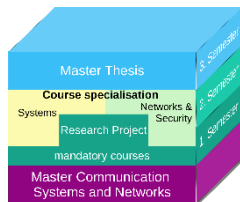


Master-Program Communication Systems and Networks

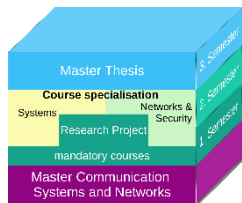
Faculty 07: Informations-, Media- and Electrical Engineering

Prof. Rainer Kronberger





- General Information about the Program
- Information from the Examination Service
- Information from the International Office

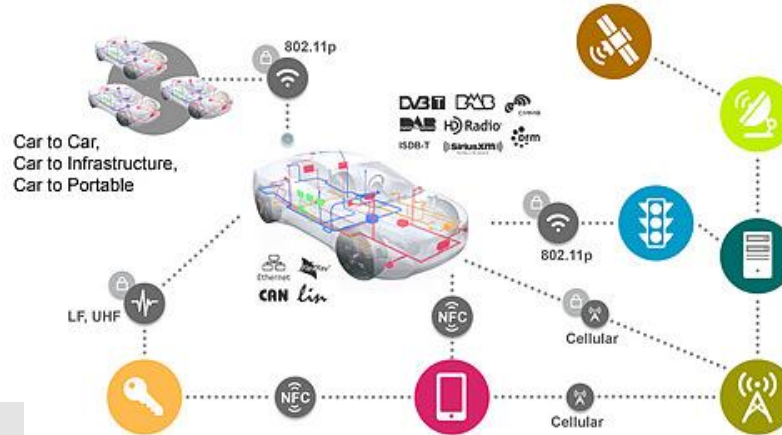


Communication Systems and Networks

A university program with perspective?



WLAN, Bluetooth



GSM, UMTS, LTE



Smart Home
RFID

access control
automation

(medical) monitoring



Wireless
Communication Systems

4G, 5G, 6G

IoT



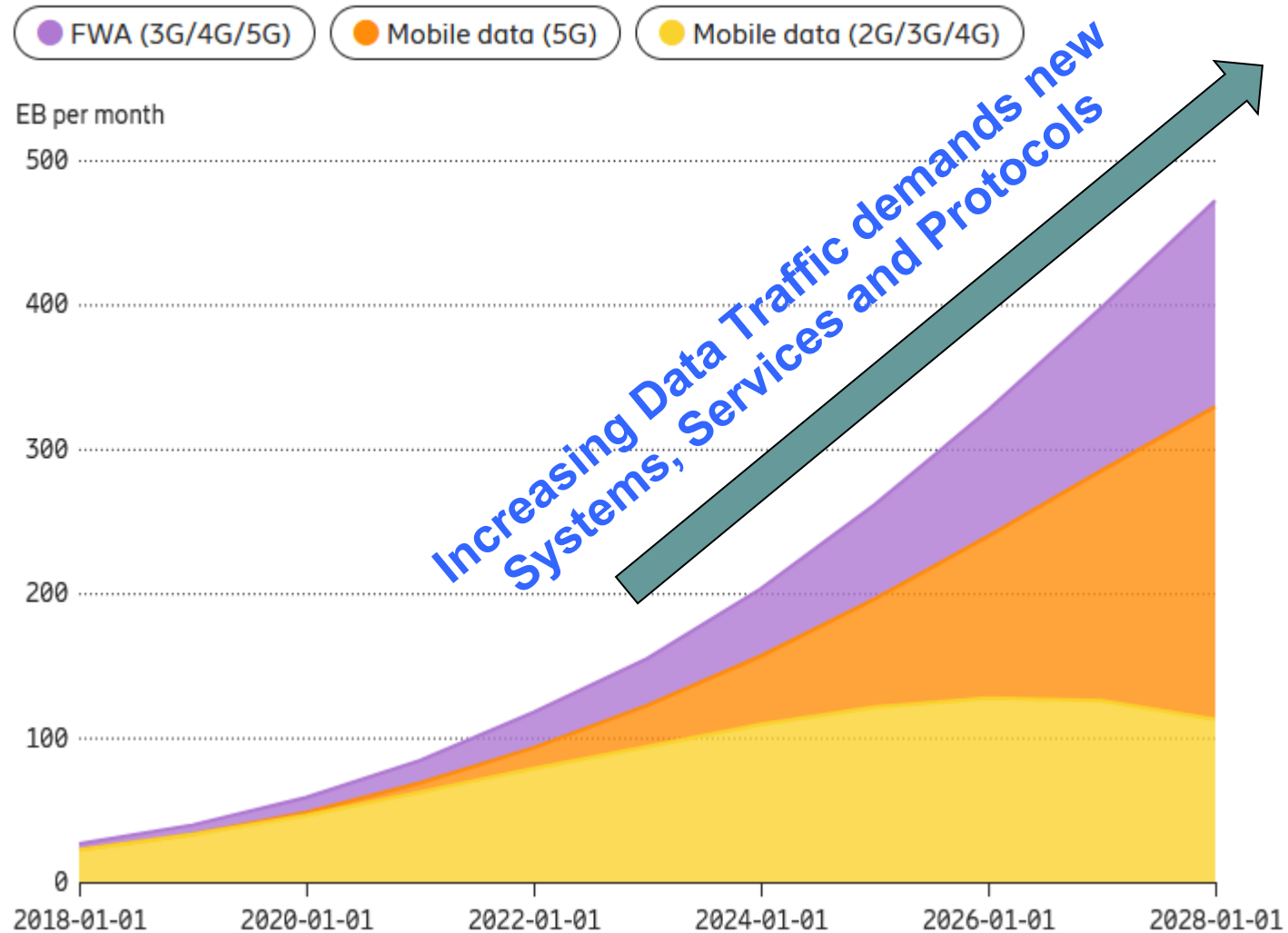
Audio & video broadcast



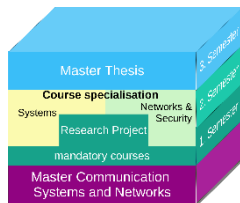
- Information- und communication technology has world wide a high importance in all areas of life

