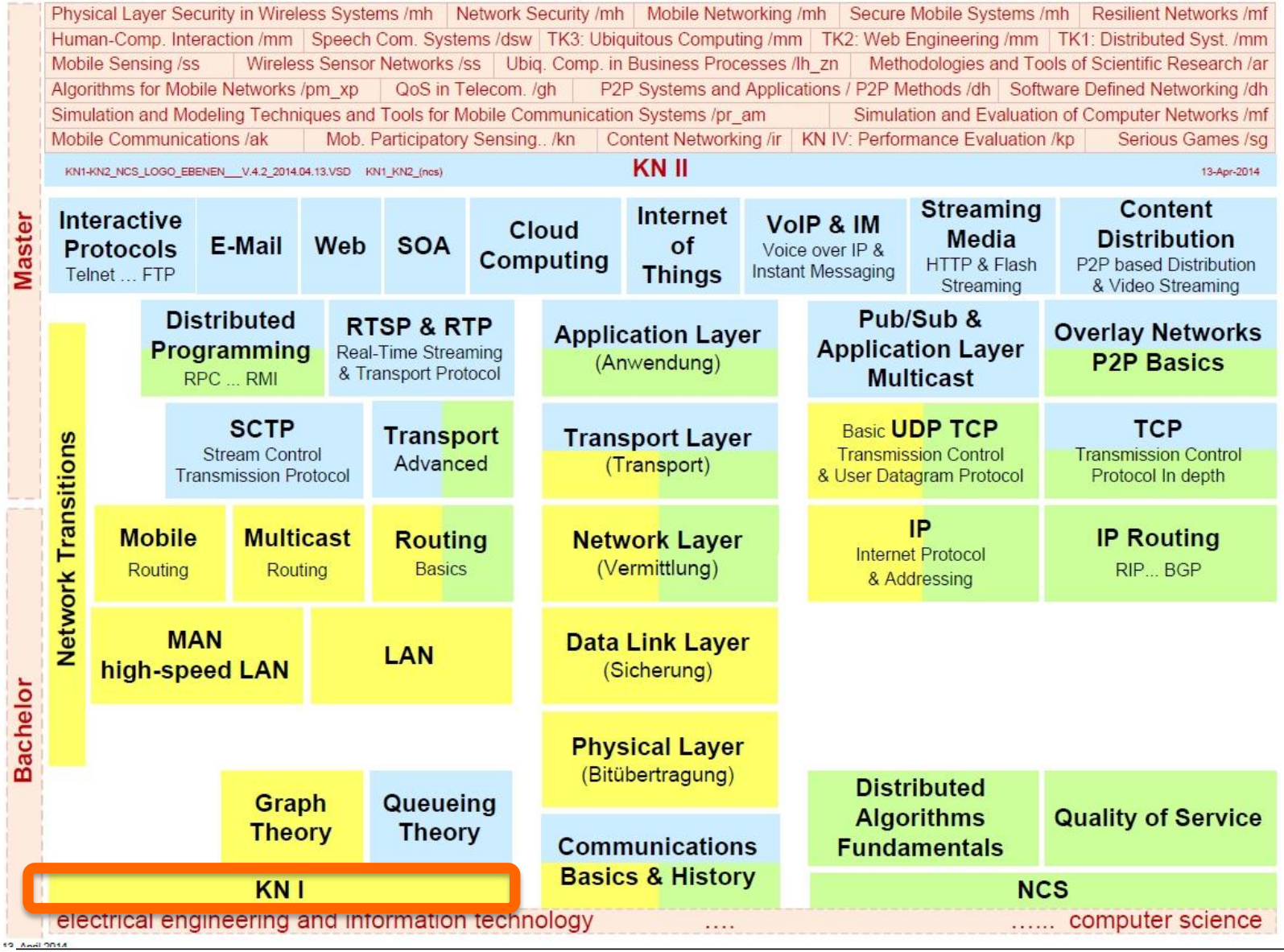
Further Enhancements

- Goal
  - To adapt to new environment
  - To allow for further enhancements, details
- Please contact
  - Ralf Steinmetz
  - Viktor Wendel
    - Any member of our KN1-team
  - Alaa Alhamoud
  - The An Binh Nguyen

Errors? Corrections ? Enhancements?

→ please let us know!

Communication Networks I today…



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Participation of the lecture means also to take part in evaluation

Objectives

- To check if we met the goals
- Change from the passive to active learning model
- Continuous learning

It means

- Some surveys (online and personal) during the term
- We need your active participation

When?

