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Identification of interchangeable modules and lectures

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Executive Summary

NEXWAY has an important educational dimension, realised and supported with the help of well-known educators and scientists within the consortium. One of the activities is the creation of a **platform** to give students easy access to European Master's Programmes and Lectures from continuous education programmes in Wireless communications with the best qualifications. This platform is open to other actors and participants.

The aims of this educational platform are:

- On the one hand, to respond to the continuously changing demands from industry for professionals with specific skills in wireless communications, and,

- On the other hand, to give students who would like to improve their curriculum access to the programmes and lectures with the best qualifications

The platform consists currently of two parts:

- This report

- An on-line database of collected Courses/ Lectures and Master Programmes

This report first of all describes the methodology used for building an educational platform in wireless communications.

A *model curriculum* for a Master of Science is drafted to guide the introduction of Master Programmes in the area of "Wireless and Mobile Communications" in agreement with the Bologna agreement. As the identified curriculum should meet the requirements for training and education in enterprises, a survey was made involving people with specific knowledge from industry.

To best meet different requirements identified, two master programmes are proposed:

- _Bologna Wireless Master_: a two year programme aimed at students who have already obtained a 3 or 4 years degree (equivalent to a bachelor).

- _European Wireless Master_: one year highly specialized programme targeted at graduate students who have already obtained the Bologna Wireless Master or a comparable 5 years degree.

The Annexes to this report include:

- The List of collected Courses/ Lectures

- The List of collected Master Programmes

- The questionnaire used to get industry points of view

The collection of information included the EU as well as the Newly Associated States.

The presented platform can be directly applied by other European initiatives. It is further envisaged that its model be used in other technical fields with minimal modifications. The project NEXWAY contributes with its activities to the implementation of the provisions of the Bologna Agreement.

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Introduction

The educational dimension of NEXWAY is being realised and supported with the help of well-known educators and scientists within the consortium, who will contribute lectures with the participation of additional invited experts. One of the objectives is to create a platform where students will have easy access to the best qualified European Master's Programmes and lectures from continuous education programmes in Wireless communications. This platform is open to other actors and participants and is directly applicable by other European Organisations. It is even envisaged to be used in other technical fields with hopefully minimal modifications. The project NEXWAY contributes with its activities to the implementation of the provisions of the Bologna Agreement.

Chapter 2 describes the methodology of building an educational platform in wireless communications. In the following chapter 3 a model curriculum for a Master of Science is drafted to guide the introduction of Master Programs in the area of "Wireless and Mobile Communications" in agreement with Bologna agreement. The identified curriculum should meet the requirements for training and education in enterprises. A study of requirements of specific knowledge for organisations and institutes is vital in identifying interchangeable modules and lecture in the field of Wireless communication. For this purpose, survey of people with specific knowledge industries are lacking or that they would need in the near future was done. Chapter 4 specifies how the survey was done and the result and the analysis of that survey.

Annex includes a collection of information about existing Master's Programmes and courses within the EU and also questionnaire for industry point of view.

Methodology

General introduction

The purpose of this section of the delivery document is to describe the methodology of building a common educational platform in wireless communications in Europe; that can be later directly applicable by other European Organizations and in other technical fields with hopefully minimal modifications. This is going to be carried out by identifying the key elements of the common Masters platform: the essential common courses across Europe, also including leading edge courses in emerging areas, other additional courses that might be important for the future and how to ensure a common standard level across Europe.

Some of the key points, which have to be taken into account in a general methodology, are the following:

➢ Characteristics of the students.

➢ Objectives.

➢ The context.

➢ Availability of means and facilities.

➢ Specialties of the educators (lecturers, professors and experts from industry).

Characteristics of the students

This is related to the type of people who are going to attend the education program. They can be engineers, or more general, people coming from technical university education graduate or under-graduate, or those who are already working for a company and need to learn about a specific topic. This will have an important influence in the time availability of them and therefore in the program organization. Due to these characteristics we propose to make a distinction between two master programmes:

Bologna Wireless Master : two years programme aimed at students who have already obtained a 3 or 4 years degree (equivalent to a bachelor).

European Wireless Master : one year highly specialized programme addressed to graduate students, as those who have already passed the Bologna Wireless Master or with a related 5 years degree.

Objectives

In one hand, the aim of the education platform is to respond to the continuously changing demands from industry on professionals with skills about a specific topic, such as wireless communications and in the other hand, is to give access to the best qualified programs and lectures to students which would like to learn about this topic, in order to improve their curriculum.

Context

This refers to the current situation of industry and more specifically, what is being asked of the professionals on the subject the platform is going to deal with and the knowledge that potential attendance has about it.

Availability of means and facilities:

In this case it will have to be taken into account what is the technical equipment that could be used, the possibility of creating and maintaining a virtual campus in the case that e-learning would be considered, the places where classes and lectures could take place, the money that could be set aside to improve the current quality of these resources.

Specialities of the educators (lecturers, professors and experts from industry):

Here it will be considered the possibility of incorporating experts coming from industry and research centres, added to full professors and lecturers from Universities and Technical schools in the case of the European Wireless Master. Obviously the competence of all of them has to be proved. The Bologna Wireless Master will be offered by different European universities and if possible should incorporate collaboration with research centres and/or wireless industries for students to develop their Master Thesis in them.

Bearing in mind all of these factors, two models of programme are proposed here for satisfying different type of potential attendance needs:

> ➢ **Bologna Wireless Master**: a sort of guide based on traditional university education, following the Bologna declaration model applied to wireless communications, for university students after obtaining a three or four years degree.

> ➢ **European Wireless Master**: a programme aimed at industry professionals who want to retrain or to learn about wireless technologies and that could be supported by a group of Universities, industries and research centres.

In this way the platform should come up to current industry demands on recently graduated students and professionals.

European Educational Platform In Wireless Communications

Motivations and Overview

The growth rate of wireless technology has been extraordinary during the last decade and the next phase will no doubt be devoted to the development of broadband access systems. Wireless communications will increasingly be used as the method of choice for accessing the Internet. We will also see a growth in dedicated wireless networks providing communication within specific sets of users. The phenomenal growth in mobile communication over the last decade or so has been made possible by impressive advances in wireless technology. The mobile phone systems are flexible and relatively cheap compared to fixed cable systems. Also, provisioning is fast – new users can be added in a matter of minutes.

However, it is also a fact that continued growth of both stationary and mobile wireless systems is currently hampered by problems related to capacity, quality of service, and security. Hence, major challenges on the road ahead are associated with a more efficient use of available resources, including an increase of the bit rate per frequency unit, means of reusing frequencies, utilization of new frequency bands, the introduction of quality of service adaptability, and improved security.

Even if the growth cannot remain exponential, there is still an urgent need for improved communications in large parts of the world. Fixed telecom systems will continue to play an important role, but wireless technology is the only way to build an infrastructure quickly and inexpensively in many countries. This will have a profound impact on social and economic development for many years to come.

This fast growth of wireless communication systems gave rise to a huge support infrastructure. Further developments in the domain of wideband systems are expected to sustain the expansion of this segment of the telecommunication and electronic market, linking it more closely to the world of data communication and Internet. Up to now, for the man on the street, wireless has meant cellular mobile phones used for speech and short text messages. The evolution is now to expand the parameter space in cell size, bit rate, range, etc. Wireless will then cover every part of a wide spectrum, ranging from wideband communications in a small cell up to global satellite systems. High bandwidth video and data will now be possible to transfer, enabling many new applications.

In the next future, a substantial amount of skilled personnel will be engaged in running wireless systems both at a network level and in the maintenance and organization of field apparatuses. At the same time, short time-to-market is becoming a must for companies engaged in the development and design of wireless system hardware, which requires advanced skills in terms of analog and digital design, but also a broad vision of all problems related to the wireless world at large. The openings for new technical positions are expected to undergo a substantial growth not only in Europe and in the United States, but also in other areas, like Latin America and Far East, where and exponential development in the wireless market has already begun.

Bologna Wireless Master: **Programme For University Education Pursuing The Bologna Declaration Purposes**

The Bologna Declaration is a pledge by 29 countries to reform the structures of their education systems in a convergent way. The fundamental principles of autonomy and diversity are respected. The Declaration recognises the value of coordinated reforms, compatible systems and common action.

The action programme set out in the Declaration is based on a clearly defined common goal, a deadline and a set of specified objectives:

➢ A clearly defined common goal: to create a European space for higher education in order to enhance the employability and mobility of citizens and to increase the international competitiveness of European higher education;

➢ A deadline: the European space for higher education should be completed in 2010;

➢ A set of specified objectives:

- The adoption of a common framework of readable and comparable degrees, "also through the implementation of the Diploma Supplement";

- The introduction of undergraduate and postgraduate levels in all countries, with first degrees no shorter than 3 years and relevant to the labour market;

- ECTS-compatible credit systems also covering lifelong learning activities;

- A European dimension in quality assurance, with comparable criteria and methods;

- The elimination of remaining obstacles to the free mobility of students (as well as trainees and graduates) and teachers (as well as researchers and higher education administrators).

Individual universities as well as higher education consortia, networks and associations are studying and discussing the implications of the Bologna process in their particular country, subject area, or type of institution. For the purpose of the educational platform in wireless two of these points are very important:

1. Adoption of a system essentially based on two main cycles, undergraduate and graduate. Access to the second cycle shall require successful completion of first cycle studies, lasting a minimum of three years. The degree awarded after the first cycle shall also be relevant to the European labour market as an appropriate level of qualification. The second cycle should lead to the master and/or doctorate degree as in many European countries.

2. Establishment of a system of credits - such as the ECTS (European Credit Transfer System) - as a proper means of promoting the most widespread student mobility. Credits could also be acquired in non-higher education contexts, including lifelong learning, provided they are recognised by the receiving universities concerned.

Taking all these elements into account a programme for a two years Master (120 ECTS credits) on wireless communications based on traditional university education is propose. ECTS system is suitable because credits involve not only teaching hours in a class, but also practical tuition, evaluation of personal work of the student at home, preparation of exams, etc.

Each European university imparts its own programme so students would obtain the Master degree from this specific university. The students can apply for the Master after obtaining a three years degree (equivalent to a bachelor degree). This previous education should give students a background in fundamental subjects to profitably follow the Master programme, guaranteed by a minimum number of ECTS credits completed:

- ➢ Mathematics, especially Fourier Transforms applied to signals and systems (6 ECTS credits).
- ➢ Stochastic Variables and Processes (4 ECTS credits) .
- ➢ Digital Modulations (6 ECTS credits).
- ➢ Communication Networks and Protocols (6 ECTS credits).
- ➢ Basics of analog and Digital Electronic Circuits (6 ECTS credits).
- ➢ Basics of Electromagnetic Wave Propagation (6 ECTS credits).
- ➢ Electrical measurement techniques (6 ECTS credits).
- ➢ Fundamentals of Radio propagation (6 ECTS credits).

The two years programme of the Master involves 120 ECTS credits and could be divided in four semesters of 30 ECTS credits.

The first year of the Master should be dedicated to core subjects related to wireless to a total of 60 ECTS credits:

- ➢ Mobile communications fundamentals (10 ECTS credits).

    Propagation, cellular systems, engineering of radio, point to point links, mobile communication systems architecture and functions, communications systems.

- ➢ Physical design of wireless communications (10 ECTS credits).

    Wireless RF and Microwave devices and technologies, antennas for wireless communications, architectures and circuits for wireless systems.

- ➢ Wireless systems overview (14 ECTS credits).

    Transmission over the wireless channel, digital communications, digital and adaptive signal processing, coding and modulation for wireless communications: CDMA and OFDM.

- ➢ Radio electrical access (14 ECTS credits).

    GSM, GPRS and UMTS systems, WLAN and WPAN (IEEE 802.11.x, IEEE 802.15.x, IEEE 802.16.x) (Bluetooth and WAP), Satellite communications.

- ➢ Wireless networking and services (12 ECTS credits).

    Telecommunications networks, mobile networks and evolution, Wireless networking: Architectures, protocols and standards, applications and services in mobile networks.

The second year of the Master to a total of 60 ECTS credits should be divided in a period dedicated to specific subjects giving priority to emerging areas and a final period devoted to the Master thesis. This final year could give rise to different specialities depending on each university resources (teaching staff and facilities). A model for a programme could be:

- ➢ Courses on emerging areas related to wireless (5 ECTS credits).
- ➢ Courses on legal, social and economical environments (5 ECTS credits).
- ➢ Elective courses for specialization lines (20 ECTS credits).

  Examples of specialities:

  - ▪ Wireless systems.
  - ▪ Networking.
  - ▪ Wireless applications and services.
  - ▪ Security in Wireless communications.
  - ▪ Wireless technologies.

- ➢ Master thesis according to the chosen speciality (30 ECTS credits).

If possible, the master thesis should be carried out in cooperation with industries and/or research centres in order to improve the students qualification and to facilitate their incorporation to the professional market.

Evaluation Criteria

Continuous evaluation through regular examinations, evaluation of the reports of the lab practice tuition and of the final Master Thesis on a real project developed in a research team, preferably in a company or research centre. The minimum pass mark should be established.

Distinction Mark

We suggest: excellent (9.50-10.00), very good (8.50-9.00), good (7.50-8.00), satisfactory (6.50-7.00), passing (5.50-6.00), fail (5.00 or less).

European Wireless Master: Programme for industry professionals for retraining in or learning about wireless communications

This Master should be a very specialized degree in Wireless communications and would be supported by several European Universities and Research centres, which will reach an agreement in order to validate the degree. That means NEXWAY members in our case.

A Steering committee will be created (or a General board should each of them have a representative) in order to manage tasks like teaching staff and students selection, programme approval, admission requirements, evaluation of students and educational staff, evaluation and update of the platform itself, etc.

A proposal is that students should have to register with only one of these universities and obtain the European Master in Wireless Communications degree from that university.

Audience

The programme is addressed to professionals in the field of Telecommunications, Computer studies and other engineering domains, who want to improve their knowledge, retrain in or learn about the most dynamic area of telecommunications, as well as graduate students who have completed a curriculum in Electronic engineering, Telecommunication engineering, Information technology or equivalent subjects.

Admission requirements

It is required to have completed a 5 year curriculum in Electronic engineering, Telecommunication engineering, Information technologies or equivalent subjects (minimum 270 ECTS credits) or another engineering or technical domain but with basic notions in communication theory and electronics. It would be highly recommended to have obtained the Bologna Wireless Master before applying for this programme.

Candidates should have good command of written and reasonable command of spoken English because all (or most) tuition and teaching material will be in English. For example it could be established that applicants not having English as their native tongue are required to have completed a TOELF language test with minimum score 550 (213, computer-based) or an IELTS test with minimum score 5.5. In addition we have though about admission prerequisites: candidates should have a background in some key areas by having completed minimum ECTS credits on them.

Cultural prerequisites

To profitably follow the Master program, candidates should have a background in the following areas, guaranteed by a minimum number of ECTS credits completed:

- Fourier Transforms applied to signals and systems (6 ECTS credits).
- Stochastic Variables and Processes (4 ECTS credits).
- Digital Modulations (6 ECTS credits).
- Communication Networks and Protocols (6 ECTS credits).
- Analog and Digital Electronic Circuits (6 ECTS credits).
- Electromagnetic Wave Propagation (6 ECTS credits).
- Electrical measurement techniques (6 ECTS credits).
- Radio propagation (6 ECTS credits).

- First and second generation systems (6 ECTS credits).
- Digital signal processing (3 ECTS credits).
- Coding and modulation for Wireless communications (3 ECTS credits).
- Basics of antennas for Wireless communications (3 ECTS credits).
- Fundamentals of Wireless networking (3 ECTS credits).

A lack of background in one or two of the above areas is considered acceptable, in the sense that the student can make up for it before or during the Master. A lack in three items is critical and may prevent the student from earning the final Master degree. A lack in four or more items should discourage application.

Student Selection Criteria

It should be carried out by the Committee based on marks, C.V, or they can be proposed by the companies they are working for.

