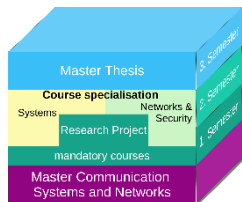


# Master-Program Communication Systems and Networks

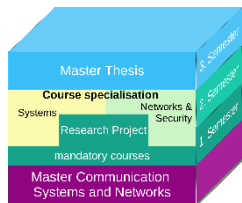
Faculty 07: Informations-, Media- and Electrical Engineering

Prof. Rainer Kronberger





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

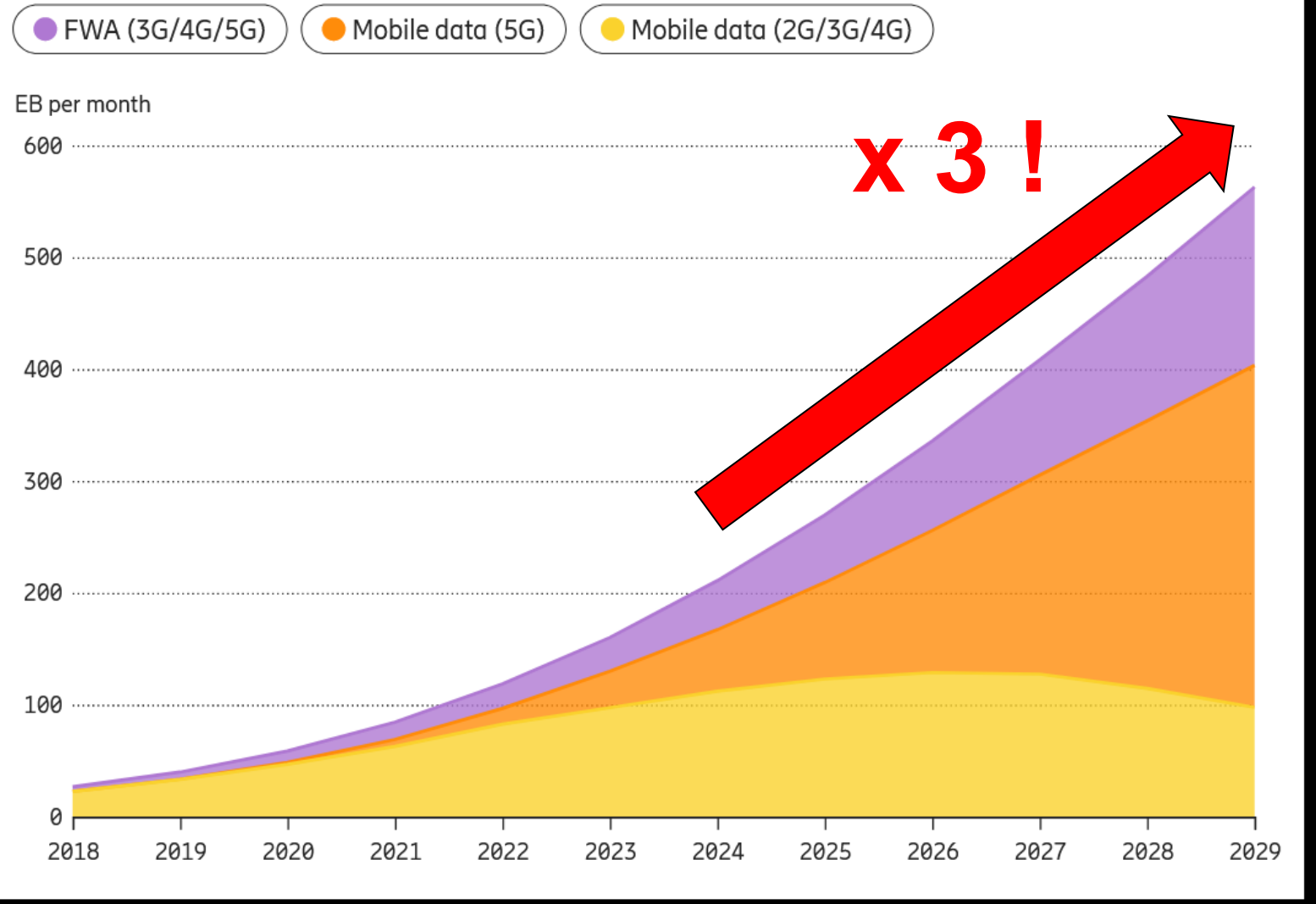




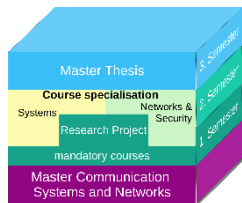


# Communication Systems and Networks

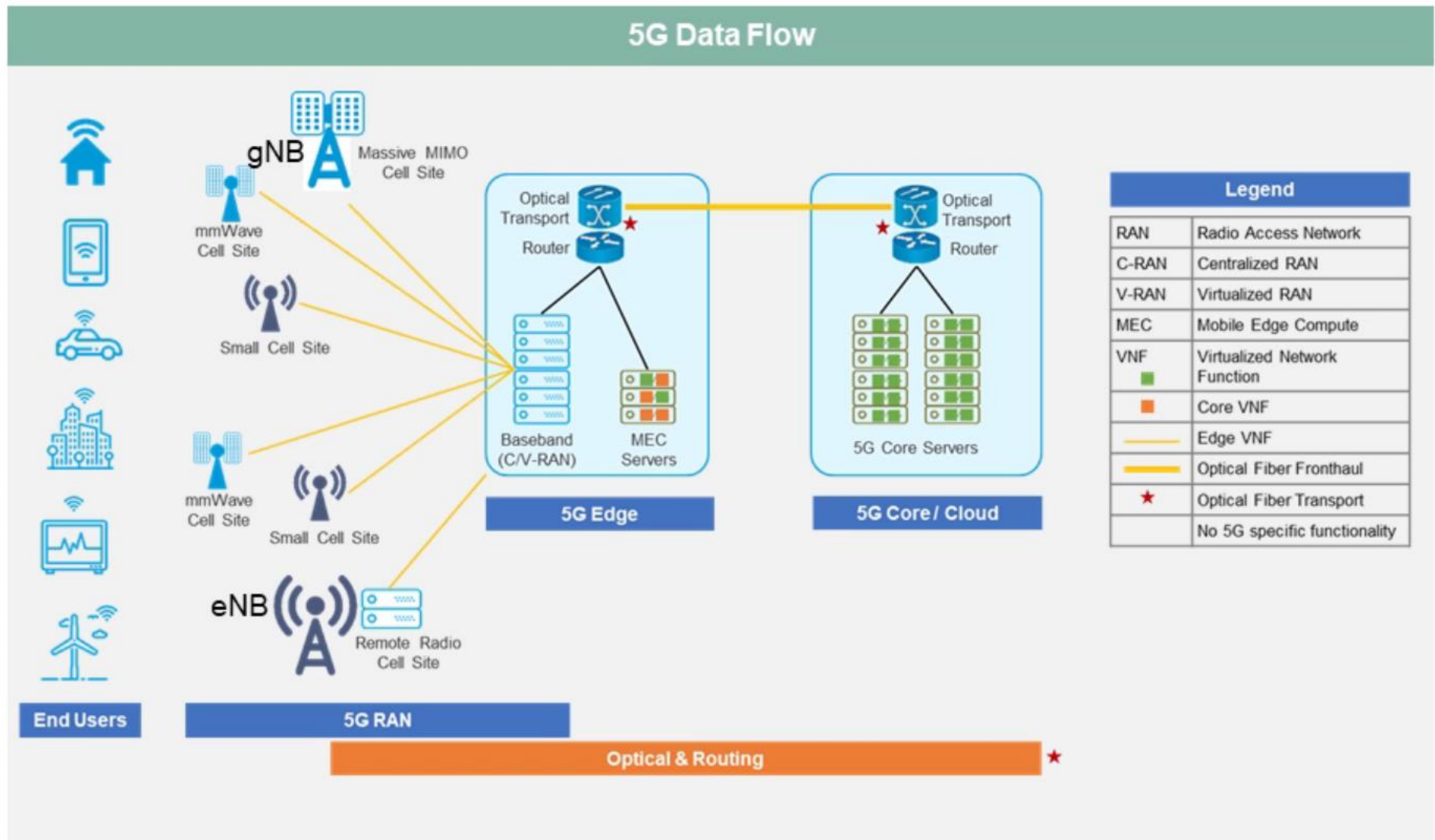
Figure 9: Global mobile network data traffic