Communication Systems and Networks

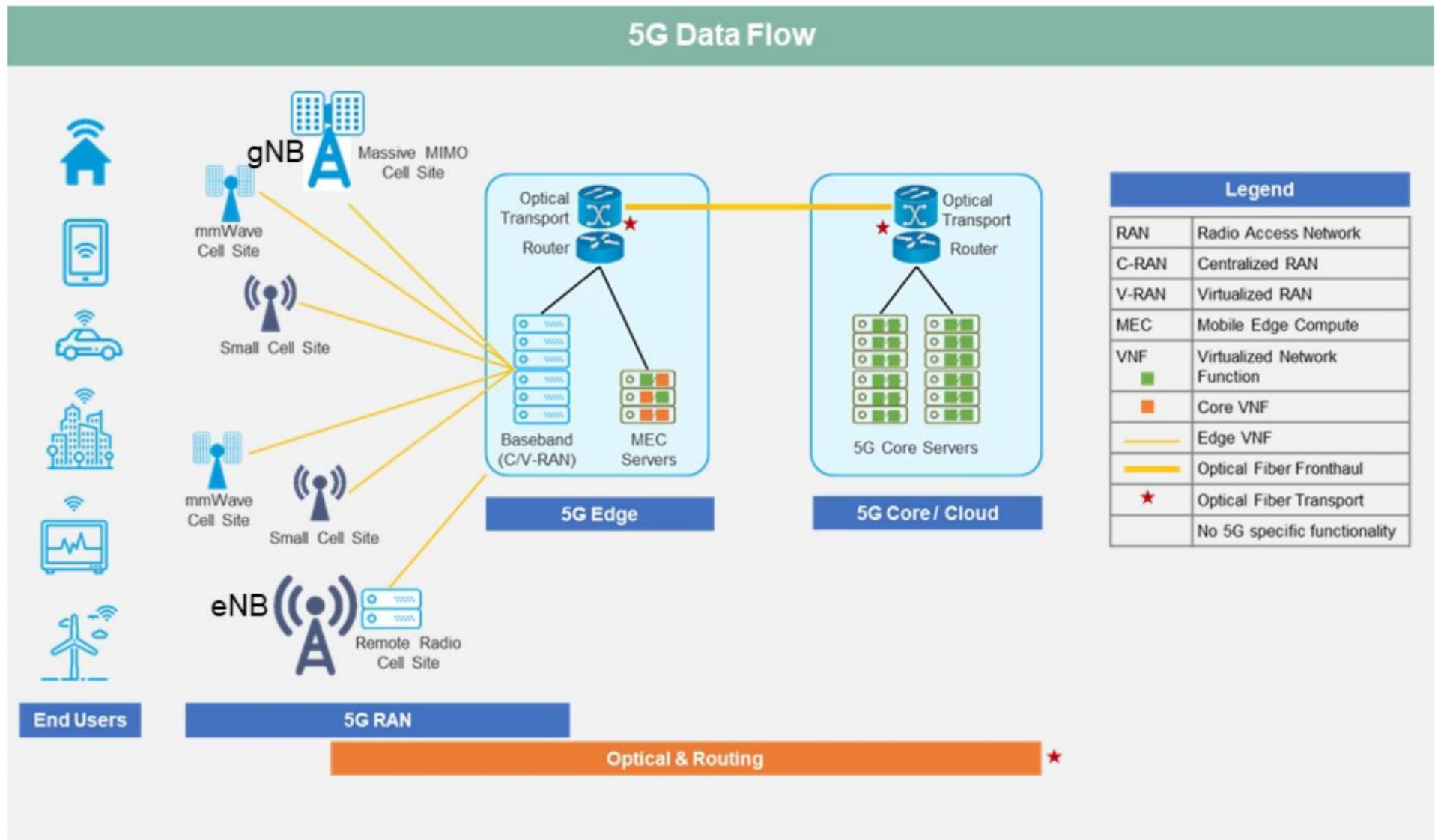
Figure 19: Global mobile network data traffic



Source: <https://www.ericsson.com/en/reports-and-papers/mobility-report/dataforecasts/mobile-traffic-forecast>



Communication Systems and Networks



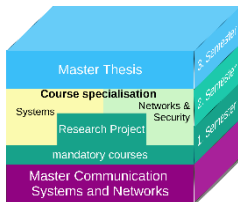
Source: Jim Nelson, „Power for Open Edge Applications“, OCP Summit, 2020.
5G Core=5G Backbone

Source: hindawi.com

Communication Systems and Networks

A university program with perspective?