Program General Objectives

Preparing the program:

Selection of the best courses which can be previously searched and organized on a data base (as we have done for wireless communications), according to a good coverage of the key topics taking into account the objectives and the context which tells us what industry is asking of people in this technical field. This is obviously related to the type of teaching and a careful scheduling has to be done.

The programme is designed to give the audience a structured framework in which all the necessary subjects for being a highly qualified professional in wireless communications area are integrated. It offers a wide-ranging overview of traditional and digital wireless communications, including third generation systems, explores signal/data processing, physical design, and high-level operation, performance, standards, and control of wireless communications systems.

The current mobile networks systems will be studied in detail: the new data network GPRS, which will give rise to a faster integration of internet and telephone world, and technologies that are in a development stage: WLAN, WAP, Bluetooth, and the new communication system UMTS, which prompt deployment will make possible multimedia mobile communications at much higher rates than current ones in GSM and GPRS and will play a dominant role in next years mobile communications market. Aspects of satellite communications will be studied, such as on-board processing and DVB-RCS and future updates of the master programme will incorporate 4G topics. Within this framework, applications development and specific contents for mobile environments are obtaining much more importance each time and for this reason and for their future growing prospects, they will be given a great importance in this programme. On the other hand, fixed and mobile systems convergence lead us to give to the students the necessary skills in order to manage with fixed networks.

The programme contents are mainly technological but there is a place for courses related to mobile communications operation and business so as to give students a wider and more

complete vision of this area. This Master in Wireless communications is an effective answer to the work market demands in terms of high-level technicians endowed with a broad vision of the wireless world but also with specific skills.

Type of Tuition

This should be decided by the Committee taking into account the current resources and facilities but also the limited time availability of professional attendance. It can be traditional teaching on a university class, e-learning based on a virtual campus or it can be a combination of both. If presence in a class is requested it is clear that the same course may have to be given in several locations with the same program. On the other hand, a course is given only in a location with the use of videoconference could be an option, but here a standard videoconference system should be proposed (and this can be difficult to implement); and the duration of the classes shouldn't be very long because of the tiredness that the use of videoconference produces on attendance.

For the practice tuition, tutors should be assigned by the Committee in order to assure a common level.

Looking at current and near future situations, it is clear that e-learning should be stressed and it would be very positive for a common European Master degree on Wireless creating a common virtual campus supported by all of the Universities in the Committee. Also, this would facilitate professionals to follow the theoretical contents of the courses at any time, so they will have a fixed timetable just for practical tuition and we should even think about virtual labs for total time flexibility.

Teaching staff selection criteria: it will be necessary to choose about university professors, industry experts or both of them. The selection will be done taking into account their publications and successful projects on the topic.

Course Schedule

The Master duration is three semesters. The programme includes 90 ECTS credits overall, 60 ECTS credits corresponding to courses including practical tuition in a specifically equipped laboratory and 30 ECTS credits corresponding to a Master Thesis project including a stage in a research centre or company operating in the field of wireless communications. The programme is structured into two semesters dedicated to courses plus one semester devoted to Master Thesis.

Number of Students

The Committee should collect proposals from industry and research centres for candidates performing their final Master Thesis and establish the total number of vacancies to fulfil them.

Resources

A minimum set of resources has to be established for courses, practice tuition and Master Thesis.

Course Contents

The wireless communications Master program can be viewed as four different profiles:

- Radio-communications **(18 ECTS credits).**
- Wireless networking and services **(18 ECTS credits).**
- Security in wireless communications **(6 ECTS credits).**
- Legal, Social and Economical environments **(6 ECTS credits).**

In addition to this, there should be elective courses (6 ECTS credits) and courses related to emerging areas (6 ECTS credits).

The courses can be grouped into one or more of these different areas and the course schedules will be coordinated to minimize course schedule conflicts within a profile.

➢ Radiocommunications

Mobile communications fundamentals. The courses are:

- Propagation: coverage and multi-path mobile channel.
- Cellular systems.
- Engineering of radio.
- Point to point links.
- Channel codification.
- Mobile communication systems architecture and functions.
- Managers of the radio resources, location and communications.
- Communications systems.

➢ Physical Design Of Wireless Communications

Objectives for this area:

Extends students understanding of physical design of wireless communication systems, emphasizing transmitter and receiver sections. They cover the design of directional, steerable antennas. The study of carrier frequencies in wireless systems that will lead them to appreciate semiconductor and other technologies. They review signal bandwidth to familiarize themselves with packaging of **transmitter and** receiver ends. They will understand difficulties in realizing high-accuracy analog/digital conversions at multi-GHz frequencies, allowing them to appreciate the need for analog circuitry. They will investigate analog/digital conversions at high sampling rates for digital processing at a receiver's front end, permitting the possible introduction of many new techniques. They discover that when front-end digital signal processing cannot be achieved, digital processing is employed at intermediate frequencies. They will understand contemporary digital signal processor technology by considering performance limitations of technologies and architectures.

The courses are:

- Wireless RF and Microwave devices and technologies.

- RF microelectronics for wireless systems.

- Antennas for wireless communications.

- Architectures and circuits for wireless systems.

➢ Wireless Systems Overview

Objectives for this area:

Students are introduced to technologies and applications of wireless communication systems, leading to an appreciation of technical issues at a modest depth. They explore the physics of wave generation, propagation and reception, continuing onto circuits and components. Learn about signal processing as well as techniques employed to impress voice and data information on a wireless channel. Receive an overview of representative applications in current- and next-generation systems. Study E&M waves, transmitters and receivers (analog sections, assuming coded data), cellular wireless systems for mobile communications, cellular LANs for data communications, satellite communications systems, and digital signal processing for wireless data networks. Covers fundamentals of digital communication that have emerged as the basis for many techniques employed in the generation of spread spectrum waveform. These include pseudo-random codes, modulation and demodulation techniques, synchronization, statistical distributions, direct sequence (DS) and frequency hopping (FH) spread spectrum, and capacity calculation for a CDMA system. Gain an overview of wireless architecture, spread spectrum communication, statistical distributions used in wireless communication, design of optimum receivers, calculation of theoretical capacity of a CDMA system, coding and decoding processes in CDMA, effects of co-channel interference in CDMA, and synchronization in CDMA wireless communication systems. Students also study 3G wireless systems using CDMA technologies.

The courses are:

- Transmission over the wireless channel.

- Digital communications.

- Digital and adaptive signal processing.

- Coding and modulation for wireless communications : CDMA and OFDM.

- Engineering software for wireless systems development.

- Radio Electrical Access.

  - GSM and GPRS systems.

  - UMTS systems.

  - WLAN and WPAN (IEEE 802.11.x, IEEE 802.15.x, IEEE 802.16) (Bluetooth, DAB, DVB-H and WAP).

  - Satellite communications and navigation.

➢ Wireless Networking And Services

Objectives for this area:

Addresses fundamentals of wireless networking, including architectures, protocols, and standards. Learn concepts, technology and applications of wireless networking in current and next-generation wireless networks. Understand engineering aspects of network functions and designs. Students will appreciate the concepts of mobility management, wireless enterprise networks, GSM, network signalling, WAP, mobile IP, and 3G systems.

The courses are:

- Telecommunications networks.
- Mobile networks and evolution.
- Wireless networking: Architectures, protocols and standards.
- Applications and services in mobile networks.
- Signalling and intelligent networks.
- Data networks and GPRS.
- Mobile-IP.
- Location-based services.

> Security In Wireless Communications
- Information, privacy and security in wireless systems.
- Introduction to cryptography.
- Computer security.
- Security in distributed systems.

> Legal, Social and Economical Environments
- Introduction to the mobile communications field.
- Human resources: generalities.
- Economical manage: generalities.
- Network infrastructure economics
  - Investment management.
  - Global telecommunications competition.
  - Product management.
  - Manufacture industry marketing.
  - Company organization.

> Elective Courses
- Radar and remote sensing.

- Design of Microwave monolithic integrated circuits.
- Opto-Electronics.

➢ Courses In Emerging Areas

According to information obtained by making enquiries to companies a package of courses in emerging areas would be offered. For example good example could be:

- Smart/MIMO antennas systems.
- Mobile computing.
- Interoperability.
- Terminal management/configurability.
- New Air interfaces, Integration of UMTS/WLAN/Broadcasting/Short range/Satellite, Ad-hoc and security.
- Software development technologies.
- UWB.

➢ Programme For Practice In Laboratory

This should be organized and specified according to the theoretical courses as a complement of them and depending on the available resources.

➢ Projects Program For Master Thesis

Some of the current key subjects Master Thesis could be about are:

- Planning.
- Network dimensioning.
- Development of applications for a mobile communications environment.
- Development of Wireless systems.
- Signal processing algorithms.

➢ Lectures

For example.

- Manufacturers Vision

Commercial products presentation by leader companies in mobile communications field.

- Satellite Communications.

➢ Round Tables

For example two or three round tables about mobile communications and their social and economical implications would be organized and experts would be invited.

Evaluation Criteria

1. Evaluation Of The Students

   Continuous evaluation through regular examinations, evaluation of the reports of the lab practice tuition and of the final Master Thesis on a real project developed in a research team, in a company or research centre. The minimum pass mark should be established.

2. Evaluation Of The Teaching Staff

   Making questions about it to the students be means of tests, supervising their courses contents.

3. Evaluation Of The Educational Platform Itself

   This has to be done periodically and preferably being helped or supervised by someone else external to the platform. It has to do with the opinion that industry has about the professionals that had been trained in these courses.

4. Updating The Platform

   Related to what else or what new things are companies demanding on this topic. Changing the program taking these things into account, as well as the information obtained from the evaluation of the students and the teaching staff, in order to successfully achieve the objectives fixed for the platform.

5. Distinction Mark

   We suggest: excellent (9.50-10.00), very good (8.50-9.00), good (7.50-8.00), satisfactory (6.50-7.00), passing (5.50-6.00), fail (5.00 or less).

   Specify several industry prizes: Given by prestigious wireless companies.

Course Fee And Financial Support

The regular tuition fee should be established. Financial support should be given under the form of grants, fully covering tuition fees and possibly providing partial support for other expenses.

How To Apply

For example, a web page about the Master containing information and links for applying should be created.

Wireless Skills Set and Curricular

In the following a model curriculum for a Master of Science is drafted to guide the introduction of Master Programs in the area of "Wireless and Mobile Communications" in agreement with the Bologna agreement. The Bologna Declaration is a pledge by 29 countries to reform the structures of their higher education systems in a convergent way

(http://europa.eu.int/comm/education/programmes/socrates/erasmus/guide/bologna.pdf).

Goal of the Bologna agreement among others is "the creation of master courses meeting the needs of mobile postgraduate students from around the world".

From this a number of requirements result:

- International Master Program (English as the main language to simplify mobility and exchange of scientific work)

- Unified credit system (ECTS: European Credit Transfer System)

- Description of content, quality and learning outcomes

The duration of a Master program is only defined within certain limits in the Bologna agreement. There is a trend to have a total of 300 ECTS including the first level degree and the Master degree, which in practice usually corresponds to 5 years full-time studies. The Master degree usually consists of 90-120 ECTS (60 as the absolute minimum). As "Wireless and Mobile Communications" is a very demanding scientific area with many new developments a program with 120 ECTS and a duration of 2 years is proposed here. It is structured as a 2 semester per year program, which can be adapted to other structures.

If the master course is taken as an advanced study program it can be completed within the minimum of one year, if the applicant has a previous master degree (or an equivalent degree) which includes the equivalent of the first year courses. The exact procedure of recognition of the courses has to be evaluated individually.

The curriculum introduced here can also be used as the basis for the development of a joint Master program between the participants of the project or other interested parties.

One starting point of the curriculum is the competence matrix developed within the project.

The curriculum is based on the objective to qualify an engineer for all areas of the topic. Other curricula can be derived from this curriculum which give more emphasis, e.g. on RF engineering. The goal here is to offer opportunities for the student to acquire basic knowledge and skills related to all communication layers, from the physical layer to the application layer. A certain specialization is given through the project and the Master thesis.

The curriculum should be seen as a certain profile which can be enriched by offering a multitude of elective courses. An overview of such courses can be gained by evaluating the database on Master courses compiled by this project (see Annex).

Each course should have a list of acronyms and main terms. In case that the local language is not English, it is good practice to give an equivalent term in the local language.

Model Curriculum Master program "Mobile and Wireless Communications"

1st Semester	ECTS	
Electrodynamics	4	
System Theory	4	
Communications Technology 1	4	
Microwave Engineering 1	4	
Semiconductor Devices	4	
Digital Signal Processing	4	
Communication Networks 1	4	
Socio-Economic Aspects of Wireless Communications	3	
2nd Semester		
Channel Coding	4	
Communication Networks 2	4	
Microwave Engineering 2	4	
Communications Technology 2	4	
RF-Front-End Devices and Circuits for Wireless Communication	4	
Next Generation Mobile Systems	4	
Network Planning	3	
Microwave Lab	3	
3rd Semester		
Stochastic Simulation of Mobile and Wireless Networks	4	
Next Generation Wireless Local Area Networks	4	
Wireless Network Protocol Software Design	4	
Seminar (New and Emerging Areas)	2	
Communications Lab	3	
Project	12	
4th Semester		
Master Thesis	30	
Sum	**120**	

The given curriculum is a sample, where some of the courses can be substituted by other elective technical or in one or two cases by non-technical courses, e.g. patent law or project management.

The following gives an overview of each course by listing the main keywords.

➢ Electrodynamics

Vector analysis, Maxwell equations, plane waves in uniform media, harmonic plane waves in waveguides and transmission lines, electrodynamic potentials

➢ System Theory

Signals, systems, models; linear time-invariant systems (time domain), Laplace transform, continuous systems (frequency domain), z-transform, discrete systems (frequency domain), Fourier transform

➢ Microwave Engineering 1+2

Line theory, TEM types of waves, reflection factor, Smith diagram, slotted line, line transformers, matching circuits, scattering matrix, passive HF elements, coupled lines, directional coupler, plane waves, Poynting vector, polarisation, theory of waveguides, rectangular/circular waveguides, theory of antennas, dipole, wire antennas, group antennas, aperture antennas, numerical methods, finite differences method, orthogonal series expansion, method of moments

➢ Microwave Lab

Slotted line, network analyzer, waveguide filter design with mode-matching CAD-Software, finite differences method, antennas, …

➢ Communications Technology 1+2

Stochastic processes, principles of digital transmission (data signal spectrum, Nyquist criterion, partial response coding, matched filter, bit error probabilities); digital modulation / demodulation of digital signals (coherent demodulation, incoherent demodulation, time synchronization, optimal receiver, receiver structures, optimal AWGN receiver, symbol/bit error probability), equalization, (linear equalization, feedback, adaptive equalization); transmission under inter-symbol interference conditions (maximum likelihood estimation, Viterbi-algorithm, error probability, channel estimation); mobile radio channels (multi path propagation, Doppler influence); mobile radio concepts (OFDM, CDMA, Rake receiver, GSM)

➢ Digital Signal Processing

Filtering, recursive filters [canonical structures, design of recursive filters, special types of recursive filters, quantization effects], non-recursive filters [FIR-systems, systems with linear phase, complex valued FIR-systems], discrete Fourier transform [definition, properties, relations with other, transforms, Fast Fourier Transform (FFT), fast convolution], including e.g., Matlab exercises

➢ Channel Coding

General principles of channel coding, structure of digital communication systems, channel models, survey of information theory, probabilities, entropy, Shannon's channel capacity, linear block codes, distance properties, principle decoding strategies, matrix description of block codes, cyclic codes, BCH and Reed-Solomon codes, convolutional codes, structure,

algebraic and graphical description, distance properties, decoding by Viterbi algorithm, channel coding applications

➢ Communications Lab

digital modulation, A/D and D/A converters, Viterbi Algorithm, OFDM, WLAN measurements, handover simulations, …

➢ Communication Networks 1+2

Distributed Systems, ISO/OSI 7 Layer Reference Model for Open Communication, Formal Specification Methods for Protocols (e.g., SDL), Data Link Layer (e.g., HDLC, Aloha, Slotted Aloha, CSMA/CA, CSMA/CD), Network Layer (IP), Transport Layer (TCP, UDP), Application Oriented Layers, Local Area Networks, Wide Area Networks, Telecommunication Networks, Network Control: (virtual) connections, Routing, Addressing, Flow Control, System Examples, e.g. ISDN / B-ISDN / ATM, Performance Analysis

➢ Stochastic Simulation of Mobile and Wireless Networks

Simulation principles, random number generators, statistical evaluation methods, simulation languages and systems, simulation examples, e.g., Aloha protocols, WLAN simulator.