Source: Ericson Mobility Report 2023

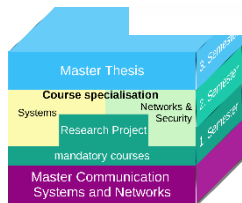


# Communication Systems and Networks



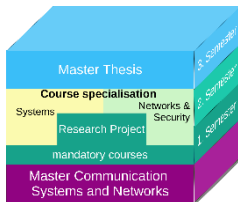
Source: Jim Nelson, „Power for Open Edge Applications“, OCP Summit, 2020.  
5G Core=5G Backbone

Source: hindawi.com



## A university program with perspective?

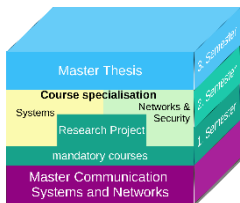
- Job possibilities worldwide in:
  - ⇒ telecommunication industry
  - ⇒ all other industries (IoT, Automotive, etc.)
  - ⇒ small and medium sized enterprises
  - ⇒ research institutes and universities (PhD possibility)
  - ⇒ public services (M.Sc → higher level)
- Significant higher earnings than B.Sc.



# Communication Systems and Networks

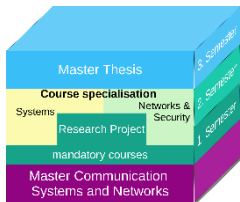
## A university program with perspective?

- 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

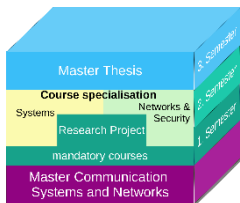
with at least 180 ECTS (additional assignments) resp. 210 ECTS

## ■ Major interrests in Information and Communication Technologies

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

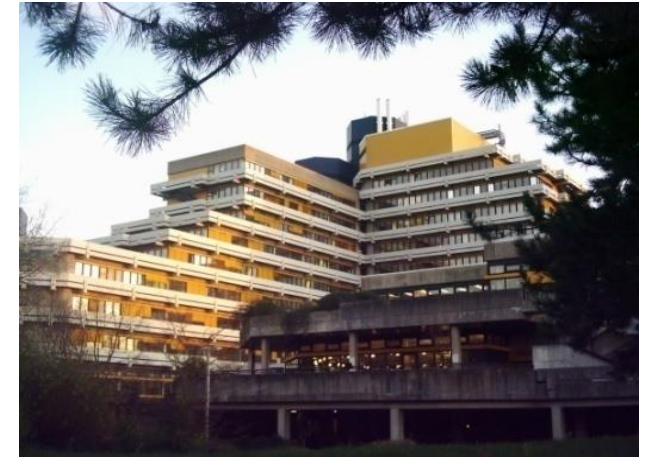
**Please contact Prof. Kronberger (by mail) immediately to discuss your working plan for earning the missing credits!**

(Provide name and student number in your mail!)



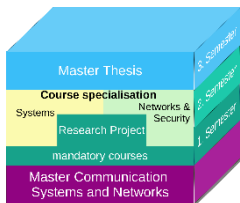
## ■ Faculty 07 (Institut for Communication Engineering INT), TH Köln

- Profs. Dettmar, Elders-Boll, Grebe, Knospe, Kronberger, Pörschmann, Silverberg, Rhein