- During the lecture
  - By us - comments are important to us/me –
  - Feedback each week via KN1 Moodle
- At the end of the term
  - by "Fachschaft"/students of computer science (FB20) and of ETiT (FB18)

Feedback

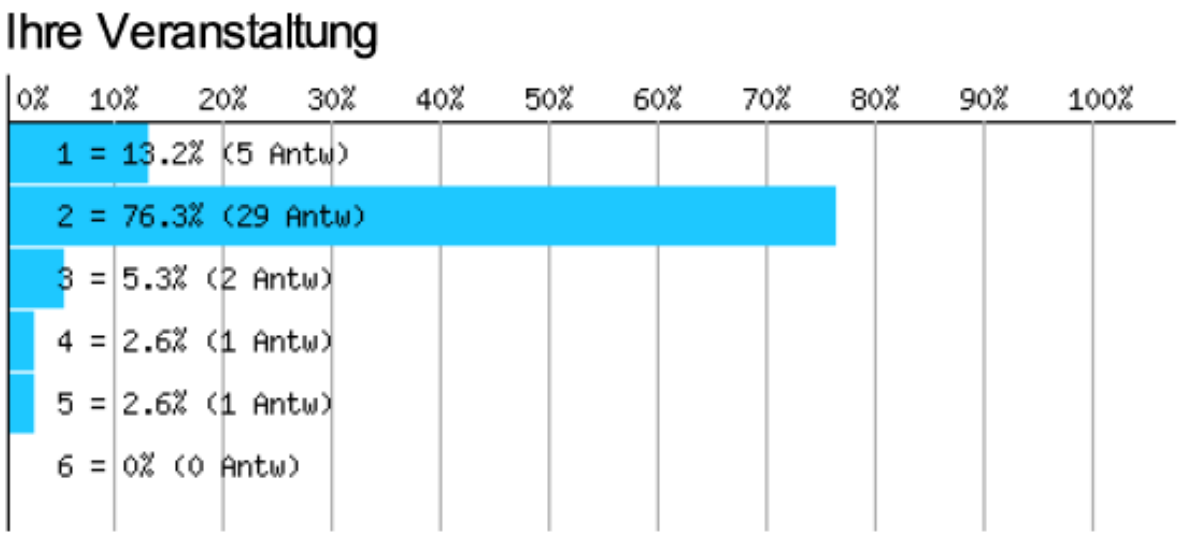
Feedback for students AND teachers

Questionnaires of the ‘Fachschaft Informatik’ and ‘Fachschaft ETiT’

- Please participate!

Results are generally made publicly available, e.g.

Welche Gesamtnote würdest du der Vorlesung (ohne Übung) geben?
(1=sehr gut, 6=ungenügend)
Which mark would you give the lectures (without exercises)?
(1=very good, 6=insufficient)



Feedback (just some)

Examples …

Was fandest du an dieser Vorlesung besonders gut?
What did you especially like in this lecture series?

Die aktuelle und moderne Wissenschaft vom Professor alas auch seiner Mitarbeiter oder Dozentin/der.

Bonussystem is well organized. Exercise presentations are useful.
Lecture recording is very good!

The content is up to date and interesting

Recordings

The lecture is available on the web

THE RECORDING SYSTEM

the recordings on the Internet

Audio. lectures on in the Net

But, also …

Welche Verbesserungvorschläge zur Vorlesung hast du?
What suggestions for improvement do you have for the lectures?

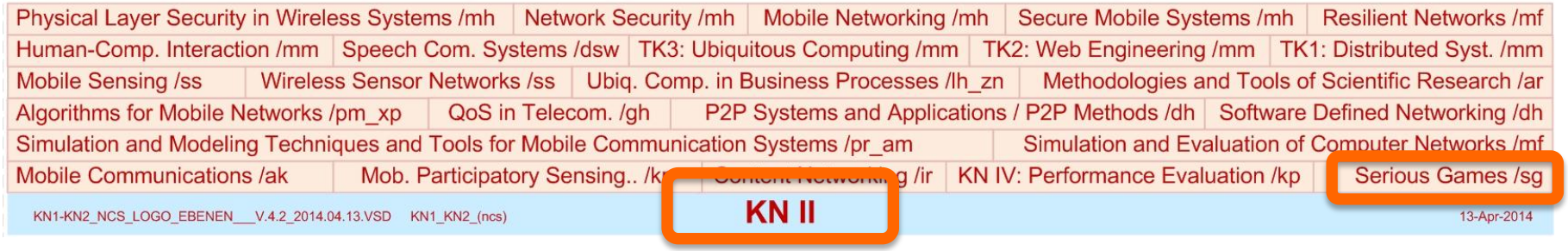
Aufhören, auf dem Notebook zu schreiben/malen, lieber die Tafel benutzen. Gescheite Folien machen und besser strukturieren. Am besten eine durchgängige Struktur für die Vorlesung, nicht bei jedem Thema eine Inhaltsnumerierung neu anfangen. Wenn schon Fragen aus dem Publikum beantworten, dann diese wenigstens für alle wiederholen. Studentenpräsentationen (in den Übungen) sollten vorher fachlich und didaktisch überprüft werden.