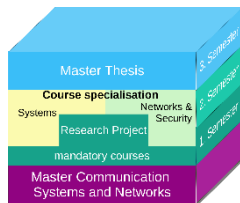
- Job possibilities worldwide in:
 - ⇒ telecommunication industry
 - ⇒ all other industries (IoT, Automotive, etc.)
 - ⇒ small and medium sized enterprises
 - ⇒ research institutes and universities (PhD possibility)
 - ⇒ public services (M.Sc → higher level)
- Significant higher earnings than B.Sc.



Communication Systems and Networks

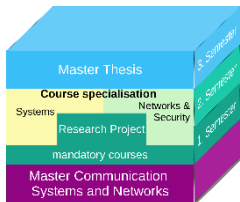
A university program with perspective?

- Great demand for master graduates! Currently, it is not covered!
- Fields of activity
 - ⇒ Design, development and implementation of modern communication systems and networks
 - ⇒ Development of devices, components, protocols and applications
 - ⇒ Evaluation and analysis of procedures and methods
 - ⇒ Assessment and evaluation of communication systems and standards
 - ⇒ Project management
 - ⇒ Sales and marketing of IT products
 - ⇒ Research at universities and institutes
 - ⇒ consulting and training of user and clients



Profile and Achievements

- focus of the study program:
 - consolidation of the theoretical knowledge in combination with practical scientific work
- nearly each module is supplemented by lab work
- students have to conduct an individual R&D work in the framework of a university or external research project to improve their scientific capabilities
- a broad range of further modules from the fields of electrical engineering, optical technologies, informatics, and media technologies is offered as electives by cooperation between TH-K and the H-BRS.



Requirements

■ Bachelor in

- Electrical / Telecommunication Engineering
- Information Engineering / Computer Science
- or similar programs

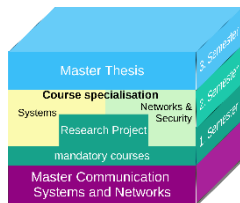
with at least 180 ECTS (additional assignments) resp. 210 ECTS

■ Major interests in Information and Communication Technologies

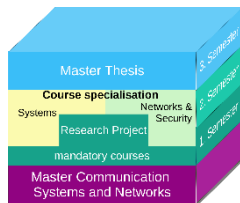
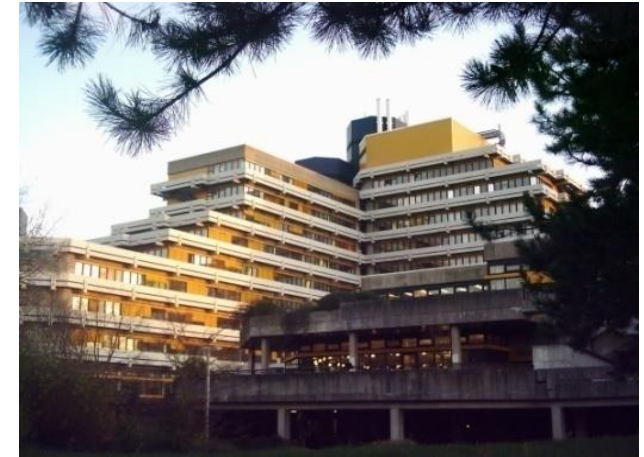
For all those of you who have got ***conditional admission***:

Please contact Prof. Kronberger (by mail) immediately to discuss your working plan for earning the missing credits!

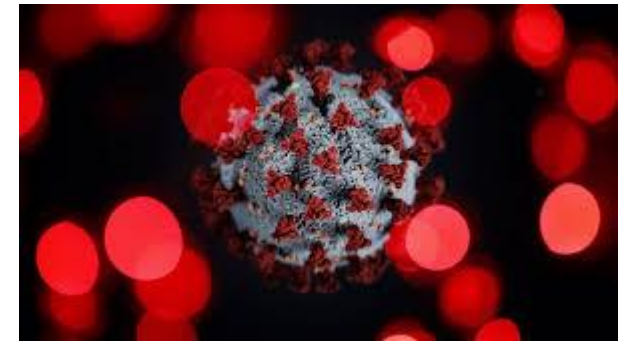
(Provide name and student number in your mail!)



- **Faculty 07 (Institut for Communication Engineering INT), TH Köln**
 - Profs. Dettmar, Elders-Boll, Grebe, Knospe, Kronberger, Pörschmann, Silverberg, Rhein
- **Fachbereich Informatik, HS Bonn-Rhein-Sieg**
 - Jonas, Jung, Lemke-Rust, Rademacher, Östreich, Reinert, Uhde,



The Coronavirus

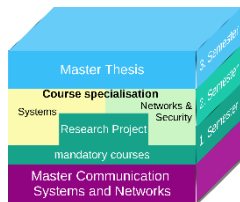


- Please watch the official announcements of TH-K and HS-BRS!

<https://www.h-brs.de/de/corona-en>

https://www.th-koeln.de/en/coronavirus_73119.php

For more details, please read the instructions on the webpage!



Information about courses in SS

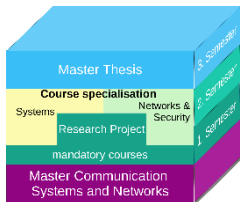
Important Covid Information (from 15.03.2022)

The number of Covid infections is rising again and this strongly affects our university: we currently see a large number of university members who are either sick or who are self-isolating due to a Covid infection and are thus not allowed to leave their home. The numbers go far beyond the usual average number of people on sick leave: currently up to one third of our teaching staff and students cannot offer or participate in on-site courses because they are required to self-isolate due to Covid. In light of this, we are forced to question our goal to offer classes in the summer semester mainly on campus in order to offer our students opportunities for social integration at TH Köln as well as to familiarize with their faculty culture.