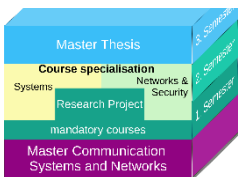
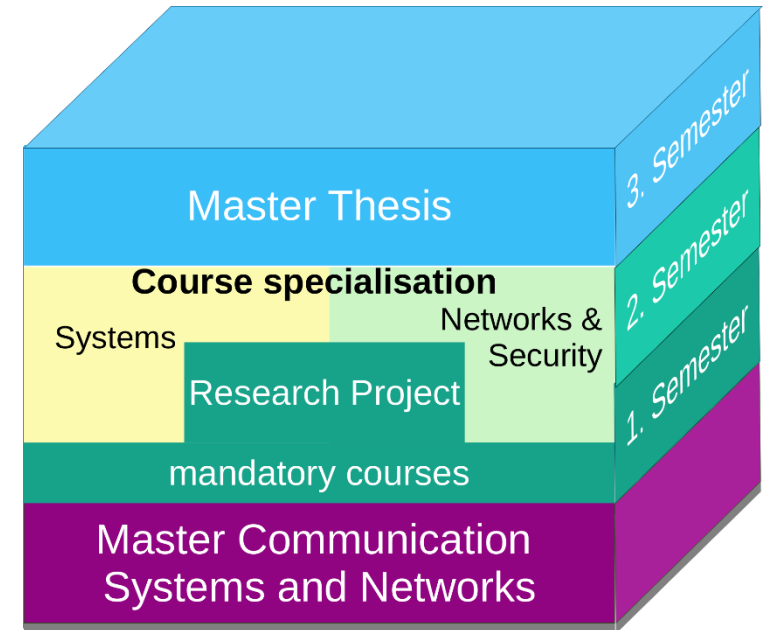
## ■ Fachbereich Informatik, HS Bonn-Rhein-Sieg

- Jung, Lemke-Rust , Östreich, Reinert, Rademacher, Uhde,



# 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**



Regular start →  
summer term

Module-ID	Module Name	Credits
<b>1. Semester</b>		
HIM	Advanced Mathematics (In English) <span style="color: red;">mandatory</span>	5
BSN	Basics on Systems and Networks <span style="color: red;">mandatory</span>	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) <span style="color: red;">mandatory</span>	5
RP	Research Project <span style="color: red;">mandatory</span>	10
<b>2. Semester</b>		
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 German)	5
RP	Research Project	10
<b>3. Semester</b>		
MAA	Master Thesis	
KOLL	Colloquium / Final Presentation	3
offered in both Semester		

No ULP

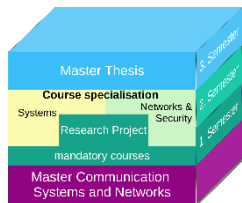
No ULP

No ULP

No ULP

Start →  
winter term

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



# Specialisation courses

Communication Systems course specialisation modules (choose 4 out of n)		Language	Site	Semester
M.ACC	Advanced Channel Coding	E	K	SS
M.SAE	Simulation of Accoustic Environments	E	K	WS
M.VAE	Virtual Acoustic Environment	E	K	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.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.SN	Servicemanagement in Netzen	G (E)	B-R-S	SS
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

E/G

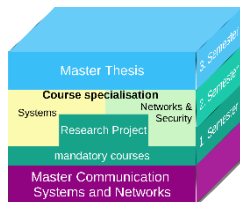
summer term: English, winter term: German

WS

winter term

SS

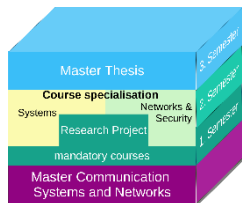
Summer term





## Curriculum

Module-ID	Module Name	Credits
<b>1. Semester</b>		
HIM	Advanced Mathematics (In English) <b>mandatory</b>	5
BSN	Basics on Systems and Networks <b>mandatory</b>	5
PFM1	Profile Module 1 (3) of the corresponding specialisation	5
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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
<b>3. Semester</b>		
MAA	Master Thesis	
KOLL	Colloquium / Final Presentation	3
offered in both Semester		



## Specialisation courses

Communication Systems course specialisation 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	WS
M.ODUN	Optische u. drahtlose Übertragungsnetze	G (E)	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.DLA	Deep Machine Learning	E	K	WS
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.NGN	Next Generation Networks	E	K	SS