Übungen zu haben, die so von der Stufe her, wie der klausur.

Write a script (text no slides)

- exercise by assistants
- formulated scripts and not just points on the slides

6 Further Multimedia Communications Teaching Offers



Lab Exercises

- Multimedia Communications Lab I (WS+SS)
- Multimedia Communications Lab II (WS+SS)

Projects

- Multimedia Communications Project I (WS+SS)
- Multimedia Communications Project II (WS+SS)

Seminars

- Multimedia Communications I (SS+WS)
- Multimedia Communications II (SS+WS)
- Digital Storytelling (WS+SS)

and

- Topics in Serious Games
- As well
  - .. See additional slides

Serious Games (V2+Ü2)

Introduction on 14.04.15
09:50h S1|01 Room A03

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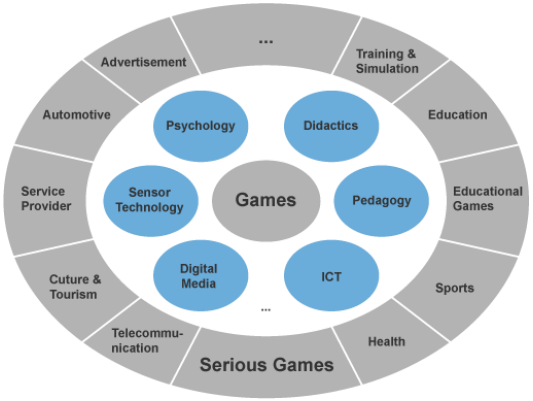
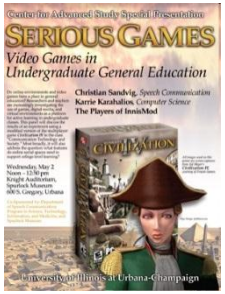
Lecturer

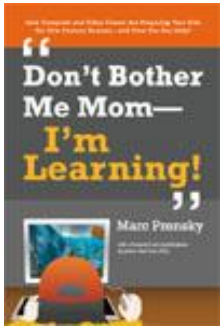
- Dr. Stefan Göbel

Organization

- Lecture: Tuesdays, 9:50 – 11:30
- Exercise: Tuesdays, 11:40 – 13:20 (theory and practice)
- Graded exam (written), 6.0 CPs

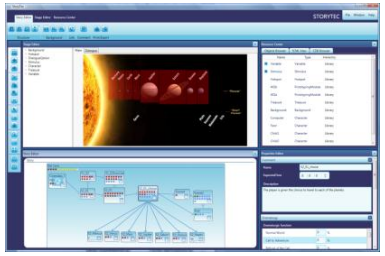






Contents

- Introduction to Serious Games
- Game Development, Game Design
- Game Technology, Tools and Engines
- Personalization, Adaptation, Storytelling
- Authoring and Content Generation
- Multiplayer Games
- Games and Web 2.0
- Interfaces, Games for Health
- Mobile Gaming
- Effects, Affects, User Experience and Sensor Technology
- Best Practice: Invited Talk by Game Developers



Learning Objectives

- Understanding the idea of Serious Games and its scientific and technological foundations
- Basic knowledge about Game Design, Game Development, Game Technology
- Insights into current applications and trends like educational games or game for health
- Ability to develop your own (serious) game

Hopefully:
Thank you for participating in the KOM lab/project!

- This year, there will be no kickoff seminar.
  Instead, OUR topic presentations will be recorded by us and uploaded to the website.

- OUR presentation may contain as may slides as we want – but the last slide of each individual topic makes use of the same template
  - Why? Because we need some structured information for all tasks, namely:
  - Supervisor, Type of Task (Lab or Project, more on the following slide), Groupsize & number of groups, Title of the Task, Student Profile and expected goals of the task.

Difference between Lab (Praktikum) and Project Tasks (Projektseminar)

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Lab task / Praktikum

- Focus on software design and implementation (SE-skills)
- Good entry point for future HiWi-jobs or theses at KOM

Project task / Projektseminar

- Focus on justified design decisions based on an in-depth study of related work
- Good preparation for a bachelor or master thesis at KOM

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KOM related very Fancy Topic

[Image of our choice]

Short summary

Goals

- Extensive literature review of ...
- Implementation of ...
- Evaluation of ...

Your Profile

- Good knowledge in OO-Java
- Basics from KN I ..
- ...

Supervisor

Group Size, Number of Groups

Type: Lab or Project

Topic ID (added by us)

What we want the student to deliver

What the student should know