Thus, TH Köln's Executive Board feels compelled to suspend on-site teaching until Easter. Therefore, all MaCSN classes will start ONLINE !

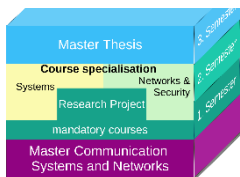
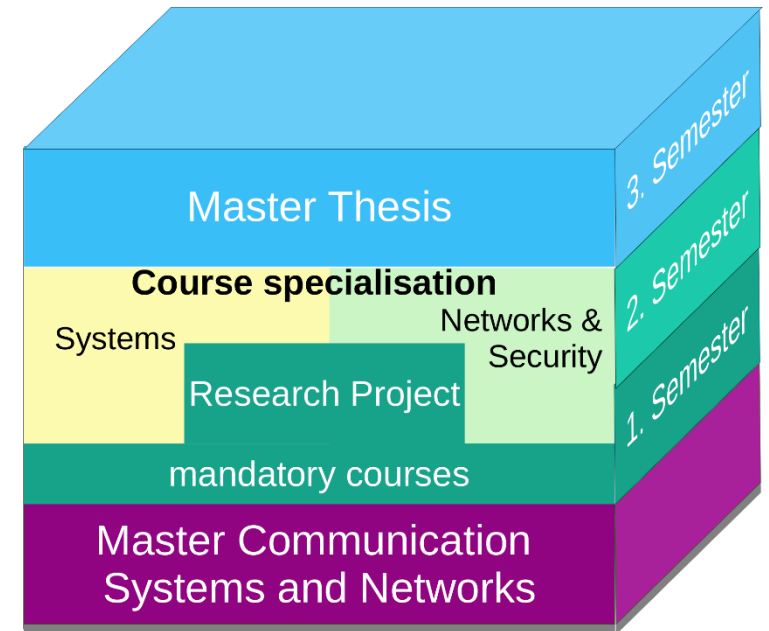
On-site classes of the summer semester 2022 may continue on April 19, 2022.

Further info will be given then by the professors!



MaCSN program structure

- **1. Semester: main subjects**
- **2 specialisations already starting 1. semester**
 - ⇒ *Communication Systems (E; TH-K)*
 - ⇒ *Communication Networks (D,E; TH-K, B-R-S (including IT-Security aspects))*
- **research project (10 ECTS)**
- **language**
 - ⇒ All courses in English at TH-K (lectures, excercises, projects, thesis)
 - ⇒ mainly German in HS BRS
- **Start**
 - ⇒ **regular summer term**
 - ⇒ **start in winter term in October with changed schedule**



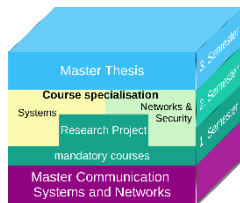
Curriculum

Regular start →
summer term

Start →
winter term

Module-ID	Module Name	Credits	
1. Semester			
HIM	Advanced Mathematics (In English) mandatory	5	No ULP
BSN	Basics on Systems and Networks mandatory	5	
PFM1	Profile Module 1 (3) of the corresponding specialisation	5	
PFM2	Profile Module 2 (4) of the corresponding specialisation	5	
EL1	Elective 1 (3) from Master modules with technical content	5	
PM	Project Management (In English) mandatory	5	No ULP
RP	Research Project mandatory	10	No ULP
2. Semester			
HIM	Advanced Mathematics (in German)	5	No ULP
PFM3	Profile Module 3 (1) of the corresponding specialisation	5	
PFM4	Profile Module 4 (2) of the corresponding specialisation	5	
EL2	Elective 2 (1) from Master modules with technical content	5	
EL3	Elective 3 (2) from Master modules		
PM (PL)	Projectmanagement/Projektleitung (in German)	5	No ULP
RP	Research Project	10	No ULP
3. Semester			
MAA	Master Thesis		
KOLL	Colloquium / Final Presentation	3	
offered in both Semester			

This is the minimum planned time! It is on you, what time you need/have to complete the program!



Specialisation courses

Communication Systems course specialization modules (choose 4 out of n)		Language	Site	Semester
M.ACC	Advanced Channel Coding	E	K	SS
M.SAE	Simulation of Acoustic Environments	E	K	SS
M.ODUN	Optische u. drahtlose Übertragungsnetze	G	B-R-S	SS
M.RFSD	RF System Design	E	K	SS
M.KRY	Cryptography	E	K	SS
M.NGN	Next Generation Networks	E	K	SS
M.DSP	Digital Signal Processing	E	K	WS
M.MLWR	Machine Learning and Scientific Computing	E	K	SS
M.AMC	Advanced Multimedia Communications	E	K	WS

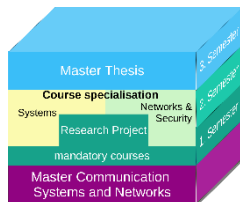
Networks & Security course specialisation modules (choose 4 out of n)				
M.AMC	Advanced Multimedia Communications	E	K	WS
M.KVS	Kommunikation in verteilten Systemen	E/G	B-R-S	SS/WS
M.ZK	Zuverlässigkeit von Systemen	G (E)	B-R-S	WS
M.IS	IT Security	E	K	WS
M.KRY	Cryptography	E	K	SS
M.VPN	Virtuelle Private Netze	G	B-R-S	WS
M.PET	Identification and Privacy Enhanced Technologies	G (E)	B-R-S	SS
M.EBS	Embedded Security	G	B-R-S	SS
M.NGN	Next Generation Networks	E	K	SS