### Legend

E: English	K: Cologne
G: German	B-R-S: St. Augustin
E/G	summer term: English, winter term: German
WS	winter term
SS	Summer term

# Modules of the MA CSN

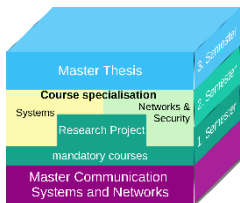
- ▶ The modules descriptions can be found in the WWW under <http://www.mcsn.de/> and then under the category **For Students**

- ✓ TH Köln follow the link

[http://f07-studieninfo.web.th-koeln.de/f07\\_handbuecher\\_2020/html\\_pdf/SgVerzeichnis.html](http://f07-studieninfo.web.th-koeln.de/f07_handbuecher_2020/html_pdf/SgVerzeichnis.html)

- ✓ H Bonn-Rhein-Sieg follow the link

[http://live-inf.h-brs.de/Aktuelles\\_Semester\\_MCSN.html](http://live-inf.h-brs.de/Aktuelles_Semester_MCSN.html)



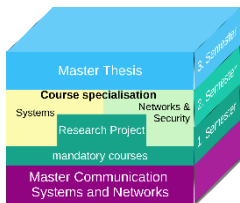
# E-Learning MA CSN

- Professors from TH Cologne will do Online lectures via ZOOM and will present course material and latest information in the E-Learning platform **ILIAS** of TH Cologne

See: <https://ilias.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!



Monday

Tag	Std	Zeit	MACSN			
Mo	1	8:00			Oberheide	PLET
Mo	2	8:50			ZO 6-1	S
Mo	3	9:45			Oberheide	PLET
Mo	4	10:35			ZO 6-1	S
Mo	5	11:30			Oberheide	PLET
Mo	6	12:20			ZO 6-1	S
Mo	7	13:15			Knospe	V
Mo	8	14:05			KRY	V
Mo	9	15:00			ZO 6-8	Ü
Mo	10	15:50	S	P	P	
Mo	11	16:45	Erkan	Grebe	Knospe	
Mo	12	17:35	PM	NGN	KRY	
Mo	13	18:30	ZO 6-8	ZO 8-7	ZO 6-10	
Mo	14	19:20				
Di	1	8:00				
Di	2	8:50				
Di	3	9:45	Kronberger	BSN	Elders-Boll	BSN
Di	4	10:35	ZO 6-8	V	ZO 6-8	V
Di	5	11:30	Kronberger	BSN	Dettmar	BSN
Di	6	12:20	ZO 6-8	Ü	ZO 6-8	Ü
Di	7	13:15				
Di	8	14:05	P			
Di	9	15:00	Dettmar			
Di	10	15:50	ACC			
Di	11	16:45	ZW 7-2			

Wednesday

Mi	4	10:35				
Mi	5	11:30	Kronberger	RFSD	V	ZW 6-1
Mi	6	12:20	Kronberger	RFSD	V	ZW 6-1
Mi	7	13:15	Kronberger	RFSD		
Mi	8	14:05	ZW 6-1	Ü		
Mi	9	15:00			Ladriere	GR
Mi	10	15:50			ZO 6-1	V
Mi	11	16:45	Seidel	CCNA3-4	Ladriere	GR
Mi	12	17:35	ZW 8-3	P	ZO 6-1	S
Mi	13	18:30	Seidel	CCNA3-4		
Mi	14	19:20	ZW 8-3	P		

Tuesday

Thursday

Do	4	10:35				
Do	5	11:30	Rhein	HIM	V	ZW 8-3
Do	6	12:20	Rhein	HIM	V	ZW 8-3
Do	7	13:15	Rhein	HIM	S	ZW 8-3
Do	8	14:05	Rhein	HIM	S	ZW 8-3
Do	9	15:00			Grebe	V
Do	10	15:50			NGN	V
Do	11	16:45			ZO 8-6	Ü
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	Pörschmann	V		
Fr	4	10:35	VAE	V		
Fr	5	11:30	ZW 8-3	Ü		
Fr	6	12:20	Dettmar	V		
Fr	7	13:15	ACC	V		
Fr	8	14:05	ZW 6-1	Ü		
Fr	9	15:00			Erkan	PM
Fr	10	15:50			ZO 6-8	V
Fr	11	16:45			Erkan	PM
Fr	12	17:35			ZO 6-8	V