➢ Next Generation Mobile Systems

Second Generation Mobile Systems, e.g., GSM, GPRS; Universal Mobile Telecommunication System (UMTS) and B3G systems

➢ Next Generation Wireless Local Area Networks

Wireless Local Area Networks (WLAN); Standard Family IEEE802.x; OFDM; HIPERLAN/2 Standard (main focus); Comparison HIPERLAN/2 - IEEE802.11a

➢ Semiconductor Devices

Band Model of semiconductors, generation and recombination mechanisms, effects of heaviliy doping and high fields, bipolar Transistor: Gummel, high injection, band model for heterojunctions, metal contacts, MOS structures, overview on specific components (LASER, MOS-bipolar-transistors, microwave diodes)

➢ RF-Front-End Devices and Circuits for Wireless Communication

Two ports, noise, gain definition, figure of merit, noise figure effects of nonlinearity, RF-front-end architecture, diplexer, filters, HPA, SSPA, LNA, antennas, …

➢ Wireless Network Planning

Radio access network planning, propagation models, channel models, radio resource management, power control, mobility models, traffic models, …

➢ Wireless Network Protocol Software Design and Test

Protocol specification languages, implementation environments, protocol testing, conformance testing, …

➢ Socio-Economic Aspects of Wireless Communications

Wireless technology business models, wireless technology impact, wireless technology development, wireless technology acceptance, wireless telecommunications markets, …

➢ Seminar

In the Seminar new and emerging areas of mobile and wireless communication can be taken up, e.g., UWB

➢ Project

The project can be carried out within industry or defined by industry and carried out within a university with joint supervision from both academia and industry.

➢ Master Thesis

The Master Thesis is carried out under the supervision of the university in an area of "Wireless and Mobile Communications".

Examples of other courses

➢ Speech and Audio Processing

(classification of noise / disturbances, noise reduction, echo cancellation, impulsive noise reduction, reverberation, other disturbances & their removal, …)

➢ Image and Video Processing

➢ Sensor Networks

➢ Security and Quality of Service

(authentication, authorization, accounting methods, quality of service mechanisms, …)

➢ Network Services

(location services, "IN", mobility services, presence service, messaging (e.g. SMS, MMS), billing, anonymity, …)

➢ Satellite Communications

➢ Positioning Systems

(basic methods, GPS, Galileo, indoor positioning systems)

➢ Performance Evaluation

(queueing networks, measurements, …)

➢ Network Management

(fault management, configuration management, accounting management, performance management, security management, ….)

Training & Education Needs from Industry

A study of requirements of specific knowledge for organisations and institutes is vital in identifying interchangeable modules and lecture in the field of wireless communication. These are the organisations and institutes that recruit people with specific knowledge that they required. The identified curriculum should meet the requirements for training and education in enterprises. For this purpose, survey of people with specific knowledge industries are lacking or that they would need in the near future was done. This section specifies how the survey was done and the result and the analysis of that survey.

Survey on industrial requirements

The questionnaire was prepared to help NEXWAY project to identify the basic knowledge required for those working in wireless communication field and identify the training and educational needs of the industries.

The industries have been distinguished in the field of wireless technology in the following manner:

a. Wireless Operators

b. Wireless Manufactures

c. Wireless Service Providers

d. Wireless Service Development

The questions were divided into 3 sections. Brief summary of the questionnaire is described below. Please see annex for the whole questionnaire.

First Section: *TOPICS AND DEVELOPMENT IN WIRELESS COMMUNICATIONS*

The questions were mainly focused on:

* Main topics company mainly involved

* Most significant development in near future

Second Section: *REQUIREMENTS FOR EDUCATION*

The questions were mainly focused on:

* easy to find employees with adequate knowledge in the wireless field

* Current level of education in Wireless Communication is adequate

Third Section: *REQUIREMENTS FOR CONTINIOUS EDUCATION/TRAINING*

The questions were mainly focused on:

* Areas for continuous educations which should be stressed more in the future

* topics for workshops and seminars on continuous education in wireless communication field that would be useful to be organized

Result and Analysis of the Survey

Section 1: Topics And Development In Wireless Communication

Today's organisations and industries are mainly involved in the field of wireless technologies. Their main interest is based upon the general idea of "wireless network" and this can be shown in figure 1, where the 19.57 % of the companies are involved in. A second major consideration splits into "wireless hardware" and "wireless communication protocol" topics, while the "wireless security" aspect is concerned by the 15.22% of the companies. Finally, the areas of "wireless IP", "wireless service" and "wireless application" are considered by a 9 to 11 % of the companies.
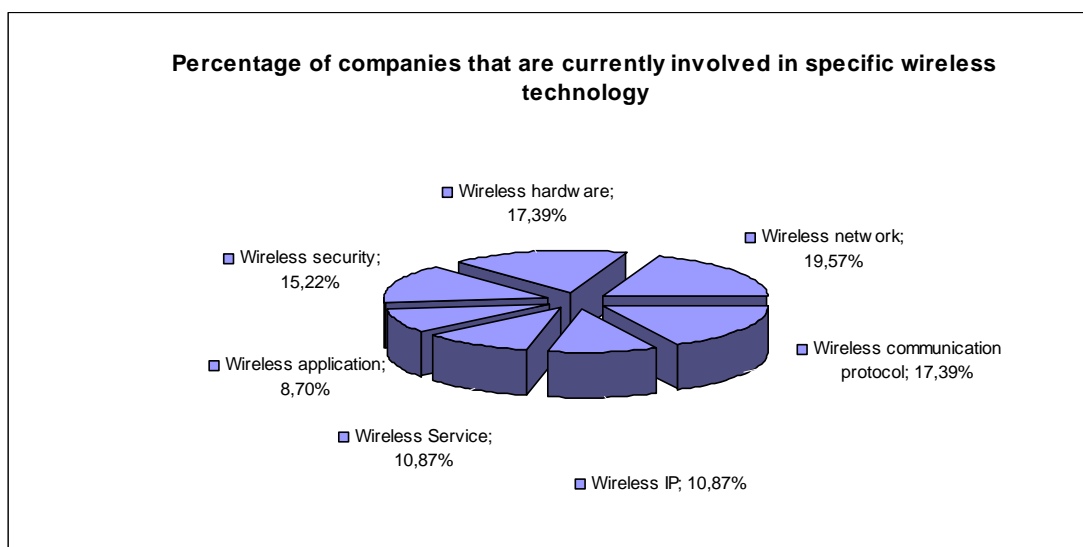
Figure 1. Percentage of companies that are currently involved in specific wireless technology

In addition, other issues that appeared to be researched by the companies and organisations are:

- WPAN
- UWB
- Smart Antennas
- Heterogeneous Systems
- Baseband Processing
- SDR what is this?
- Wireless Internet Access
- Low Speed Communications
- Mobile Portals

The near future of wireless technologies is of a great concern for the companies, organisations and consumers. By default the companies introduce new technologies therefore their considerations of such development is a good indicator of the near future of wireless aspects. In general the effort will be targeted on "wireless service" aspects which are introduced by the 29.41% of the companies/organisations. Followed by the "wireless IP" topic that holds the 23.53% of the pie, as shown in Figure 2. The aspect of "wireless application", "wireless security" and "wireless network" are outlined by the 12 to 18%. Finally, the research and development based upon hardware and communication protocol appear to be in low priority.
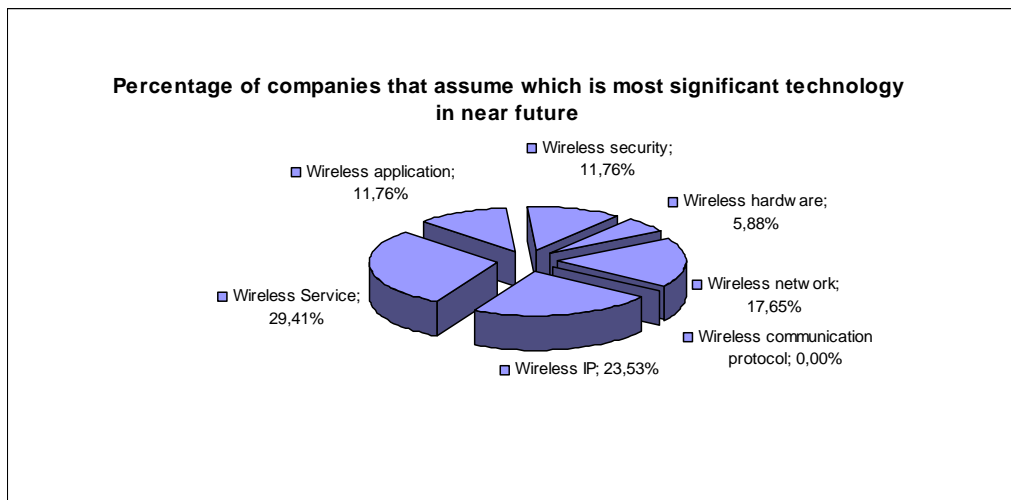
Figure 2. Percentage of companies that assume which is most significant technology in near future

The "near future agenda" also contains the following areas:

- WPAN
- Heterogeneous Systems

Apart from the general introduction of the near future research and development, the most significant issue which is directly related in the companies' upcoming plans is the "wireless network" by a percentage of 33.33%. The fields of "wireless IP" and "wireless security" occupy at 14 to 19% of the companies for their upcoming plans. Despite the fact that field of "wireless service" was introduced as the major general future activity, the relation towards the companies' future plans is un-proportional while the latter clings to 9.52%. Meanwhile, a portion of 4.76% of the companies inducts the "wireless communication protocol" issue as shown in Figure 3.
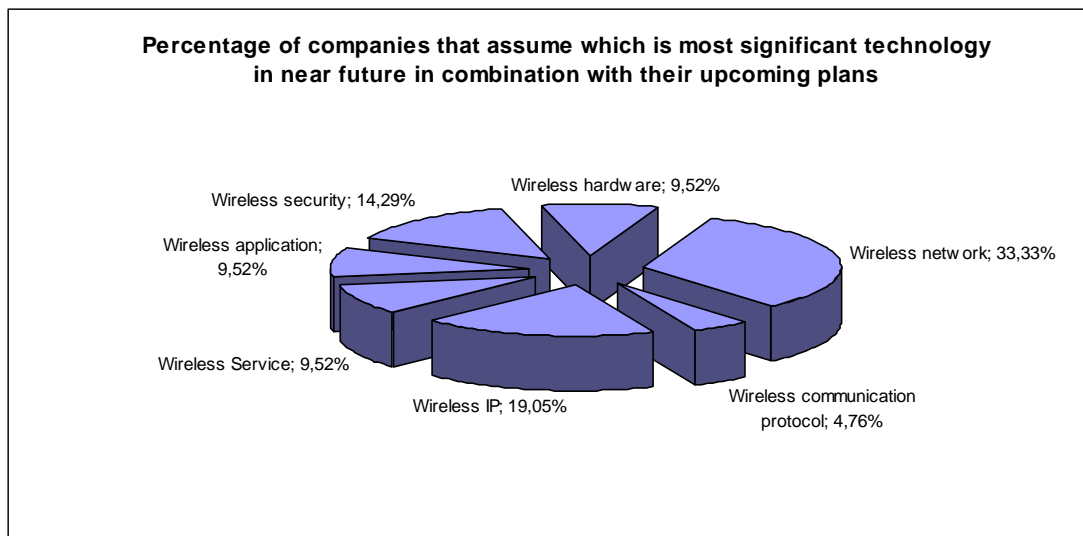
Figure 3. Percentage of companies that assume which is most significant technology in near future according to their upcoming plans

Some other detailed information has also been given as specific topics:

- Deploying WLAN hot spots

- Deploying WLAN and 3G systems

- Home RF

- Seamless and convergence services

- Seamless handover and positioning

- Implementation of UMTS

- Wireless applications

- Wireless communication in medical applications

The near future findings compared with the long future findings for the wireless technology provide vital information to the economical aspects of wireless technologies. Short investments and long investments correspond to these adjustments of near and long future. In general the outcome is divided between three major technologies, mainly the "wireless network", "wireless security" and "wireless service" with the corresponding values of 22.73%, 18.18% and 18.18% respectively. The 13.64% of the companies introduce that the upcoming long term future developments are concerned to be the fields of hardware applications, while the topics of "wireless IP" and "wireless communication protocol" are introduced by a minority of companies, as shown in Figure 4.
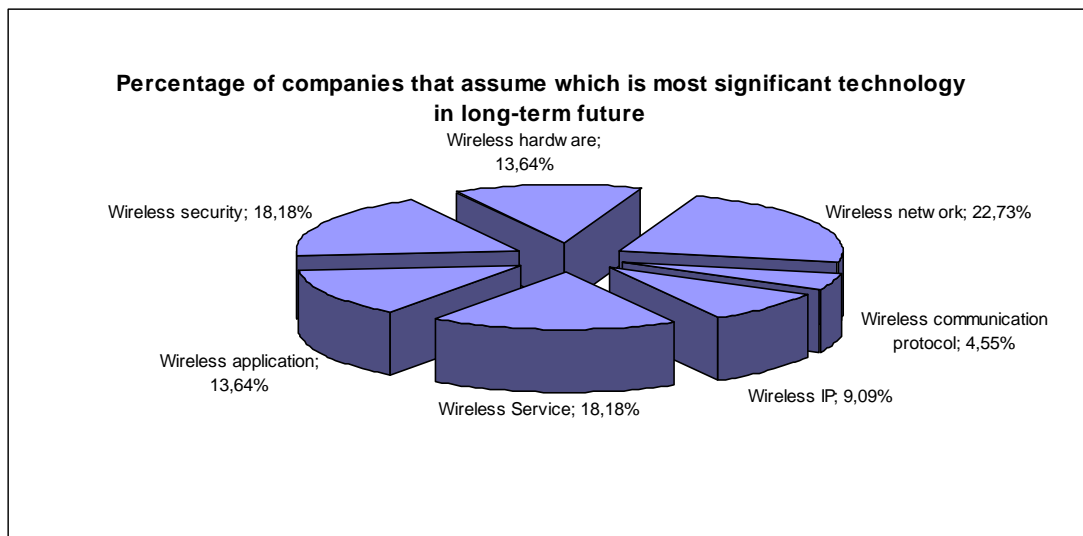
Figure 4 Percentage of companies that assume which is the most significant technology in long-term future

Detailed long term future developments are the following:

- Low power architecture

- High-speed wireless access

- Wireless sensor networks

- Coexistence mechanisms

- Integration of various devices

- Integration of heterogeneous systems

    o Integration of ad-hoc and infrastructure networks

- Security of ad-hoc networks

- Advanced antenna concepts

- WLAN and UMTS development

For the coming years the planned investments of organizations with main area in the wireless are almost equally distributed among the wireless technology fields. The four major issues that are concerned are: hardware, security, application and service, followed by network and wireless IP, while the wireless communication protocol is once again left behind as shown in Figure 5.