Legend

E: English K: Cologne
G: German B-R-S: St. Augustin

G(E) German, materials and exam maybe available in English (please contact lecturer)
E/G summer term: English, winter term: German
WS winter term
SS Summer term

Profiles Master CSN (Image: TH Köln)

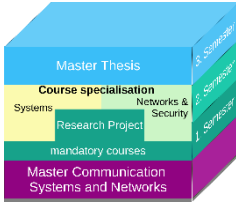


Curriculum

Module-ID	Module Name	Credits
1. Semester		
HIM	Advanced Mathematics (In English) mandatory	5
BSN	Basics on Systems and Networks mandatory	5
PFM1	Profile Module 1 (3) of the corresponding specialisation	5
PFM2	Profile Module 2 (4) of the corresponding specialisation	5
EL1	Elective 1 (3) from Master modules with technical content	5
PM	Project Management (In English) mandatory	5
RP	Research Project mandatory	10
2. Semester		
HIM	Advanced Mathematics (in German)	5
PFM3	Profile Module 3 (1) of the corresponding specialisation	5
PFM4	Profile Module 4 (2) of the corresponding specialisation	5
EL2	Elective 2 (1) from Master modules with technical content	5
EL3	Elective 3 (2) from Master modules	
PM (PL)	Projectmanagement/Projektleitung (In English)	5
RP	Research Project	10
3. Semester		
MAA	Master Thesis	27
KOLL	Colloquium / Final Presentation	3
offered in both Semester		

Specialisation courses

Communication Systems course specialization modules (choose 4 out of n)		Language	Site	Semester
M.ACC	Advanced Channel Coding	E	K	SS
M.SAE	Simulation of Acoustic Environments	E	K	SS
M.ODUN	Optische u. drahtlose Übertragungsnetze	G	B-R-S	SS
M.RFSD	RF System Design	E	K	SS
M.KRY	Cryptography	E	K	SS
M.NGN	Next Generation Networks	E	K	SS
M.DSP	Digital Signal Processing	E	K	WS
M.MLWR	Machine Learning and Scientific Computing	E	K	SS
M.AMC	Advanced Multimedia Communications	E	K	WS
Networks & Security course specialisation modules (choose 4 out of n)				
M.AMC	Advanced Multimedia Communications	E	K	WS
M.KVS	Kommunikation in verteilten Systemen	E/G	B-R-S	SS/WS
M.ZK	Zuverlässigkeit von Systemen	G (E)	B-R-S	WS
M.IS	IT Security	E	K	WS
M.KRY	Cryptography	E	K	SS
M.VPN	Virtuelle Private Netze	G	B-R-S	WS
M.PET	Identification and Privacy Enhanced Technologies	G (E)	B-R-S	SS
M.EBS	Embedded Security	G	B-R-S	SS
M.NGN	Next Generation Networks	E	K	SS



Modules of the MA CSN

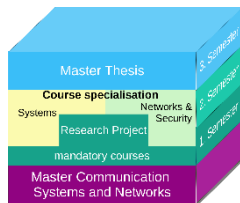
- The modules descriptions can be found in the WWW under <http://www.mcsn.de/> and then under the category **For Students**

- ✓ TH Köln follow the link

http://f07-studieninfo.web.th-koeln.de/f07_handbuecher_2020/html_pdf/SgVerzeichnis.html

- ✓ HS Bonn-Rhein-Sieg / Department of Computer Science

https://www.h-brs.de/en/degree-programmes?field_infobox_sp_degree_target_id_verf=3&field_group_target_id_verf=125&field_lecture_language_target_id_verf=All&field_campus_target_id_verf=All



E-Learning MA CSN

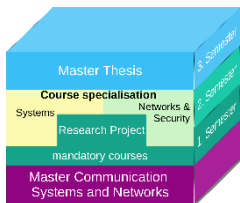
- Professors from TH Cologne provide course material and latest information in the E-Learning platform **ILIAS** or **ILU*** of TH Cologne

See: <https://ilias.th-koeln.de> or <https://ilu.th-koeln.de/> and choose

F07 - Faculty of Information, Media and Electrical Engineering

- Please register for each course. Most courses require a PW, which will be given by the professor.
- Request access at HS B-R-S. System is different!

*ILU is the successor system of ILIAS. Currently both systems are active until end of ILIAS. Please check both!



Class Schedules TH K

Monday

Tag	Std	Zeit	MACSN			
Mo	1	8:00				
Mo	2	8:50				
Mo	3	9:45				
Mo	4	10:35				
Mo	5	11:30				
Mo	6	12:20				
Mo	7	13:15				
Mo	8	14:05				
Mo	9	15:00				
Mo	10	15:50				
Mo	11	16:45				
Mo	12	17:35				
Mo	13	18:30				
Mo	14	19:20				
Di	1	8:00				
Di	2	8:50				
Di	3	9:45				
Di	4	10:35				
Di	5	11:30				
Di	6	12:20				
Di	7	13:15				
Di	8	14:05				
Di	9	15:00				

Tuesday

Wednesday

Mi	1	8:00							
Mi	2	8:50							
Mi	3	9:45							
Mi	4	10:35							
Mi	5	11:30							
Mi	6	12:20							
Mi	7	13:15							
Mi	8	14:05							