V: Lecture Ü: Excercises P: LabWork



Further information about the lecture time schedule:

[https://ilias.th-koeln.de/ilias.php?ref\\_id=911719&cmd=render&cmdClass=ilrepositorygui&cmdNode=wc&baseClass=ilRepositoryGUI](https://ilias.th-koeln.de/ilias.php?ref_id=911719&cmd=render&cmdClass=ilrepositorygui&cmdNode=wc&baseClass=ilRepositoryGUI)

# Information about courses in SS

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

[https://ilias.th-koeln.de/goto.php?target=cat\\_62623&client\\_id=ILIAS\\_FH\\_Koeln](https://ilias.th-koeln.de/goto.php?target=cat_62623&client_id=ILIAS_FH_Koeln)

- BSN (**Profs. Dettmar** / Elders-Boll /Kronberger)

Online Tue, 19. March, 09.45

<https://th-koeln.zoom.us/j/88593028014> Meeting ID: 822 4068 5445 Passcode: BSN\_2022

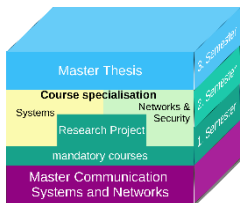
- HIM Advanced Mathematics (**Prof. Rhein**)

**English language only summer term!**

First lecture, Thurs., March 21, 11.30

- NGN Next Generation Networks (**Prof. Grebe**)

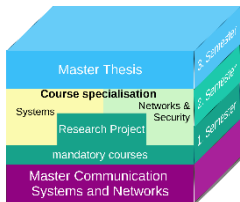
First lecture, Thur., March 21, 15.00





# Information about courses at TH-K (summer term)

- **KRY Cryptography (Prof. Knospe)**  
First lecture: online, Monday., March 18, 13.15,  
(mandatory course for IT-Security in winter term!)
- **VAE Virtual Acoustic Environments (Prof. Pörschmann)**  
First lecture, Friday, 22. March, 09.45
- **ACC Advanced Channel Coding (Prof. Dettmar)**  
First lecture, Friday, 22. March, 12.20
- **RFSD Radio Frequency System Design (Prof. Kronberger)**  
First lecture, Wednesday 20 March, 11.30
- **PM Project Management (English, Dr. Erkan)**  
(register course in **Prof. Dettmar**)  
First lecture, Friday 12. April 16.30  
**Attention:** You have to register in ULP-PSSO



## Timetable of Semester MKSN

**Semester:** Sommersemester 2024, **Calendar Weeks:** 15-28, **Weekdays:** Monday-Sunday, **As of:** 2024-03-18 13:20:10

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

	from	until	Room	Activity	Period	Who
Tu	10:45	12:15	St-C120	Kommunikation in verteilten Systemen (V)	09.04.2024-09.07.2024 (KW 15-28)	Rademacher
	13:30	15:00	St-C120	Kommunikation in verteilten Systemen (Ü/P)	09.04.2024-09.07.2024 (KW 15-28)	Rademacher
Th	9:00	10:30	St-B062	Optische und drahtlose Übertragungsetze (V)	11.04.2024-11.07.2024 (KW 15-28)	Uhde
	10:45	12:15	St-B062	Optische und drahtlose Übertragungsetze (Ü)	11.04.2024-11.07.2024 (KW 15-28)	Uhde

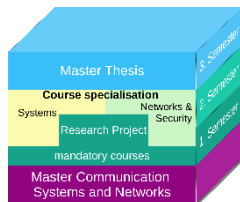
(KW = Kalenderwoche, gKW = even calendar weeks, uKW = odd calendar weeks)

Further information about the lecture time schedule:

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

For course registration: <http://register.inf.h-brs.de/>

 mandatory!