Percentage of companies that are planing to invest or work in coming years

Wireless hardware; 16,13%

Wireless network; 12,90%

Wireless security; 16,13%

Wireless communication protocol; 9,68%

Wireless application; 16,13%

Wireless IP; 12,90%

Wireless Service; 16,13%
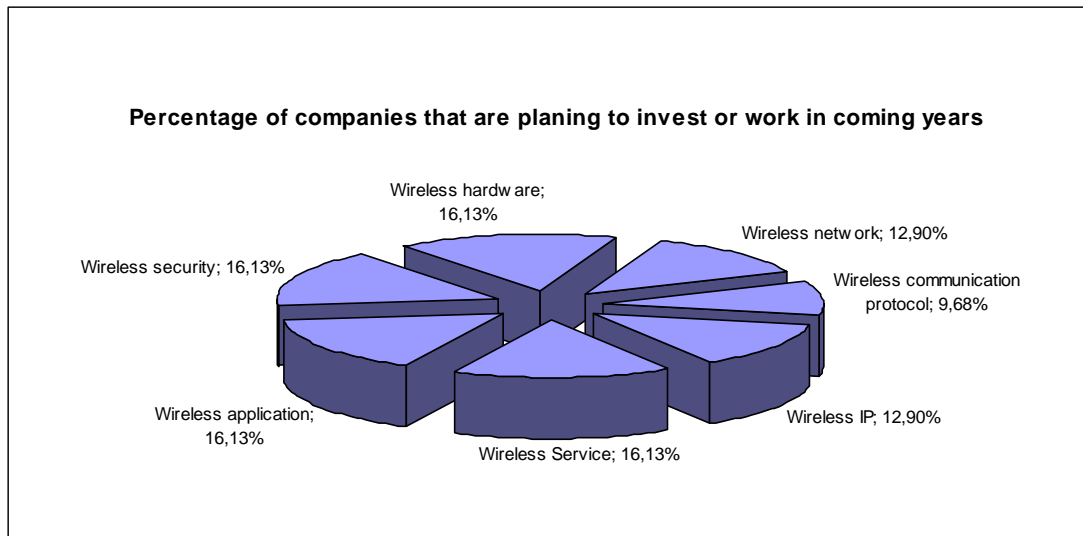
Figure 5. Percentage of companies that are planning to invest or work in coming years

In more details the specific wireless technologies follow:

- Applications:
    - Audio and video streaming for in-home applications
- Hardware:
    - Wireless sensor networks
    - Wireless chip deployment
- Services:
    - Deployment of wireless solutions and services
- Network integration:
    - WLAN – cellular integration
    - Fixed to mobile convergence
- Other:
    - Implementation of wireless technology in medical products

Section 2: Requirements For Education

Since companies and organizations have to maintain state-of-the-art expertise in each of the wireless fields, the question is whether there is a work-force capable enough with adequate knowledge in the wireless fields.

The industry persists that there are not engineers that fulfill the wireless needs since only half of the queried companies have positively replied to the question of people with adequate knowledge. Therefore the outcome is that still there are companies searching employees with specific knowledge with no success.

The reason behind a non-adequate work-force is mainly focused by the companies on the current level of education where a 53.33% believes that is insufficient. This underlines the problematic interplay between universities and organizations.

Fields of wireless communications that should be strongly covered by the universities, according to companies, are:

- Practical oriented introduction courses
- UWB
- Smart/MIMO antennas systems
- End-to-end communication systems engineering
- Mobile computing
- Digital Broadcasting
- Systems aspects
- Interoperability
- Services
- Business impacts
- Wireless security
- Better knowledge of physical layer
- Networking with:
  - Low speed
  - Small bandwidth
  - Energy Efficient Ad-hoc
- Basics concepts of telecommunications architecture
- Telecommunications protocols
- More practical courses as development with networks including IP
- Development process

Section 3: Requirements For Continuous Education / Training

Areas for continuous educations that should be stressed more in the future, according to the companies are:

- Standards evolution
- Short courses on hot topics in wireless
- Wireless services and solutions
- Terminal management / configurability
- Systems architectures

- Technologies for services and application, awareness of costs

- WCDMA, Wireless IP, SIP, IMS

- New Air interfaces, Integration of UMTS/WLAN/Broadcasting/Short range/Satellite, Ad-hoc and security

- Wireless networks, protocols, security, hardware

- New protocols and applications

- IP networks Mobile/ Wireless networks, OFDM, CDMA, Channel and source coding

- Software development technologies

Topics for workshops and seminars on continuous education in wireless communication field that should be useful to be organised, according to the companies are:

- QoS and audio-video streaming techniques

- UWB

- HAPS

- Wireless IP

- Service Application

- Security

- WLAN

- Mobile computing

- Security Interoperability in home

- Business cases for services and applications

- Wireless security

- Advanced antennas

- Low speed

- Small bandwidth energy efficient networking

- Ad-hoc service and security

- General overview of Wireless communications and possible apps / restrictions (for medical field/hospital environments)

- Security for heterogeneous networks

- At the moment .NET and Oracle technologies

The requirements survey of the industries has provided important information on the current and future needs of the industries in the field of wireless technology.

Apart from their views on near and long-term research importance the most significant outcome of the survey is that most of the industries believe the current standard of education does not provide the level of knowledge they require. According to the industries 'Practical oriented introduction courses', 'UWB', 'Smart/MIMO antennas systems', and 'End-to-end communication systems engineering' are among the many areas that should be covered by universities. Industries also prefer short courses on various emerging technologies.

Among the industries surveyed most (about 20%) of the research work was done in 'wireless networks'. They have identified 'wireless service' as the most significant technology in the near future. However the industries surveyed will still put most effort in 'wireless network' research during that period. 'Low-power architecture', 'high-speed wireless access', 'sensor networks, and 'security' are presumed important research activities in the long-term future.

Conclusions

The methodology of building education platform in wireless communications was described. It can be later directly applicable by other European Organizations in other technical fields with hopefully minimal modifications. Based on it a model curriculum for a Master of Science was drafted to guide the introduction of Master Programmes in the area of "Wireless and Mobile Communications" in agreement with Bologna agreement. As the identified curriculum should meet the requirements for training and education in enterprises a study of requirements of specific knowledge for organisations and institutes was done.

The educational dimension of NEXWAY was supported with the help of well-known educators and scientists within the project. Main result is a platform where students will have easy access to the best qualified European Master's Programmes and lectures in area of wireless communications.

Appendix 1 - Courses/ Lectures

A collection of information about existing Master's Programmes and courses within the EU and including the newly associated countries was compiled (see Table 1). Each partner was assigned a list of countries and then gathered available Master's Programmes and courses from these countries.

Table 1 Country coverage for the involved NEXWAY partners

Country	Partner Responsible
Austria	CSEM
Belgium	TU-Delft
Bulgaria	CPK
Czech Republic	FOKUS
Denmark	CPK
Finland	CPK
France	TU-Aachen
Germany	TU-Dresden
Greece	NTUA
Hungary	TU-Dresden
Ireland	UniBremen
Island	DICOM
Italy	NTUA
Luxembourg	TU-Aachen
Netherlands	TU-Delft
Norway	UniBremen
Poland	FOKUS, CPK
Portugal	IT
Spain	DICOM
Sweden	UniBremen
Switzerland	CSEM
United Kingdom	NTUA

Courses and Master's Programs were entered into the database. This resulted in the milestone "Database of related modules, courses and Master's Programs in Wireless Communication". The database now includes 226 courses in wireless communication and 77 Master's Programs.

The database content can be searched publicly and can be found at http://nexway.tu-dresden.de:8080/webpages/nexway3/search.html for courses and http://nexway.tu-dresden.de:8080/webpages/nexway4/search.html for Master's Programs. It will be linked from the NEXWAY website. It has now been enhanced with editing, deleting and searching capabilities plus new input of courses and Master's Programs. Internal document containing information about all the courses and Master's Programs was uploaded to the private section of the project website. The database is continuously updated with more information from the partners and the members.
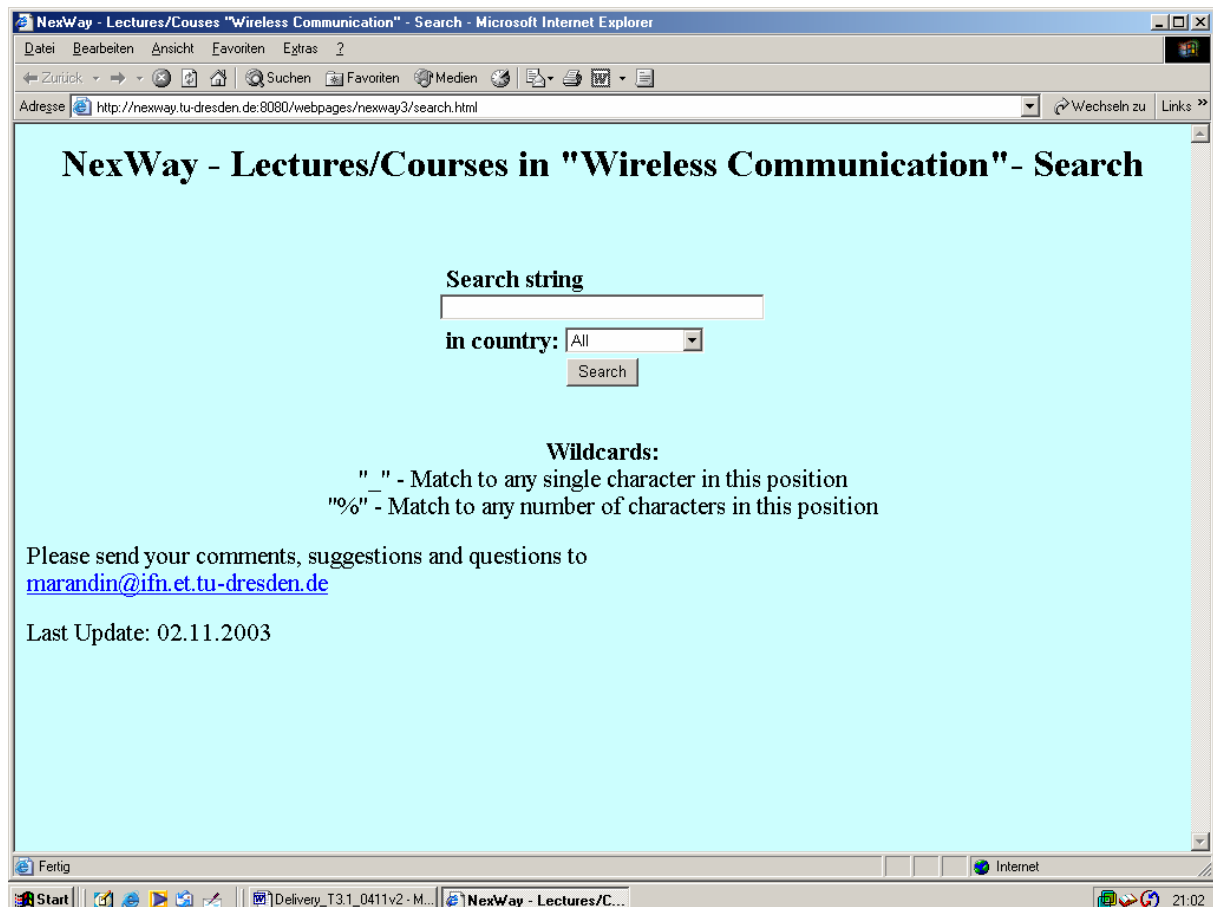
NexWay - Lectures/Courses - Search results

New search

N	University	Country	Department	Course title	Details
1	Vienna University of Technology	Austria	Faculty of Electrical Engineering and Information Technology	Third Generation Mobile Communication Networks (389-039)	Details
2	Aalborg University	Denmark	Communication Department	Spread Spectrum Techniques and Applications (CDMA)	Details
3	Technical University of Denmark	Denmark	Research Center COM	Future Mobile Communication Systems and - Services	Details
4	Technical University of Denmark	Denmark	Research Center COM	Access- and Home Networks	Details
5	EURECOM	France	Mobile Communications	Management of Mobile Networks	Details
6	University of Mannheim	Germany	Mathematics und Computer Science	Mobile Networks	Details
7	University of Twente	Netherlands	Electrical Engineering	Mobile and wireless networking (262001)	Details
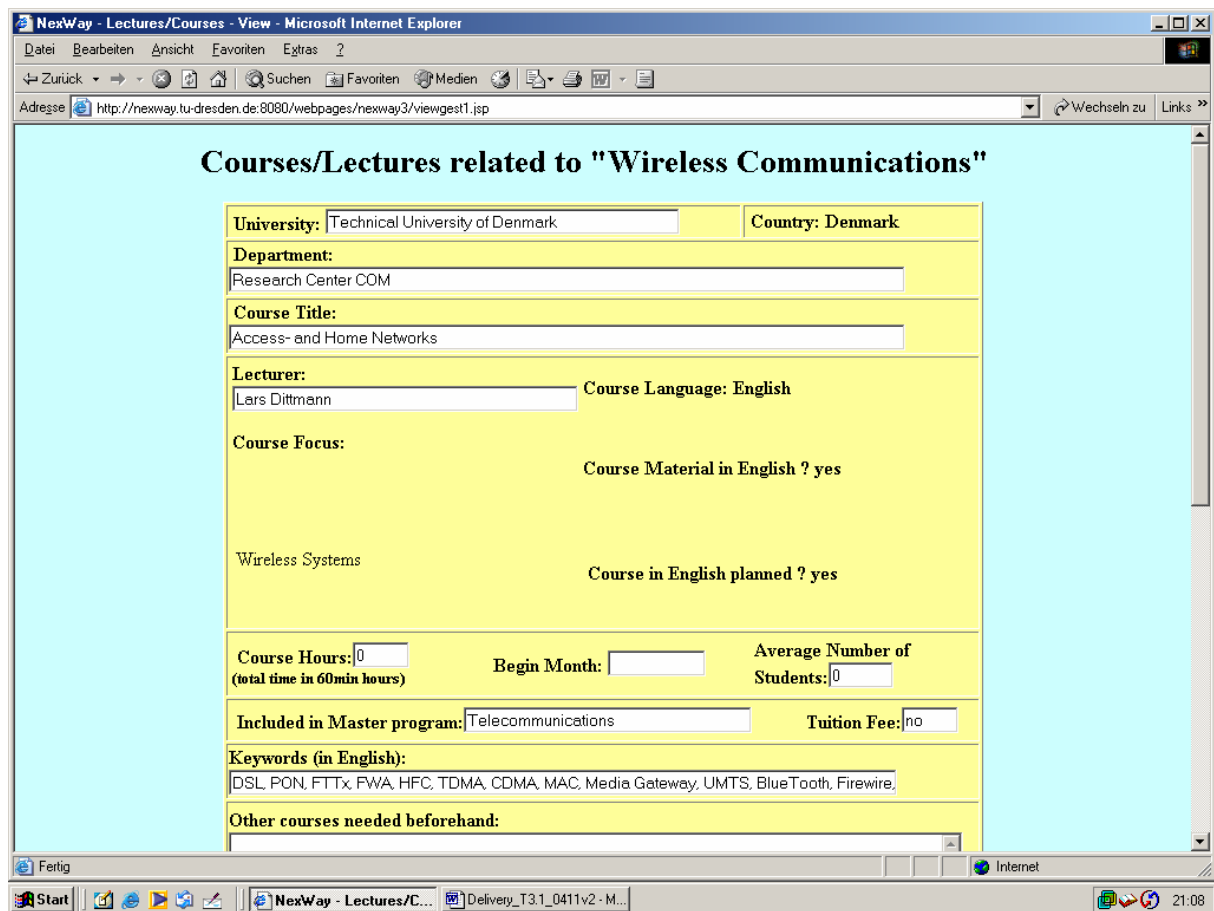
Figure 6 Screenshots from lecture database