Thursday

Do	6	12:20							
Do	7	13:15							
Do	8	14:05							
Do	9	15:00							
Do	10	15:50							
Do	11	16:45							
Do	12	17:35							
Do	13	18:30							
Do	14	19:20							

Friday

Fr	1	8:00							
Fr	2	8:50							
Fr	3	9:45							
Fr	4	10:35							
Fr	5	11:30							
Fr	6	12:20							
Fr	7	13:15							
Fr	8	14:05							
Fr	9	15:00							
Fr	10	15:50							

V: Lecture Ü: Exercises P: LabWork

Further information about the lecture time schedule:

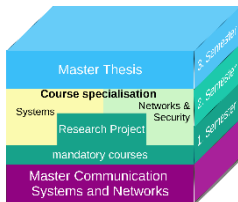
https://ilias.th-koeln.de/ilias.php?ref_id=986528&cmd=render&cmdClass=ilrepositorygui&cmdNode=wc&baseClass=ilRepositoryGUI

Information about courses in Winter Term

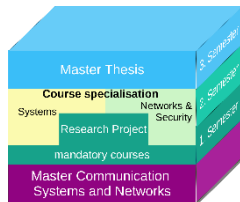
Please look up/find the courses under the name of the professors in ILIAS or ILU (**registration required!**)

https://ilias.th-koeln.de/goto.php?target=cat_62623&client_id=ILIAS_FH_Koeln

- BSN (**Profs. Dettmar** / Elders-Boll /Kronberger)
Winter term: only videos, short introduction after Tuesday xx
- HIM Advanced Mathematics (**Prof. Rhein**)
German language/ **English language summer term!**
First lecture, Friday., Oct. 6, 13.15 Room ZW8-3
- AMC Advanced Multimedia Communication (**Prof. Grebe**)
First lecture, Online, Thur., Oct. 5, 13.15, ZO 8-6



- ITS IT Security (**Prof. Knospe**)
(only with passed course Cryptography!) → Freshman cannot take course! Only 3rd sem.!
First lecture: online, Mo., Oct. 10, 12.20 ZS 6-1
- DSP Digital Signal Processing (**Prof. Elders-Boll**)
First lecture: Tue., Oct. 10, ZO 6-6



Course schedule B-R-S WS 23/24

Timetable of Semester Master CSN 1

Semester: Wintersemester 2023/2024, **Calendar Weeks:** 40-51, 2-4, **Weekdays:** Monday-Sunday, **As of:** 2023-10-03 11:15:41

The table does not show events that lie in the past.

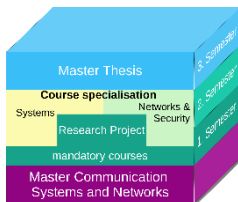
	from	until	Room	Activity	Period	Who
Mo	9:00	10:30	St-C125	Virtuelle Private Netze (V)	02.10.2023-22.01.2024 (KW 40-4)	Oestreich
	10:45	12:15	St-C125	Virtuelle Private Netze (Ü)	02.10.2023-22.01.2024 (KW 40-4)	Oestreich
	13:30	15:00	St-C125	Virtuelle Private Netze (Ü)	02.10.2023-22.01.2024 (KW 40-4)	Oestreich
Tu	13:30	15:00	St-B062	Kommunikation in verteilten Systemen (V)	10.10.2023-23.01.2024 (Wintersemester (ab KW 41-56))	Rademacher
	15:15	16:45	St-B062	Kommunikation in verteilten Systemen (Ü)	10.10.2023-23.01.2024 (Wintersemester (ab KW 41-56))	Rademacher
We	13:30	15:00	St-B062	Zuverlässigkeit von Systemen (V)	04.10.2023-24.01.2024 (KW 40-4)	Jung, Reinert
	15:15	16:45	St-B062	Zuverlässigkeit von Systemen (Ü)	04.10.2023-24.01.2024 (KW 40-4)	Jung, Reinert

(KW = Kalenderwoche, gKW = even calendar weeks, uKW = odd calendar weeks)

Further information about the lecture time schedule:

HS Bonn-Rhein-Sieg (FB Informatik) <https://eva2.inf.h-brs.de/stundenplan/>

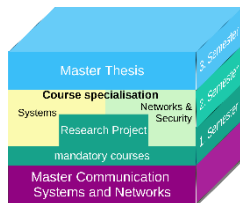
For course registration: <https://infoportal.inf.h-brs.de/app1/de/reg/>  **mandatory!**



Double Degree Program with Polytechnical University of Valencia, Spain

Polytechnical University Valencia (UPV) and Technische Hochschule Köln (THK) promote the exchange of students in degree courses of “*Master of Science in Communication Systems and Networks*” and “*Máster Universitario en Tecnologías, Sistemas y Redes de Comunicaciones*” (“Master in Telecommunication Technologies, Systems and Networks”) to obtain a **Double Degree**.

- Students have to acquire 90 ECTS credits in total during their studies at both Universities in the respective Master programs.
- Courses during one or two semester in Köln and one semester in Valencia and afterwards final thesis in Köln or Valencia.