# 2 Double Degree Programs with Spanish Universities

- **Double Degree Universitat Politècnica de València (UPV)**
- **Double Degree Universidad Politécnica de Madrid (UPM) (new!)**

Join the program and spend one semester in Spain! Then you will get:

*“Master of Science in Communication Systems and Networks”* THK

and

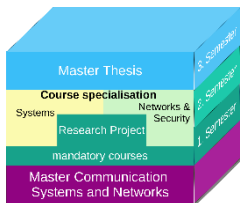
“Master in Telecommunication Technologies, Systems and Networks” UPV

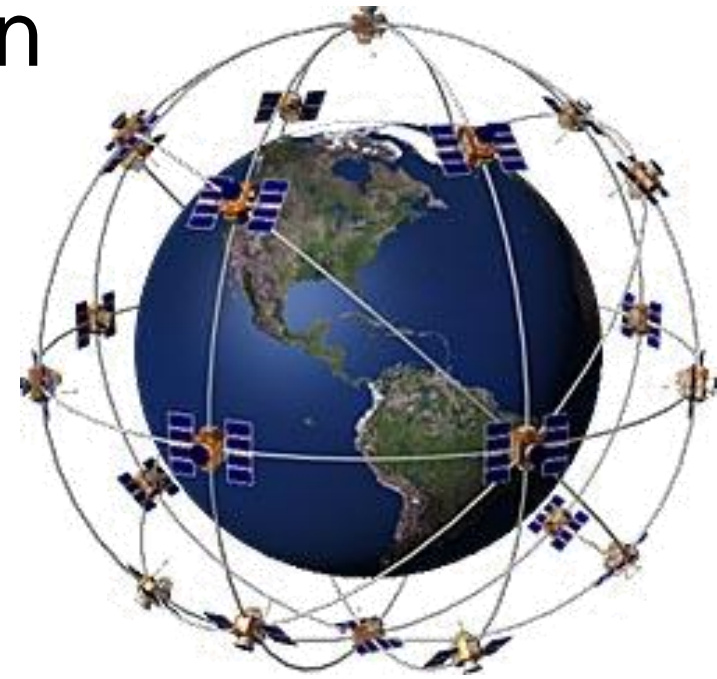
or

“Master Internet of Things” UPM

More Information:

[https://www.th-koeln.de/en/international\\_office/double-degree-communication-systems-and-networks-master\\_102989.php](https://www.th-koeln.de/en/international_office/double-degree-communication-systems-and-networks-master_102989.php)





## 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

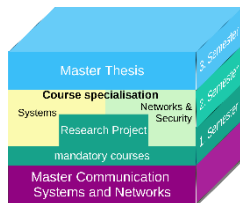
### 8. Floor

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

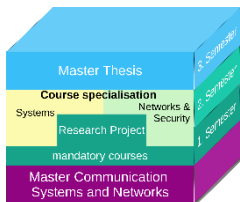




# Important Information about Research Project

**Fakultät 07 Informations-, Medien- und Elektrotechnik**

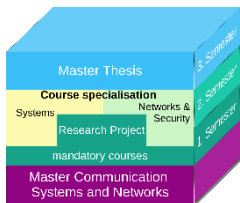
**Prof. Rainer Kronberger**





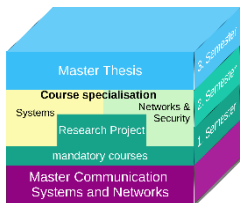
## Important Facts

- **10 ECTS / 300h workload**
- **1<sup>st</sup> and/or 2<sup>nd</sup> 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 !****



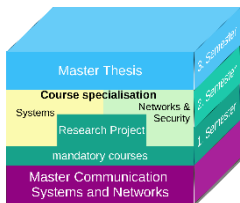
# What is a Research Project?

- **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



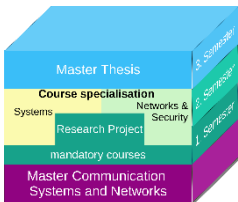
# Time, work schedule and evaluation(1)

- 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

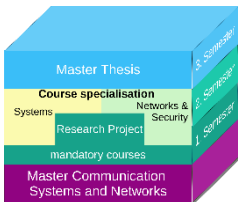


# Course Registration - Exam Registration

- 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 withdrawl 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**