Table of Courses/ Lectures

No.	Course Title	Course Focus	Country
1	Access and Home Networks	Wireless Systems	Denmark
3	Adaptive Antenna Systems		Denmark
4	Adaptive Filtering Theory	Antenna and RF Design Signal Processing	Denmark
5	Adaptive Processing techniques for digital communications (Traitements adaptatifs pour les communications numériques)	Signal Processing	France
2	Adhoc networks and distributed data processing (Réseaux ad hoc et informatique diffuse (RE3 06))	Wireless Systems Protocols	France
6	Advanced aspects in mobile communications networks	Information Theory Wireless Systems Protocols	Spain
7	Advanced design of digital systems (Conception Avancee De Systemes Numeriques)		Switzerland
8	Advanced digital communications (Communications Digitales Avancees)		Switzerland
9	Advanced Modulations	Signal Processing	Poland
10	Advanced Signal Processing	Signal Processing	France
11	Advanced Signal Processing	Signal Processing	Poland
12	Advanced Telecommunication Systems	Information Theory	Poland
13	Advanced topics (MOB) (Sujets Avances (MOB))		Switzerland
14	Advanced Wireless Multiuser Communications	Signal Processing Information Theory	Germany
15	Algorithms for communication networks	Protocols	Switzerland
16	Antenna Systems	Antenna and RF Design	Netherlands
17	Antenna Technology	Antenna and RF Design	Poland
18	Antennas	Antenna and RF Design	Denmark
19	Antennas (Antennes)	Antenna and RF Design	France
20	Antennas and Propagation		Switzerland
21	Application of Antennas and Propogation	Antenna and RF Design	Czech Republic
22	Applied Digital Information Theory II		Switzerland
23	Architecture and management of telecommunication networks (Architecture et gestion des réseaux de télécommunications)	Signal Processing	France
24	Audio and Video Compression (Compression	Signal Processing	France

	audio et vidéo)		
25	Basics of High-Frequency Techniques	Antenna and RF Design	Poland
26	Bluetooth (ETC 005)	Wireless Systems	Sweden
27	Broadband Networks, SDH, ATM (Réseaux large bande, SDH, ATM)	Signal Processing Information Theory	France
28	Broadband technology and functionality (Techniques et fonctions haut débit)	Signal Processing Protocols	France
29	Broadcast systems	Signal Processing Information Theory	Germany
30	CDT :Components and building blocks of telecommunication (Composants et dispositifs de télécommunications)	Applications	France
31	Cellular Radio Engineering	Wireless Systems	France
34	Channel- and Turbo-Coding (Codage de canal et turbo-codes)	Information Theory	France
32	Channel Modelling and Multiuser Receiver in Mobile Communication	Signal Processing Wireless Systems	Germany
33	Channel models for radio digital communications	Applications	Spain
35	Coding Theory		Poland
37	Communication Electronics		Switzerland
39	Communication Networks		Poland
40	Communication Networks		Switzerland
41	Communication networks I	Signal Processing Information Theory	Germany
42	Communication networks II	Signal Processing Information Theory Wireless Systems	Germany
43	Communication Networks II	Information Theory Protocols	Germany
44	Communication Protocols	Protocols	Poland
45	Communication Systems		Switzerland
46	Communication Systems (Systèmes de communication)	Signal Processing Protocols Applications	France
47	Communication Systems 3	Antenna and RF Design Signal Processing	Finland
48	Communication Systems II	Antenna and RF Design Signal Processing	Denmark
49	Communication Systems III		Denmark
50	Communication Systems III		Denmark
51	Communication systems with mobiles (Systèmes de communication avec les mobiles)	Wireless Systems	France

52	Communication Techniques 1 - Exercises (382.003)		Austria
36	Communications	Signal Processing Protocols	France
38	Communications Engineering - Laboratory Exercises B (389.092)		Austria
53	Communications Engineering - Laboratory Exercises for Physics Majors (381.436)		Sweden
54	Communications Engineering 1	Signal Processing Information Theory Applications	Germany
55	Communications Engineering 2	Signal Processing Information Theory Protocols	Germany
56	Communications Technology II	Signal Processing Information Theory Applications	Germany
57	Computer networks (Reseaux Informatiques)		Switzerland
58	Computer Networks 2	Protocols	Ireland
59	Design and Management of network infrastructure (Conception et administration d'infrastructures informatiques)	Wireless Systems Protocols	Luxemburg
60	Design of transmission systems (CST : Conception des systèmes de transmission)	Applications	France
61	Digital Broadcasting and Television Systems	Signal Processing Wireless Systems Applications	Poland
62	Digital Circuits		Poland
63	Digital Communication II: Equalisation Techniques for ISI Channels		Denmark
64	Digital Communication III: Advanced Digital Modulation Techniques	Signal Processing Wireless Systems	Denmark
65	Digital Communications	Information Theory Wireless Systems	Poland
66	Digital Communications Theory	Signal Processing Information Theory	France
67	Digital Filtering Theory	Antenna and RF Design Signal Processing	Denmark
68	Digital Mobile Communications I	Signal Processing Wireless Systems	Germany
69	Digital Mobile Communications II	Signal Processing Wireless Systems	Germany
70	Digital Mobile Radio Communications (Communication numérique radio mobile)	Wireless Systems	France
71	Digital Modulation Techniques and Applications (Techniques de modulation numérique et applications (TS3 12))	Information Theory Applications	France

72	Digital Signal Processing	Signal Processing	Poland
73	Digital signal processing (Traitement numerique de signaux)		Luxemburg
74	Digital Transmission (Transmission numérique)	Signal Processing Information Theory	France
75	Electromagnetic Compatibility		Switzerland
76	Electronics for telecommunication systems (EST : Electronique pour les sytèmes de télécommunications)	Antenna and RF Design	France
77	Electronics of Radiocommunication systems (Electronique des systèmes de radiocommunication (EA2 09))	Antenna and RF Design	France
78	Embedded software for nomadic applications (Logiciel Embarque pour Application Portables)	Applications	France
79	Engineering and Management of Telecommunication Networks (Ingenierie et management des reseaux de telecommunications)	Wireless Systems Protocols Applications	France
80	Error Control Coding	Antenna and RF Design Signal Processing	Denmark
81	Fields, Waves and Antennas	Antenna and RF Design	Poland
82	Future Mobile Communication Systems and - Services	Wireless Systems Applications	Denmark
83	Global Information Systems		Switzerland
84	High Speed Networks and Multimedia	Protocols Applications	France
85	Highfrequency and Microwave Electronics I		Switzerland
86	History of Communications Technology		Austria
87	III European Summer School on Telecommunications	Applications	Spain
88	Information Security Technology	Information Theory	Finland
89	Information Systems		Ireland
90	Information Theory	Information Theory	Poland
91	Information Theory and Coding	Information Theory	Ireland
92	Information transfer		Switzerland
93	Information Transport Protocols : SDH, ATM, IP (Protocoles de transport de l'information : SDH, ATM, IP)	Protocols	France
94	Integrated circuits and Telecoms systems (Circuits Intégrés et Systèmes de Télécoms)	Antenna and RF Design Signal Processing	France
95	Integrated Circuits for High Speed		Switzerland

	Communications		
96	Introduction to communication systems (Introduction Aux Systemes De Communication)		Switzerland
97	Introduction to Radar (Introduction aux radars)	Wireless Systems	France
98	Introduction to Software Engineering	Antenna and RF Design	Finland
99	Introduction to Wireless Engineering	Wireless Systems	Sweden
100	Konservatorium Mobile Radio Communications (389.136)		Austria
101	Konservatorium Mobilfunk (381.431)		Austria
102	Laboratory Antennentechnik (389.031)		Austria
103	Laboratory Communication Engineering - Laboratory Exercises A (389.081)	Signal Processing Wireless Systems	Austria
104	LAN, MAN, WAN :Architectures and Protocols	Wireless Systems Protocols	France
105	Management of Mobile Networks	Wireless Systems	France
106	Management of mobile networks (Administration Des Reseaux Mobiles)		Switzerland
107	Microwave Techniques		Poland
108	Mobile Advanced Topics	Wireless Systems	France
109	Mobile and Wireless Information System	Information Theory Wireless Systems	Germany
110	Mobile and wireless networking (262001)	Wireless Systems Protocols	Netherlands
111	Mobile and Wireless Networks (Réseaux mobiles et sans fil)	Wireless Systems	France
115	Mobile communication networks	Signal Processing Information Theory Wireless Systems	Germany
116	Mobile communication networks II	Wireless Systems Protocols	Germany
117	Mobile Communication Systems	Antenna and RF Design Signal Processing	Finland
118	Mobile Communication Systems		Poland
119	Mobile communication systems (Services De Communications Mobiles)		Switzerland
120	Mobile communication systems (Systemes De Communications Mobiles)		Switzerland
121	Mobile Communication Systems; 2G and 3G Cellular Systems-courses for industry	Antenna and RF Design Wireless Systems Applications	Poland
112	Mobile Communications	Information Theory Wireless Systems Protocols	Germany
113	Mobile Communications		Switzerland

114	Mobile Communications	Information Theory Protocols	Germany
122	Mobile communications	Information Theory Wireless Systems	Germany
123	Mobile Communications	Antenna and RF Design Wireless Systems	Spain
124	Mobile Communications	Protocols Applications	Spain
125	Mobile Communications	Wireless Systems	Poland
126	Mobile Communications	Signal Processing Wireless Systems	Germany
127	Mobile communications (125160)	Wireless Systems	Netherlands
128	Mobile Communications Airtel-UPM	Protocols Applications	Spain
129	Mobile Communications I/ Wireless Communication	Signal Processing Wireless Systems	Germany
130	Mobile Communications II	Wireless Systems	Germany
131	Mobile Communications networks	Protocols	Spain
132	Mobile Communications Planning and Methods		Finland
133	Mobile Communications Services	Wireless Systems	France
134	Mobile Communications Systems	Wireless Systems	France
135	Mobile Communications Systems and Services		Finland
136	Mobile Computing	Information Theory Wireless Systems Protocols Applications	Germany
	Mobile Computing	Wireless Systems	Portugal
137	Mobile Digital Communications	Wireless Systems	Belgium
138	Mobile Network Architecture	Wireless Systems Protocols	France
139	Mobile Networks	Information Theory Wireless Systems Protocols Applications	Germany
140	Mobile Networks (Réseaux mobiles)	Wireless Systems	France
141	Mobile Networks and Services (Réseaux, services mobiles)	Wireless Systems Applications	France
142	Mobile networks design, planning and dimensioning.	Protocols	Spain
143	Mobile Phones (Mobiles)	Wireless Systems	France
	Mobile Radio Communication Systems	Wireless Systems	Portugal
144	Mobile Radio network planning (Conception Planification des reseaux mobiles)	Wireless Systems	France

145	Mobile Radio Networks and Protocols I	Signal Processing Wireless Systems Protocols	Germany
146	Mobile Radio Networks and their Protocols	Information Theory Wireless Systems Protocols Applications	Germany
147	Mobile Radio system concepts	Signal Processing Information Theory	Germany
148	Mobile Radio Telephone Networks (Réseaux de radiotéléphonie mobile)	Wireless Systems	France
149	Mobile satelite communication systems (Systemes De Communication De Satelites Mobiles)		Switzerland
150	Mobile Services (EDT 013)		Sweden
151	Mobiles GSM	Wireless Systems	France
152	Mobility		France
153	Mobility (MOBILITY)		Switzerland
154	Modelling, Optimisation and Evaluation of Networks (Modélisation/ Optimisation/ Evaluation des Réseaux)	Protocols	France
155	Modulation and Coding Methods	Antenna and RF Design Signal Processing	Finland
	Multiple access techniques	Signal Processing, Wireless Systems	Portugal
158	Multiple courses within the department	Antenna and RF Design Signal Processing Information Theory Wireless Systems	Austria
156	Multi-service and Multimedia Networks	Information Theory Wireless Systems Protocols Applications	Poland
157	Multi-user communications (389.038)		Austria
159	Nanoscale Material Physics		Denmark
160	Network dimensioning and performance (Performance de réseaux, dimensionnement)	Signal Processing Information Theory Protocols	France
161	Network Protocols and Architecture (Protocole réseau et architecture)	Wireless Systems Protocols	France
162	Networking and mobility (Reseaux Et Mobilite)		Switzerland
163	Networks and Protocols (Réseaux et Protocoles)	Protocols	France
164	New Standards for Future Mobile Communication Systems	Signal Processing Wireless Systems Protocols	Germany
165	Numerical Methods in Field Theory and	Antenna and RF Design Signal	Denmark

	Propagation	Processing	
166	Numerical Methods in Radio-Frequency and Microwave Engineering (381.496)		Austria
167	Operating systems, networks and communications.	Protocols	Ireland
168	Optical Communication		Denmark
169	Parallel and Distributed systems	Information Theory	Finland
170	Personal and Mobile Communication Systems	Wireless Systems	Portugal
171	Planning of Cellular Systens	Wireless Systems	Portugal
172	Principles of digital communications (Principes Des Communications Numeriques)		Switzerland
173	Propagation, Antennas and Diversity	Antenna and RF Design Signal Processing	Denmark
174	Protocols for Broadband Networks (Protocoles pour les réseaux haut débit)	Protocols	France
175	Protocols for Multimedia Communications		Switzerland
176	Radio Frequency Circuits	Antenna and RF Design	Poland
177	Radio Frequency Circuits	Antenna and RF Design	Poland
178	Radio frequency measurement systems	Antennas and RF design	Portugal
179	Radio Frequency Techniques	Antenna and RF Design	Portugal
180	Radio Net Planning	Information Theory Wireless Systems	Germany
181	Radio Network Planning Methods	Antenna and RF Design	Finland
182	Radio Propagation	Antennas and RF design	Portugal
183	Radio Propagation and Engineering (Ingénierie radio et propagation)	Signal Processing	France
184	Radio Transmitting Technique and its Applications	Antenna and RF Design Signal Processing	Poland
185	Radiocommunication Systems		Poland
186	Radiocommunication Systems (Systèmes de radiocommunications)	Wireless Systems	France
187	Radio-Frequency Engineering 2 (381.628)		Austria
188	REMOTE - Real-Time Mobile Telecommunication	Wireless Systems Protocols Applications	Sweden
189	RF & Microwave Communication Systems	Antenna and RF Design Signal Processing	Germany
190	RF circuit design for Mobiles (Conception de circuits RF pour les portables)	Antenna and RF Design	France
191	RF Communication Circuits	Antenna and RF Design	Denmark

192	Routing in Communication Networks	Protocols	Finland
193	Satelite Networks (Réseaux satellitaires)	Wireless Systems	France
194	Satellite Communication Systems	Wireless Systems	Poland
195	Satellite communication systems (SCS : Systèmes de communications par satellites (à Toulouse))	Antenna and RF Design Applications	France
196	Satellite communications	Antenna and RF Design Wireless Systems Applications	Spain
197	Satellite Communications	Information Theory Wireless Systems	Germany
198	Security of Communication Protocols	Protocols	Finland
199	Selected topics in digital communication (Chapitres Choisis En Communication Digitale)		Switzerland
200	Self-organized networks (Reseaux Auto-Organises)		Switzerland
201	Seminar Research Projects in Advanced Signal Processing (382.012)		Austria
202	Service Creation and Management	Applications	Finland
203	Signal and System Theory I		Switzerland
204	Signal and System Theory II		Switzerland
205	Signal processing for communication (Traitement Des Signaux Pour Les Communications)		Switzerland
206	Signal Processing in GSM Terminals (Traitement du signal dans les terminaux. GSM)	Antenna and RF Design Signal Processing	France
207	Signal Processing in Telecommunications	Signal Processing	Finland
208	Signal Processing in Telecommunications	Signal Processing	Finland
209	Signal Processing in Telecommunications		Finland
210	Signal Processing Systems	Signal Processing	Finland
211	Signal Processing Systems	Signal Processing	Finland
212	Signals and Communications (Signal et Communications)	Signal Processing Information Theory	France
213	Simulation of Transmission Systems (Simulation de systèmes de transmission (A3 01))		France
214	Space-Time Signal Processing in Mobile Communications	Antenna and RF Design Signal Processing	Germany
215	Speech transmission (Transmission De La Parole)		Switzerland