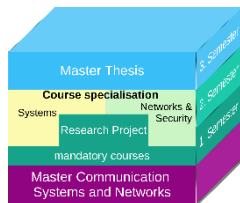
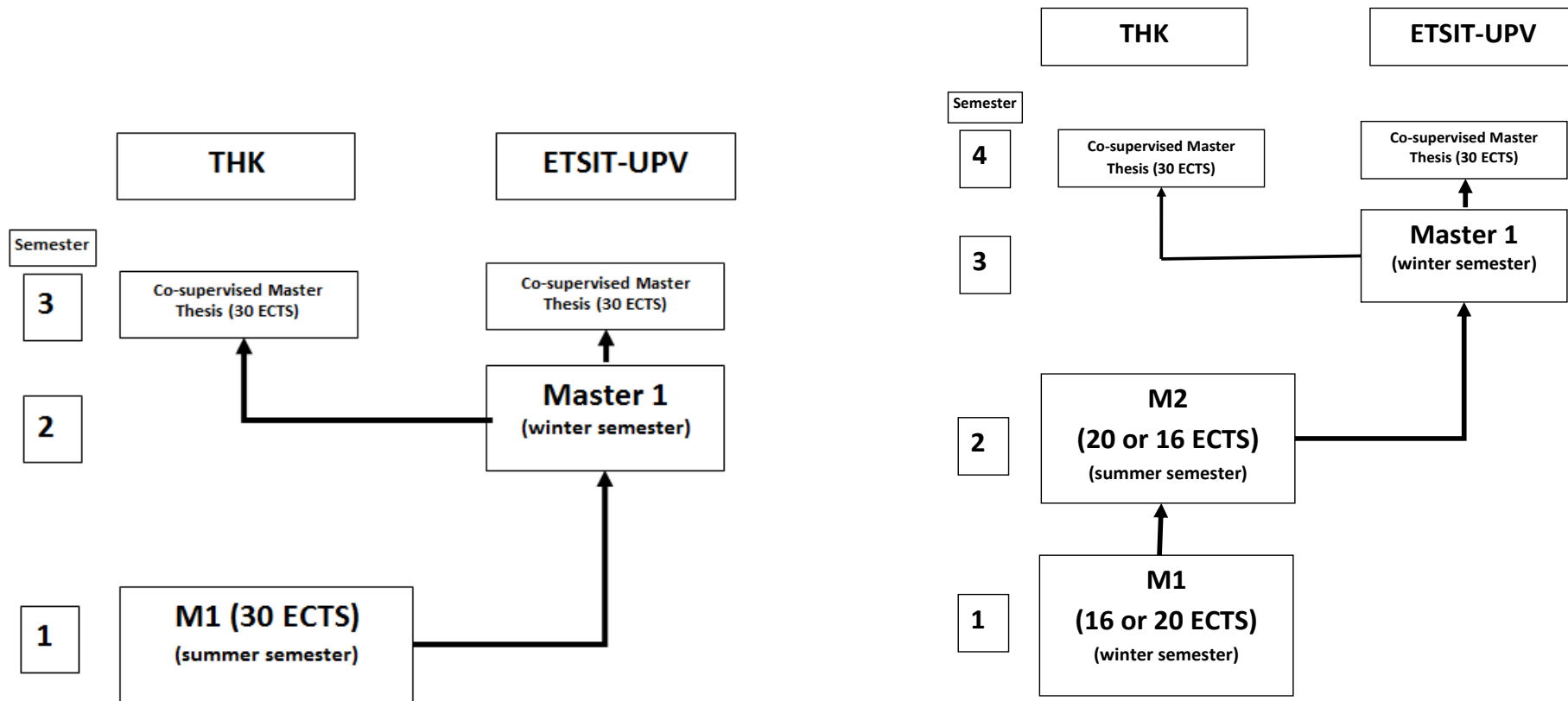


Double degree

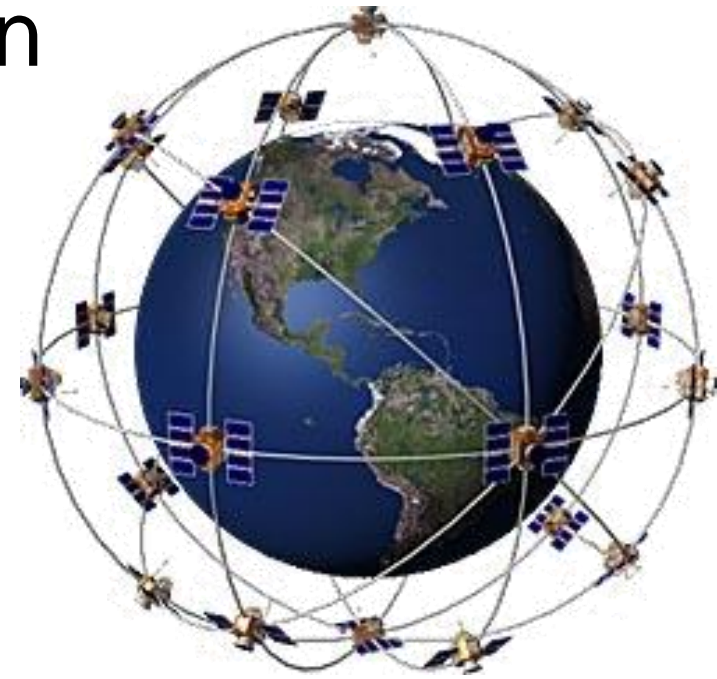
■ Student from Cologne outgoing to Valencia

ITINERARY 2: THK to ETSIT-UPV

[Each box represents 30 ECTS credits]



Orientation at TH Koeln



Room-Name

Building, Direction (**N, O, S, W**), level, Room -Nr.

for example ZW 7 – 2 is in the main building, Westwing, 7. floor, room 2)

Important rooms

2. Floor

Entrance, Offices for Examination/ Application

Main Lecture Room AM (Audimax), Lecture rooms 7 - 14

Student Council (AstA) and Mensa

6. Floor

ZO 6 – 5 = Student council Communications Engineering

ZN 6 – 18 = Secretary / Dean

ZO 6 – 6, ZO 6 – 10, ZW 6 – 1, ZS 6 – 1 Lecture rooms

7. Floor

ZW 7 – 2 = Lecture room

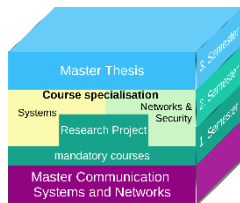
8. Floor

North : Laboratories for Telecommunication (Prof. Dettmar, Prof Elders-Boll)

East: Network Lab (Prof. Grebe)

West: Acoustic Lab (Prof. Pörschmann), HighFrequency Lab (Prof. Kronberger)

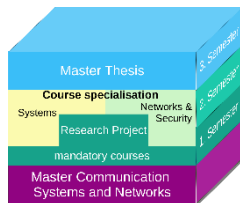
ZW 8-3 u. ZO 8-6: Lecture Rooms



Important Information about Research Project

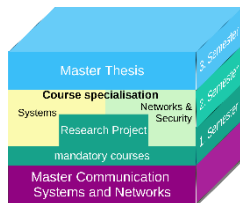
Fakultät 07 Informations-, Medien- und Elektrotechnik

Prof. Rainer Kronberger



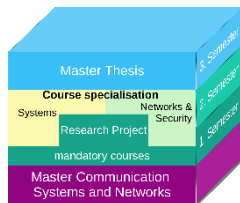
Important Facts

- **10 ECTS / 300h workload**
- **1st and/or 2nd semester**
- **Theoretical and/or practical work**
- **Will be supervised by participating professors**
- **Can also be done in industry, but **only with permission and involvement of a professor !****



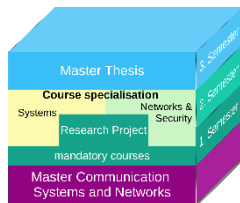
What is a Research Project?

- **Research projects are offered by participating professors each semester .**
 - **The student is fully responsible by himself to look for a research project!**
 - **The topic of the project should be in the personal area of interests of the student!**
 - **The student may offer the professor own topics or wishes (in the field of research of the professor / laboratory)**
- **Within the project, the student shall**
 - work individually on a research topic
 - analyze a problem in a scientific way
 - find new or suitable solutions to solve the problem
 - plan the project in a scientific way
 - do experiments, simulations and/or theoretical work
 - evaluate the results
 - present the results and write a report



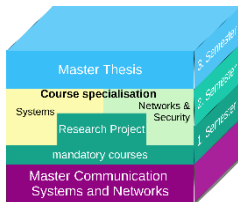
Time, work schedule and evaluation(1)

- Research project can be started any time either in SS or in WS
- research project starts with introduction phase (4 – 6 weeks)
 - student chooses the topic of the research project
 - student gets familiar with the problem
 - student works theoretically to understand the problem
- student gives a presentation about the topic, the problem and shows first ideas and solutions (after 1 - 2 months)
 - will be presented together with other students
 - student gives a short summary (2 pages)
 - presentation and summary will be evaluated (25%)
- **When you have started your RP, you have maximum 12 months to finish!**
Hard deadline! Otherwise you will fail!



Time and work schedule and evaluation(2)

- **main research work continues**
 - lab work (6 - 8h / week = 1 full day or 2 x half days /week !)
- **work can be done either during the semesters only but also during the semester break in one block (e.g. totally 7 - 8 weeks fulltime)**
- **final presentation at the end of the project**
 - will be presented together with other students
 - student gives a project report (max. 10 pages)
 - presentation and report will be evaluated by the professor(s)
- **total grading:**
 - 25% from first presentation
 - 40% overall performance of research work
 - 25% final presentation
 - 10% final report

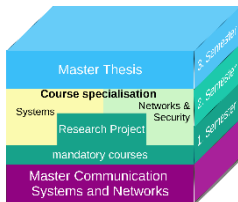


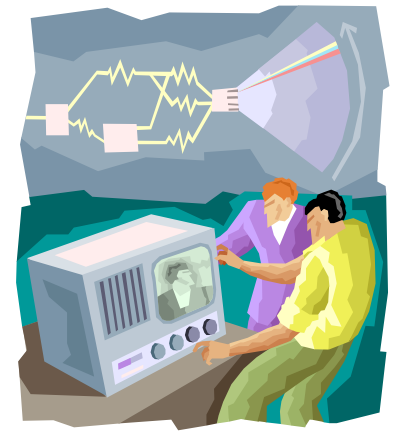
Course Registration - Exam Registration

- You will get an additional and detailed Information from the examination office about the **PSSO Examination Registration Software**.

Some important hints, for now:

- Register in ILIAS courses (find course under Prof. name)
- Register in the PSSO for the ULP ! **DO NOT MISS!**
If course has a **ULP**, this is **mandatory**! Otherwise you cannot register for the course exam! Registration for ULP **afterwards not possible!**
- Register in the PSSO until given deadline for the course exam!
Exam withdrawel possible until one week before exam!





Find further information under

<http://www.mcsn.de/>

or

TH-Köln: Prof Rainer Kronberger, Room ZW 8-14

Office hours: by request per mail

HS Bonn-Rhein Sieg: Prof. Rademacher, Prof. Jonas