216	Spread Spectrum and CDMA Systems		Poland
217	Spread Spectrum Techniques and Applications (CDMA)	Wireless Systems Applications	Denmark
218	Statistical Signal Processing		Finland
219	Stochastic Fundamentals of Communication Signals - Exercises (382.767)		Austria
220	Stochastic models and signal processing		Switzerland
221	System engineering in wireless communication	Wireless Systems	Finland
222	Technique of Emission and Receiving	Signal Processing Wireless Systems Applications	Poland
223	Telecommunication	Signal Processing	Denmark
224	Telecommunication Systems		Finland
225	Telecommunications: The Transmission (Télécommunications : la transmission)	Signal Processing	France
226	Telephony, Narrow-band ISDN and introduction to Broad-band (Téléphonie, RNIS bande étroite. Introduction au large bande (RE3 03))	Signal Processing Protocols	France
227	Terrestrial and Satellite Radiocommunication Systems (Syst. de Radiocom. Terrestres et Satellitaires)	Antenna and RF Design Wireless Systems	France
228	Theory and Designing of Antennae	Antenna and RF Design	Poland
229	Third Generation Mobile Communication Networks (389-039)		Austria
230	Transceiver architectures I	Antenna and RF Design Signal Processing	Denmark
231	Transmission Lines and Filters		Switzerland
232	Transmission Systems Engineering	Wireless Systems Applications	Netherlands
233	Transmission Technology II (Wireless Information Theory)		Switzerland
234	Video processing and communications (Imagerie Multimedia Et Communications)		Switzerland
235	Waves and Antennas	Antenna and RF Design	Poland
236	Wearable Systems I		Switzerland
238	Wearable Systems II		Switzerland
239	Wideband CDMA communications		Belgium
240	Wireless and Mobile Communications	Antenna and RF Design Wireless Systems	Belgium
241	Wireless Communications		Denmark
242	Wireless communications	Wireless Systems	France

243	Wireless Communications	Wireless Systems	Poland
244	Wireless communications (Communications Sans Fil)		Switzerland
245	Wireless Data Communication		Denmark
246	Wireless LANs	Signal Processing Wireless Systems Protocols Applications	France
247	Wireless Networks (ETC 019)	Wireless Systems	Sweden
248	Wireless System Engineering	Antenna and RF Design	Sweden
249	Wireless Telecommunication Systems	Wireless Systems	Belgium
250	WLAN systems		Poland

Access and Home Networks

Course outline

- General aspects of network access, and use specific "standards" to exemplify basic trends and differences.

- Evaluate and compare the aspect of higher capacity in wired network with the flexibility and mobility in wireless network.

- For the public part of the network the solutions based on reuse of existing infrastructure (such as cable-modem or xDSL) with enhanced optical feeder network (e.g. PONs) will be compared with LAN-type solutions using new cabling and wireless and mobile solutions (FWA, UMTS, GPRS etc.).

- In the home or workspace environment the same type of comparison between wired and wireless solutions will be made (e.g. Blue Tooth, Firewire, Hyperlan and Ethernet).

- The course will also cover the gateway function and seamless interworking aspects of cross-communication between the private and public domains as well as between wired and wireless domains.

- General networking aspects - the course will study some of the newer ideas of restructuring the network e.g. based on a mediaconverter, that collects the different access formats and redirects data to the most appropriate bakbone or service infrastructure.

- For the infrastructure the planning and the administrative aspects will be covered as well with focus on the load constraints by mobile or nomadic users.

Course focus

- Wireless Systems

Course details

University	Technical University of Denmark
Department	Research Center COM
Country	Denmark
Lecturer	Lars Dittmann
Course language	English
Material in English?	yes
Course in English planned?	yes
Keywords	DSL, PON, FTTx, FWA, HFC, TDMA, CDMA, MAC, Media Gateway, UMTS, BlueTooth, Firewire, Hyperlan, IPv6, DMT, CAP
Included in master program	Telecommunications
Tuition fee	No

Contact information

Tel. (+45) 4525 3851

Email: ld@com.dtu.dk

Web address: http://www.com.dtu.dk/education/intmsc/

Ad Hoc Networks and Distributed Data Processing (Réseaux ad hoc et informatique diffuse (RE3 06))

Course focus

- Wireless Systems
- Protocols

Course details

University	Ecole Nationale Superieure Electronique, Informatique & Radiocommunications Bordeaux (ENSEIRB)
Department	Ecole Nationale Superieure Electronique, Informatique & Radiocommunications Bordeaux (ENSEIRB)
Country	France
Course language	French
Material in English?	no
Course in English planned?	no

Contact information

Tel. +33 (0)5 56 84 65 00

Email: webmaster@enseirb.fr

Web address: www.enseirb.fr

Adaptive Antenna Systems

Course outline

- Uni-directional propagation
- Dual-directional propagation
- Multiple input- Multiple output systems
- Distributed Antenna Systems

Course details

University	Aalborg University
Department	Communication Department
Country	Denmark
Course language	English
Material in English?	yes
Course in English planned?	yes
Keywords	MIMO,propagation
Included in master program	Mobile Radio Communications
Tuition fee	no
Remarks	Offered in the 9th semester

Contact information

Tel. + 45 96 35 86 40

Email: cpk@cpk.auc.dk

Web address:
http://esn.auc.dk/Studieordning_PDF/specialer/4_12_mobile_communicaion.htm

http://cpk.auc.dk/master/mob_master.html

Adaptive Filtering Theory

Course focus

- Antenna and RF Design
- Signal Processing

Course details

University	Aalborg University
Department	Communication Department
Country	Denmark
Course language	English
Material in English?	yes
Course in English planned?	yes
Included in master program	Digital Communications and Mobile Communications
Tuition fee	no
Remarks	8th semester;

Contact information

Tel. + 45 96 35 86 40

Email: cpk@cpk.auc.dk

Web address: http://cpk.auc.dk/antennas/teach_8sem_2002.html

Adaptive Processing Techniques For Digital Communications (Traitements Adaptatifs Pour Les Communications Numeriques)

Course outline

Adaptive signal processing techniques are becoming more and more common, mainly because of the exponential growth of digital components real time processing power. They also take advantage of the steadily progressing algorithmics and allow a drastic increase of system performances and functionalities. Besides traditional applications such as eavesdropping, radar and guiding, they are now investing telecommunications, a sector with large needs, due to its greediness in terms of scarce spectral resources.Wireless networks of 2nd and 3rd generation will thus have to incorporate multi sensor adaptive antennas, in order to increase their capacity.

The course will mainly deal with multi sensor adaptive signal processing and will focus on their many potential applications for 2nd and 3rd generation mobile radio communications.

Course focus

Signal Processing

Course details

University	ParisTech
Department	École Nationale Supérieure de Techniques Avancées
Country	France
Lecturer	Pascal CHEVALIER (THALES-Communications)
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. (33) (0) 1 45 52 54 01

Email: webmaster@ensta.fr

Web address: www.ensta.fr

Advanced Aspects In Mobile Communications Networks

Course outline

- Advanced concepts in mobile communications systems
- Cellular systems
- Wireless access networks
- Signalling
- Media access control techniques.

Course focus

- Information Theory
- Wireless Systems
- Protocols

Course details

University	University of Cantabria
Department	Communications Engineering Department (DICOM)
Country	Spain
Lecturer	Roberto Sanz Gil
Course language	Spanish
Material in English?	no
Course in English planned?	no
Keywords	Cellular, wireless-network
Included in master program	Communications Engineering
Begin month	November
Course hours	30
Average number of students	8
Tuition fee	110 EUR

Contact information

Tel. 34-942201389

Email: sanzr@unican.es

Web address: http://www.dicom.unican.es

Advanced Design Of Digital Systems (Conception Avancee De Systemes Numeriques)

Course outline

- Synthesis of multi-level logic systems
    - Methodology and use of CAD tools.
    - High-complexity programmable circuits
    - Study and use of different families of FPGA circuits
- Hardware description and simulation languages : VHDL
- Automatic synthesis
    - Generation of logic schematics from functional description in VHDL
- Architectural synthesis co-design
    - Complete development of a system, with a sofware part (program executed by a processor) and a hardware part (programmable or custom integrated circuit).
- Reconfigurable systems.
    - Examples: realization of a cache menory controller, realization of a superscalar processor, etc.

Course details

University	EPFL
Department	2ème cycle - Orientation Internet et Systèmes d'information - Technologie
Country	Switzerland
Lecturer	: Eduardo SANCHEZ, professeur EPFL/DI, Giovani DE MICHELI, Prof. invité
Course language	French
Material in English?	yes
Course in English planned?	yes
Keywords	outils de conception des systèmes numériques complexes
Course hours	84

Contact information

Tel. 0041 21 693 5637

Email: dsc@epfl.ch Web address: http://dscwww.epfl.ch/students/livret.asp

Advanced Digital Communications (Communications Digitales Avancees)

Course outline

- Review of hypothesis testing problem
- The complex base band equivalent channel
- Transmission over channels with colored noise
- Maximum likelihood sequence estimator
- Equivalent discrete time channel
- Whitening filter
- Equalization (minimum mean squared error, zero forcing criterium, decision feedback)
- OFDM
- Spread Spectrum Techniques
- Multiple access communications
- Spread spectrum system
- Basic analysis of maximum length linear feedback shift registers

Course details

University	EPFL
Department	2ème cycle - Orientation Internet et Systèmes d'information - Théorie
Country	Switzerland
Lecturer	Rüdiger URBANKE, professeur EPFL/DSC
Course language	English
Material in English?	yes
Course in English planned?	yes
Keywords	techniques de traitement de signaux digitaux - advanced digital signal processing techniques
Other courses needed beforehand	Principes de communications digitales - Principles of digital communications
Course hours	84

Contact information

Tel. 0041 21 693 5637

Email: dsc@epfl.ch

Web address: http://dscwww.epfl.ch/students/livret.asp

Advanced Modulations

Course focus

- Signal Processing

Course details

University	Poznan University of Technology
Department	Electrical Engineering Dept, Institute of Electronics & Telecommunications
Country	Poland
Course language	Polish
Material in English?	no
Course in English planned?	yes
Tuition fee	0
Remarks	It is currently given in Polish, however, it is possible to give it in English.

Contact information

Tel. +4861 6652741

Email: wesolows@et.put.poznan.pl

Advanced Signal Processing

Course outline

- Parameter estimation
    - Random parameters
    - Bayesian estimation
    - Minimum mean squared error estimation
    - Orthogonality principle
    - Maximum aposteriori estimation performance bounds, the linear model
    - Minimum variance estimation
    - Bias, efficiency, consistency, Cramer-Rao lower bound
    - Least-squares the linear model
- Optimal filtering
    - Wiener filtering, non-causal, causal and FIR; and application to equalization
    - State-space models
    - Kalman filtering
    - Adaptative FIR filtering
    - Some elements from optimization theory, steepest descent
    - The LMS algorithm
    - The RLS algorithm
    - Performance analysis
    - Applications

Course focus

Signal Processing

Course details

University	EURECOM
Department	Mobile Communications
Country	France
Course language	French
Material in English?	no
Course in English planned?	no

Contact information

Tel. +33 (0) 493002608

Email: christian.bonnet@eurecom.fr

Web address: www.eurecom.fr

Advanced Signal Processing

Course outline

- Lectures and materials for students prepared at Hertfordshire University in cooperation with Texas Instruments containing advantages of digital approach to signal processing and description of a typical DSP.

Course focus

- Harvard architecture, specific addressing modes, DSP dedicated instructions, division into fixed and floating point DSP's.

- Filtering: FIR and IIR filters, filter parameters.

- Frequency domain and applications of different kinds of Fourier transform.

- Applications of DSP.

- Laboratories:

    o Practical programming of DSProcessor TMS320C50 (fixed point) implemented on Starter Kit board equipped with the processor A/D and D/A converters

    o Antialiasing and smoothing filters, connected to a PC by RS port. Oscilloscope for observation of output signal.

    o Basic arithmetic operations, memory map, addressing modes.

    o Demonstration of example programs.

    o Practical implementation of periodic signal generator utilising circular buffer.

    o Design of FIR filter coefficients with Matlab and the Implementation of FIR filter in the processor.

Course focus

- Signal Processing

Course details

University	Technical University of Lodz
Department	International faculty of Engineering: Telecommunication and Computer Science
Country	Poland
Lecturer	Piotr Makowski, M.Sc.
Course language	English
Material in English?	no
Course in English planned?	no
Included in master program	Telecommunication and Computer Science

Contact information

Tel. +48 42 636 53 14

Email: admin@ife.p.lodz.pl

Web address: http://oizet.p.lodz.pl/h/des.asp?module=510

Advanced Telecommunication Systems

Course focus

- Information Theory

Course Details

University	Technical University of Lodz
Department	International faculty of Engineering : Telecommunication and Computer Science
Country	Poland
Course language	English
Material in English?	no
Course in English planned?	no
Included in master program	Telecomunication and Computer Science

Contact information

Tel. +48 42 636 53 15

Email: admin@ife.p.lodz.pl

Web address: http://oizet.p.lodz.pl/h/des.asp?module=515

Advanced Topics (Mob) (Sujets Avances (Mob))

Course outline

- Algorithms and tools to locate base stations

- Frequency and channel allocation : static, adaptive and dynamic

- Handover and power control strategies

- Speech burst radio transmission networks (PRNET)

- Use of multiple element antenna

Course details

University	EPFL
Department	2ème cycle Eurecom - Com. Mobiles
Country	Switzerland
Lecturer	Dirk SLOCK
Course language	French
Material in English?	yes
Course in English planned?	yes
Keywords	sujets plus avancés dans les communications radio mobiles - advanced radio engineering topics
Course hours	15

Contact information

Tel. 0041 21 693 5637

Email: dsc@epfl.ch

Web address: #http://dscwww.epfl.ch/students/2eme-cycle-Eurecom-sanction-etudes-01-02.pdf

Advanced Wireless Multiuser Communications

Course focus

- Signal Processing
- Information Theory

Course details

University	University of Ulm
Department	Electrical Engineering
Country	Germany
Lecturer	Jürgen Lindner
Course language	English
Material in English?	yes
Course in English planned?	yes
Included in master program	Information Technology
Other courses needed beforehand	Communications Engineering I

Contact information

Tel. +49 731 50-26250

Email: juergen.lindner@e-technik.uni-ulm.de

Web address: http://it.e-technik.uni-ulm.de/World/Teaching/Teach1Awimuc.html

Algorithms For Communication Networks

Course outline

- Presentation of fundamental techniques for the design and analysis of algorithms for various applications in communication networks.

Course focus

- Protocols

Course details

University	ETHZ
Department	-
Country	Switzerland
Lecturer	Erlebach Th.
Course language	German
Material in English?	no
Course in English planned?	no
Keywords	Communication networks
Other courses needed beforehand	Basics of algorithms and graphs (recommended)
Remarks	Lecture number: 35-489

Contact information

Tel. 0041 1 632 5002

Email: dept-sekr@ee.ethz.ch

Web address: http://www.ee.ethz.ch/students/courses.en.html

Antenna Systems

Course focus

- Antenna Design
- RF Design

Course details

University	Delf University of Technology
Department	Electrical Engineering
Country	Netherlands
Lecturer	M. Hajian
Course language	English
Material in English?	yes
Course in English planned?	yes
Keywords	Antennas, radiation pattern, gain, directivity, matching, signal processing
Included in master program	Telecommunications
Begin month	september
Course hours	26
Remarks	webpage in Dutch

Contact information

Tel. +31152786256

Email: M.Hajian@ITS.TUDelft.nl

Web address: http://www.irctr.tudelft.nl/course/antennes/

Antenna Technology

Course focus

- Antenna Design
- RF Design

Course details

University	Warsaw University of Technology
Department	The Faculty of Electronics and Information Technology
Country	Poland
Course language	English
Material in English?	Yes
Course in English planned?	No

Contact information

Tel. +48 22 825 37 58

Email: ece@elka.pw.edu.pl

Web address: http://www.ire.pw.edu.pl/zejim/ece/gr_prog.html

Antennas

Course outline

- Radiation from electromagnetic sources
- Duality
- Equivalence principles
- Integral equations for wire antennas
- Array theory
- Aperture antennas
- Horn antennas
- Reflector antennas

Course focus

- Antenna Design
- RF Design

Course details

University	Technical University of Denmark
Department	COM
Country	Denmark
Lecturer	Peter Meincke
Course language	English
Material in English?	yes
Course in English planned?	yes
Keywords	antennas, electromagnetic field theory, radio communication
Other courses needed beforehand	31405 / 48110 Wireless Communication or Introductory Electromagnetic Theory
Tuition fee	no
Remarks	The course provides a good background for participation in special courses and master thesis projects in antennas and electromagnetics.

Contact information

Tel. (+45) 4525 3813

Email: pme@oersted.dtu.dk

Web address: http://www.oersted.dtu.dk/31430

Antennas (Antennes)

Course focus

- Antenna Design
- RF Design

Course details

University	L'Institut National Polytechnique de Grenoble
Department	Ecole Nationale Supérieure d'Electronique et de Radioélectricité de Grenoble
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. (33)04 76 85 60 00

Web address: www.enserg.fr

Antennas and Propagation

Course outline

Introduction to wave propagation phenomena between stationary communications systems and mobile communications systems (e.g. fixed line of sight, mobile, satellite). The goal is to understand fundamental antenna parameters as well as their computation with respect to selected antenna structures. The course also provides an introduction to modern antenna arrays.

Course details

University	ETHZ
Department	-
Country	Switzerland
Lecturer	Vahldieck R
Course language	German
Material in English?	no
Course in English planned?	no
Keywords	mobile, satellite, modern antenna arrays
Remarks	Lecture number: 35-114

Contact information

Tel. 0041 1 632 5002

Email: dept-sekr@ee.ethz.ch

Web address: http://www.ee.ethz.ch/students/courses.en.html

Application of Antennas and Propagation

Course outline

- Definitions and parameters

- Antenna measurement methods

- Linear antennas, wire antennas, aperture antennas, reflector, lens antennas, radomes, slot and microstrip antennas, wide frequency band antennas

- Antenna noise temperature

- Radiation pattern synthesis

- Antennas and propagation for fixed and mobile communication, personal communication system propagation

- Influence of hydrometeors - fades in atmosphere

- Theory of diffraction

- Orthogonal transmission systems

- Satellite link propagation.

Course focus

- Antenna Design

- RF Design

Course details

University	Czech Technical University
Department	Faculty of Electrical Engineering
Country	Czech Republic
Course language	English
Material in English?	No
Course in English planned?	No

Contact information

Tel. +420 2 2435 1111

Email: pliskov@feld.cvut.cz

Web address: http://www.cvut.cz/ctu/international/prospectus/prof3.pdf

Applied Digital Information Theory II

Course outline

- Mathematics of coding and cryptography
- Practical schemes for channel coding

Course details

University	ETHZ
Department	-
Country	Switzerland
Lecturer	Mittelholzer Th.
Course language	German
Material in English?	No
Course in English planned?	No
Keywords	mathematics of coding and cryptography
Remarks	Lecture number : 35-418

Contact information

Tel. 0041 1 632 5002

Email: dept-sekr@ee.ethz.ch

Web address: http://www.ee.ethz.ch/students/courses.en.html

Architecture And Management Of Telecommunication Networks (Architecture Et Gestion Des Reseaux De Telecommunications)

Course focus

- Signal Processing

Course details

University	ParisTech
Department	École Nationale Supérieure de Techniques Avancées
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. (33) (0) 1 45 52 54 01

Email: webmaster@ensta.fr

Web address: www.ensta.fr

Audio And Video Compression (Compression Audio Et Video)

Course focus

- Signal Processing

Course details

University	L'Institut National Polytechnique de Grenoble
Department	Ecole Nationale Supérieure d'Electronique et de Radioélectricité de Grenoble (ENSERG)
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. (33)04 76 85 60 00

Web address: www.enserg.fr

Basics of High-Frequency Techniques

Course outline

- High frequency technique.

- Propagation of electromagnetic waves in transmission lines.

- Transmission lines for microwave applications.

- Analysis and synthesis of microwave passive circuits.

- Microwave impedance and S parameters measurements.

- Fundamentals of microwave devices.

- Active devices for microwave amplification.

Course focus

- Antenna and RF Design

Course details

University	Warsaw University of Technology
Department	Faculty of Electronics and Information Technology
Country	Poland
Lecturer	Krzysztof Robaczynski, M.Sc
Course language	Polish
Material in English?	No
Course in English planned?	No
Keywords	microwaves, circuits, analysis, synthesis, measurements

Contact information

Tel. +48226607622

Email: k.robaczynski@ire.pw.edu.pl

Bluetooth (ETC 005)

Course focus

- Wireless Systems

Course details

University	Blekinge Institute of Technology
Department	Department of Telecommunications and Signal Processing
Country	Sweden
Course language	Swedish
Material in English?	No
Course in English planned?	No
Included in master program	M.Sc. in Electrical Engineering

Contact information

Tel. +46 457 38 57 28

Email: jan.mark.de.haan@bth.se

Web address: http://www.its.bth.se/ets/index-eng.html

Broadband Networks, Sdh, Atm (Réseaux Large Bande, Sdh, Atm)

Course focus

- Signal Processing
- Information Theory

Course details

University	Ecole des Technologies de l`Information et du Management EFREI Paris
Department	Ecole des Technologies de l`Information et du Management EFREI Paris
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. (33) (0)1 46 77 64 67

Email: informations@efrei.fr

Web address: www.efrei.fr

Broadband Technology And Functionality (Techniques Et Fonctions Haut Débit)

Course focus

- Signal Processing
- Protocols

Course details

University	Institute National Polytechnique de Toulouse
Department	École Nationale Supérieure d}Électrotechnique, d}Électronique, d}Informatique,
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. (+33)05 62 24 21 00

Email: inp@inp-toulouse.fr

Web address: www.inp-toulouse.fr

Broadcast Systems

Course focus

- Signal Processing
- Information Theory

Course details

University	Dresden University of Technology
Department	Electrical Engineering and Information Technology
Country	Germany
Lecturer	Heinrich Nuszkowski
Course language	German
Material in English?	No
Course in English planned?	No
Included in master program	Communications Laboratory
Other courses needed beforehand	Communications technology
Begin month	October

Contact information

Tel. +49 (351) 463-32117

Email: nuszkows@ifn.et.tu-dresden.de

Web address: http://www.ifn.et.tu-dresden.de/MNS/lehre/rfsys.html

Cdt :Components And Building Blocks Of Telecommunication (Composants Et Dispositifs De Télécommunications)

Course focus

- Applications

Course details

University	ParisTech
Department	École Nationale Supérieure des Télécommunications (ENST)
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. +33 (0)1 45 81 77 77

Email: communication@enst.fr

Web address: www.enst.fr

Cellular Radio Engineering

Course outline

- History of services and techniques in radio communications

- The electromagnetic spectrum

- Some elements of electromagnetic propagation and antennas

- Terrestrial coverage and cellular system design, cochannel and adjacent channel interference calculation, channel allocation, techniques to increase cellular system capacity

- Multipath propagation, fading, diversity

- Mobile radio channel characterization

- An attenuation model with three spatial scales : attenuation with distance (free space, reflections, diffractions), shadowing effects, fading, Doppler spreading

- Analytical and empirical propagation models

- Coverage prediction tools.

Course focus

- Wireless Systems

Course details

University	EURECOM
Department	Mobile Communications
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. +33 (0) 493002608

Email: christian.bonnet@eurecom.fr

Web address: www.eurecom.fr

Channel Modelling and Multiuser Receiver in Mobile Communication

Course outline

- Fundamentals of optimal multiuser receivers in comparison with matched filters, linear multiuser systems, decorrelation receivers and realization investment for development and complexity.

Course focus

- Signal Processing
- Wireless Systems

Course details

University	Berlin University of Technology
Department	Electrical Engineering and Computer Science
Country	Germany
Lecturer	Holger Boche
Course language	German
Material in English?	No
Course in English planned?	No
Keywords	optimal multiuser receivers
Included in master program	Telecommunication Systems
Begin month	April

Contact information

Tel. +49 30 314 28 459

Email: Holger.Boche@tu-berlin.de

Web address: http://wwwmk.ee.tuberlin.de/en/lectures/lecture_digital_mobile_communi/ Lecture_digital_mobile_communi.html

Channel Models For Radio Digital Communications

Course outline

- Current models and their application. Channel simulation and measure techniques. Current state of environment specific channel models based on propagation process simulation investigations.

Course focus

- Applications

Course details

University	University of Cantabria
Department	Communications Engineering Department (DICOM)
Country	Spain
Lecturer	Rafael Pedro Torres jiménez
Course language	Spanish
Material in English?	No
Course in English planned?	No
Keywords	Channel-models
Included in master program	Communications Engineering
Begin month	April
Course hours	30
Average number of students	6
Tuition fee	110 EUR

Contact information

Tel. 34-942201558

Email: torresrp@unican.es

Web address: http://www.gsr.unican.es

Channel And Turbo-Coding (Codage De Canal Et Turbo-Codes)

Course focus

- Information Theory

Course details

University	ParisTech
Department	École Nationale Supérieure de Techniques Avancées
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. (33) (0) 1 45 52 54 01

Email: webmaster@ensta.fr

Web address: www.ensta.fr

Coding Theory

Course details

University	Poznan University of Technology
Department	Electrical Engineering Dept, Institute of Electronics&Telecommunications
Country	Poland
Lecturer	Prof. Krzysztof Wesolowski (regular studies);Dr Hanna Bogucka (extramural studies)
Course language	Polish
Material in English?	No
Course in English planned?	Yes
Tuition fee	0
Remarks	Size of the course: 30h lecture + 15 h lab + 15 h problem sessions.

Contact information

Tel. +4861 6652741

Email: wesolows@et.put.poznan.pl

Communication

Course focus

- Signal Processing
- Protocols

Course details

University	Institut Supérieur d'Informatique de Modélisation et de leurs Applications (ISIMA)
Department	Institut Supérieur d'Informatique de Modélisation et de leurs Applications (ISIMA)
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. (33)0473405000

Email: mrue@isima.fr

Web address: www.isima.fr

Communication Electronics

Course outline

- Foundation course for understanding modern electronic circuits for communication applications.

Course focus

- Basic amplification stages emitter and source coupled structures

- Small and large signal analysis

- Nonlinear analysis of electronic circuits, distortion and intermoduation

- Distortion in feedback amplifiers

- C-E amplifier with shunt feedback, C-E amplifier with emitter feedback

- Basic output structures

- Transformers and their applications in radio circuits

- Tuned circuits in bandpass amplifiers

- Impedance matching and matching networks

- Bandpass amplifiers, electronic oscillators, instability and oscillation, frequency domain description, amplitude limiting through bias-shift

- The Colplitts Oscillator

- Crystal Controlled Oscillators

- Relaxation and Voltage Controlled Oscillators

- Analog multipliers, mixers and modulators

- The Gilbert Multiplier, mixing, modulation and frequency translation

- AM and FM demodulation, Automatic Gain Control

- Fundamentals of Phase-Locked Loops, basic configurations and applications, small signal analysis, capture and locking, frequency division by dual modulous prescalers, spurious analysis of Phase Locked Loops

Course details

University	ETHZ
Department	-
Country	Switzerland
Lecturer	Huang Q.

Course language	German
Material in English?	No
Course in English planned?	No
Keywords	modern electronic circuits for communication applications.
Remarks	Lecture number : 35-111

Contact information

Tel. 0041 1 632 5002

Email: dept-sekr@ee.ethz.ch

Web address: http://www.ee.ethz.ch/students/courses.en.html

Communication Engineering - Laboratory Exercises B (389.092)

Course outline

- Active filters
- Digital signal processing , Data transmission
- Speech processing
- RF-network synthesis and analysis
- Antennas, Radio measuring techniques
- Television, Optical communications
- Phase-locked loops (PLL)
- Spread - spectrum techniques
- Surface-acoustic-wave (SAW) components

Course focus

- Creative handling problems of modern communications and RF engineering
- Getting to know examples of practical solutions.

Course details

University	Vienna University of Technology
Department	Faculty of Electrical Engineering and Information Technology
Country	Austria
Lecturer	MECKLENBRÄUKER Wolfgang, Dipl.-Ing. Dr.techn., RANK Erhard, Dipl.-Ing., MATZ Gerald, Dipl.-Ing. Dr.t
Course language	German
Material in English?	No
Course in English planned?	No
Keywords	Handling problems of modern communications and RF
Other courses needed beforehand	Additional Suppositions Communication Engineering - Laboratory Exercises A
Course hours	9

Contact information

Tel. 0043 1 58801-0

Web address: http://www.lzk.ac.at/lecture/tuwien/389092

Communication Networks

Course details

University	Warsaw University of Technology
Department	The faculty of electronics and information technology
Country	Poland
Course language	English
Material in English?	Yes
Course in English planned?	No

Contact information

Tel. +48 22 825-37-58

Email: ece@elka.pw.edu.pl

Web address: http://www.ire.pw.edu.pl/zejim/ece/gr_prog.html

Communication Networks

Course outline

- Introduction in basic terms and principles
- Networks with direct links
- Router and switch based networks
- End-to-end protocols
- Names and addresses
- Application programmer's interfaces
- Network security, Selected topics
- Integrated assignments and practical exercises

Course focus

- The students will understand the fundamental concepts of communication networks, with a focus on computer networking.
- They will learn to identify relevant mechanisms that are used to networks work, and will see a reasonable set of examples implementing such mechanisms, both as seen from an abstract perspective and with hands-on, practical experience.
- The lecture is accompanied by 5-6 sets of assignments, which should help to better understand and increase the depth of knowledge conveyed in the lecture.

Course details

University	ETHZ
Department	-
Country	Switzerland
Lecturer	Plattner B.
Course language	German
Material in English?	No
Course in English planned?	No
Keywords	communication networks
Other courses needed beforehand	A layered model of communication systems (represented by the OSI Reference Model) has previously been introduced.
Remarks	Lecture number : 35-120

Contact information

Tel. 0041 1 632 5002, Email: dept-sekr@ee.ethz.ch,

Web address: http://www.ee.ethz.ch/students/courses.en.html

Communication Networks I

Course outline

- Information-theoretical description of discrete and continuous sources

- Entropy

- Markoff chains

- Description of discrete and continuous channels

- Redundancy and irrelevance, capacity of disturbed channels

- Coding of discrete sources with codes of variable length. Example: Facsimile to CCITT/ITU

- Coding procedure for audio signals (adaptive differential pulse-code modulation, linear Prediktive coding), examples: ITU and GSM

- Coding of video signals, standards for video conference technology and ISDN videophone (ITU, JPEG, MPEG)

- Fundamental ideas of the errorsecuring coding

- Block coding

- Hamming code

- Coding gain

- Bit nesting (Interleaving).

Course focus

- Signal Processing

- Information Theory

Course details

University	Aachen University of Technology
Department	Electrical Engineering and Information Technology
Country	Germany
Lecturer	Peter Vary
Course language	German
Material in English?	Yes
Course in English planned?	Yes
Included in master program	Communications Engineering
Begin month	October

Contact information

Tel. (+49) (0)241 80 26 956

Email: vary@rwth-aachen.de

Web address: http://www.ind.rwth-aachen.de/education/lectures/lectures.html#NSYS1

Communication Networks II

Course outline

- Folding coding

- Elements of remainder class arithmetic

- Reed Solomon code, convolutional code, optimal decoding to Viterbi, hard Decision and soft Decision, examples: Error protection in the Compact Disc system and in the digital mobile telephone (GSM)

- Baseband transmission, band-pass filter transmission, combined modulation and coding (modulation Trellis coded)

- Concept of the ISDN, transmission technique

- Mobile telephone GSM, transmission technique and net organization.

Course focus

- Signal Processing

- Information Theory

- Wireless Systems

Course details

University	Aachen University of Technology
Department	Electrical Engineering and Information Technology
Country	Germany
Lecturer	Peter Vary
Course language	German
Material in English?	Yes
Course in English planned?	Yes
Included in master program	Communications Engineering
Begin month	April

Contact information

Tel. (+49) (0)241 80 26 956

Email: vary@rwth-aachen.de

Web address: http://www.ind.rwth-aachen.de/education/lectures/lectures.html#NSYS2

Communication Networks II

Course outline

- The course covers the principles and practice of computer networking and telecommunications with emphasis on the Internet

- Starting with the transport layer, the course provides a detailed discussion of upper layer principles and protocols

- In addition to well known protocols, recent developments in the area of multimedia communication (e.g. Quality of Service, Peer-to-Peer networking, IP-Telephony), will be examined thoroughly

- Introductions to wireless and mobile networking and in the field of network security will be covered as well

Course focus

- Information Theory
- Protocols

Course details

University	Darmstadt University of Technology
Department	Electrical Engineering and Information Technology
Country	Germany
Lecturer	Ralf Steinmetz
Course language	German
Material in English?	No
Course in English planned?	Yes
Included in master program	Multimedia Communications
Other courses needed beforehand	Communication Networks I
Begin month	October

Contact information

Tel. +49-6151-166151

Email: Ralf.Steinmetz@KOM.tu-darmstadt.de

Web address: http://www.kom.e-technik.tu-darmstadt.de/Teaching/KN_II/kn_ii.html

Communication Protocols

Course focus

- Protocols

Course details

University	Poznan University of Technology
Department	Electrical Engineering Dept, Institute of Electronics&Telecommunications
Country	Poland
Course language	Polish
Material in English?	No
Course in English planned?	Yes
Tuition fee	0
Remarks	It is currently given in Polish, however, it is possible to give them in English.

Contact information

Tel. +4861 6652741

Email: wesolows@et.put.poznan.pl

Communication Systems

Course outline

- Fundamentals: OSI reference model of a digital communication system

- Physical Layer: modulation, tasks of the receiver, fundamental problems of wireless and wired digital transmission, fading, channel estimation, synchronization

- Data link layer basics: multiplexing and multiple access, error correcting codes, ARQ protocols

- Network Layer basics: routing, flow control

- Systems

- Examples on the application of the fundamental principles in existing and upcoming wireless and wired digital communication systems : access networks (e. g. xDSL, WLL, WLAN, WPAN, Bluetooth), cellular wireless networks (e. g. GSM, UMTS) and navigation (e. g. GPS)

Course focus

- Introduction into the fundamentals of digital communication system

- Selected examples on the application of the fundamental principles in existing and upcoming communication systems.

Course details

University	ETHZ
Department	-
Country	Switzerland
Lecturer	Wittneben A.
Course language	German
Material in English?	No
Course in English planned?	No
Keywords	digital communication systems
Other courses needed beforehand	Signal and System Theory I.
Remarks	Lecture number : 35-121

Contact information

Tel. 0041 1 632 5002

Email: dept-sekr@ee.ethz.ch

Web address: http://www.ee.ethz.ch/students/courses.en.html

Communication Systems (Systèmes de communication)

Course focus

- Signal Processing
- Protocols
- Applications

Course details

University	Institute National Polytechnique de Toulouse
Department	École Nationale Supérieure d}Électrotechnique, d}Électronique, d}Informatique,
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. (+33)05 62 24 21 00

Email: inp@inp-toulouse.fr

Web address: www.inp-toulouse.fr

Communication Systems 3

Course focus

- Antenna and RF Design
- Signal Processing

Course details

University	Helsinki University of Technology
Department	Department of Electrical and Communications Engineering and Department of Computer Science
Country	Finland
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Tuition fee	No

Contact information

Tel. +3589451 5381

Email: anita.bisi@hut.fi

Web address: http://keskus.tct.hut.fi/masters/maskur1.html

Communication Systems II

Course focus

- Antenna and RF Design
- Signal Processing

Course details

University	Aalborg University
Department	Communication Department
Country	Denmark
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Included in master program	Digital Communications and Mobile Communications
Tuition fee	No

Contact information

Tel. + 45 96 35 86 40

Email: cpk@cpk.auc.dk

Web address: http://cpk.auc.dk/antennas/teach_8sem_2002.html

Communication Systems III

Course outline

- Third Generation Systems
- Wireless Multimedia Communication
- Fourth Generation Access Techniques

Course details

University	Aalborg University
Department	Communication Department
Country	Denmark
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Keywords	3G, OFDM,MC CDMA
Tuition fee	No
Remarks	9 semester

Contact information

Tel. + 45 96 35 86 40

Email: cpk@cpk.auc.dk

Web address: http://cpk.auc.dk/antennas/teach_9sem_2002.html

Communication Systems with Mobiles (Systemes De Communication Avec Les Mobiles)

Course outline

- Introduction to mobile radio communications
- Professional radiocommunications networks
- Universal Mobile Telecommunication System
- Conferences (CDMA, PDA)

Course focus

- Wireless Systems

Course details

University	ENIC
Department	Communications mobiles
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. +33 (0) 493002666

Email: maisenic@enic.fr

Web address: www.enic.fr

Communication Techniques 1 - Exercises (382.003)

Course outline

- Ability to practically apply the theory taught in the associated lecture course "Communication Techniques 1" to solve relevant problem

- Student tutor assisted discussion and solution of problems relevant to the associated lecture course "Communication Techniques 1"

Course details

University	Vienna University of Technology
Department	Faculty of Electrical Engineering and Information Technology
Country	Austria
Lecturer	HLAWATSCH Franz, Dipl.-Ing. Dr.techn.
Course language	German
Material in English?	No
Course in English planned?	No
Keywords	Apply the theory Communication Techniques
Other courses needed beforehand	Sound knowledge of signals and systems, random variables, and random processes
Course hours	1

Contact information

Tel. 0043 1 58801 38915

Email: fhlawats@pop.tuwien.ac.at

Web address: http://www.lzk.ac.at/lecture/tuwien/382003

Communications Engineering - Laboratory Exercises for Physics Majors (381.436)

Course details

University	Vienna University of Technology
Department	Faculty of Electrical Engineering and Information Technology
Country	Sweden
Lecturer	BONEK Ernst, Dipl.-Ing. Dr.techn.
Course language	German
Material in English?	No
Course in English planned?	No
Keywords	Physics majors
Course hours	4

Contact information

Tel. 0043 1 58801 38936

Email: ebonek@nt.tuwien.ac.at

Web address: http://www.lzk.ac.at/lecture/tuwien/381436

Communications Engineering 1

Course focus

- Signal Processing
- Information Theory
- Applications

Course details

University	University of Ulm
Department	Electrical Engineering
Country	Germany
Lecturer	Werner Teich
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Included in master program	Information Technology

Contact information

Tel. +49 731 50-26258

Email: werner.teich@e-technik.uni-ulm.de

Web address: http://it.e-technik.uni-ulm.de/World/Teaching/Teach1Commeng1.html

Communications Engineering 2

Course focus

- Signal Processing
- Information Theory
- Protocols

Course details

University	University of Ulm
Department	Electrical Engineering
Country	Germany
Lecturer	Werner Teich
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Included in master program	Information Technology
Other courses needed beforehand	Communication Engineering 1

Contact information

Tel. +49 731 50-26258

Email: werner.teich@e-technik.uni-ulm.de

Web address: http://it.e-technik.uni-ulm.de/World/Teaching/Teach1Commeng2.html

Communications Technology II

Course focus

- Signal Processing
- Information Theory
- Applications

Course details

University	University of Bremen
Department	Electrical and Information Engineering
Country	Germany
Lecturer	Karl Dirk Kammeyer
Course language	German
Material in English?	Yes
Course in English planned?	Yes
Included in master program	Communications Engineering
Other courses needed beforehand	Communications Technology I
Begin month	October

Contact information

Tel. +49 421 218-3356

Email: kammeyer@ant.uni-bremen.de

Web address: http://www.ant.uni-bremen.de/teaching/nt/index.html.en

Computer Networks (Reseaux Informatiques)

Course outline

- The principles of computer networking.

- Layers, connection oriented versus connectionless operations. Services and Protocols. Architectures.

- The connectionless network layer of the Internet

- IP v4 and IP v6

- ICMP, ARP, packet forwarding versus routing

- Multicast IP

- The transport layer of the Internet : TCP, UDP

- The domain name system of the Internet

- UNIX networking commands

- Socket programming

Course details

University	EPFL
Department	1er cycle - Systèmes de communication
Country	Switzerland
Lecturer	Jean-Yves LE BOUDEC, professeur EPFL/DSC
Course language	French
Material in English?	Yes
Course in English planned?	Yes
Keywords	écrire un programme client ou serveur TCP ou UDP - write a UDP or TCP server or client program
Other courses needed beforehand	Initiation to the C programming language
Course hours	56
Remarks	Préparation pour: Computer Networking II

Contact information

Tel. 0041 21 693 5637

Email: dsc@epfl.ch

Web address: http://dscwww.epfl.ch/students/livret.asp

Computer Networks 2

Course outline

- Local area versus wide-area networks
- Topology and standards
- ISDN and B-ISDN, narrowband and broadband, services, interfaces, and protocols
- System Communication Design Considerations
- Design and validation of communication protocols
- Data security in networks, network security threats and encryption fundamentals

Course focus

- Protocols

Course details

University	University of Limerick
Department	Department of Electronic & Computer
Country	Ireland
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Included in master program	Master of Engineering in Computer and Communications Systems
Other courses needed beforehand	Honours undergraduate degree in a numerate discipline.
Course hours	3
Remarks	Course hours in credits

Contact information

Web address: http://www.ece.ul.ie/

Design And Management Of Network Infrastructure (Conception Et Administration D'infrastructures Informatiques)

Course outline

- Presentation of up-to-date methods for development and design of WANs and LANs
- Theoretical knowledge will be checked by prototype realization.

Course focus

- Wireless Systems
- Protocols

Course details

University	Institut Supérieur de Technologie Luxembourg University of Applied Sciences
Department	Département d'électrotechnique
Country	Luxemburg
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. (00352)(0)42 01 01-1

Email: info@ist.lu

Web address: www.ist.lu

Design Of Transmission Systems (Cst : Conception Des Systemes De Transmission)

Course focus

- Applications

Course details

University	ParisTech
Department	École Nationale Supérieure des Télécommunications (ENST)
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. +33 (0)1 45 81 77 77

Email: communication@enst.fr

Web address: www.enst.fr

Digital Broadcasting and Television Systems

Course outline

- MPEG-2
- VB systems and measurements

Course focus

- Signal Processing
- Wireless Systems
- Applications

Course details

University	Warsaw University of Technology
Department	Faculty of Electronics and Information Technology
Country	Poland
Lecturer	Tomasz Krzymien, M.Sc.
Course language	Polish
Material in English?	No
Course in English planned?	No
Keywords	television, video compression
Tuition fee	0

Contact information

Tel. (48 22) 660-5367

Email: krzymien@ire.pw.edu.pl

Digital Circuits

Course outline

- The course is an introduction to digital logic design in electrical or computer engineering. Course material starts with an introduction to number systems and codes

- Then follows combinational logic design principles, including switching algebra, combinational circuit analysis, synthesis and minimization

- Next a sequential logic design methods are presented

- A collection of examples presented during the course show logic circuits design targeted for PLD, CPLD, FPGA realization

Course details

University	Warsaw University of Technology
Department	Faculty of Electronics and Information Technology
Country	Poland
Lecturer	Dr. Przemyslaw Miazga, Prof. Cezary Zielinski
Course language	English
Material in English?	Yes
Course in English planned?	No
Keywords	Boolean logic, digital integrated circuits, combinational logic, sequential circuits, VHDL design
Included in master program	EDC1 – 3rd semester
Other courses needed beforehand	none
Tuition fee	0
Remarks	Course Focus:Digital Circuit Design

Contact information

Tel. (48-22) 660 78 78

Email: p.miazga@ire.pw.edu.pl

Digital Communication II: Equalisation Techniques for ISI Channels

Course details

University	Aalborg University
Department	Communication Department
Country	Denmark
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Tuition fee	No
Remarks	8th semester

Contact information

Tel. + 45 96 35 86 40

Email: cpk@cpk.auc.dk

Web address: http://cpk.auc.dk/antennas/teach_8sem_2002.html

Digital Communication III: Advanced Digital Modulation Techniques

Course outline

- The basic model of a digital communication system operating in an additive white Gaussian noise (AWGN) channel
- Continuous phase modulation : MSK
- Gaussian Minimum Shift Keying (GMSK)
- Decomposition of CPM
- Trellis-coded modulation
- EDGE

Course focus

- Signal Processing
- Wireless Systems

Course details

University	Aalborg University
Department	Communication Department
Country	Denmark
Lecturer	Bernar Floury
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Keywords	niose channel;modulation;
Included in master program	Mobile Radio Communications
Tuition fee	No
Remarks	9 semester

Contact information

Tel. + 45 96 35 86 40

Email: cpk@cpk.auc.dk

Web address: http://cpk.auc.dk/dicom/E02/DigitalCommunicationIII.htm

Digital Communications

Course outline

- The course is designed to introduce students to fundamentals of digital communication systems, almost exclusively at the physical layer.

- At the completion of this course students should understand fundamental principles of digital communications at the physical layer, including the following:

    o Basic operations required to convey digital information across a channel

    o How to judge/evaluate digital communication system performance

    o Basic characteristics of modulation schemes used in digital communications, and their relative performance and merits

    o Basic digital transmitter and receiver structures

    o Source and channel coding

- Project will help students to know how to simulate several processes that take place in digital communication systems.

Course focus

- Information Theory
- Wireless Systems

Course details

University	Warsaw University of Technology
Department	Faculty of Electronics and Information Technology
Country	Poland
Lecturer	Prof. Jacek Wojciechowski
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Keywords	Signals and spectra, signal formatting, baseband modulation and detection, bandpass modulation and demodulation, communication link analysis, channel coding.
Included in master program	Yes
Tuition fee	0

Contact information

Tel. (48 22) 660 77 13

Email: jwojc@ire.pw.edu.pl

Digital Communications Theory

Course outline

- Foundation of channel coding

- Trellis coding and Viterbi decoding

- Block coding with particular reference to Reed-Solomon codes

- Concatenated coding and iterative decoding (Turbo-codes)

- Presentation of some case studies based on real-world systems, like standard modems, PCM modems, the PSTN network and the standard TDM and SDH hierarchies.

Course focus

- Signal Processing

- Information Theory

Course details

University	EURECOM
Department	Mobile Communications
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. +33 (0) 493002608

Email: christian.bonnet@eurecom.fr

Web address: www.eurecom.fr

Digital Filtering Theory

Course focus

- Antenna and RF Design
- Signal Processing

Course details

University	Aalborg University
Department	Department of Communication Technology
Country	Denmark
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Included in master program	Digital Communications and Mobile Communications
Tuition fee	No
Remarks	Offered in the eighth semester

Contact information

Tel. + 45 96 35 86 40

Email: cpk@cpk.auc.dk

Web address: http://cpk.auc.dk/antennas/teach_8sem_2002.html

Digital Mobile Communication I

Course outline

- This course deals with digital transmission methods and data transmission on mobile radio communications channel

- For cellular mobile radio communication systems, multiple access methods are presented

- A short overview of existing mobile communication systems, for instance, GSM and IS-95, is given

Course focus

- Signal Processing

- Wireless Systems

Course details

University	Berlin University of Technology
Department	Electrical Engineering and Computer Science
Country	Germany
Lecturer	Holger Boche
Course language	German
Material in English?	No
Course in English planned?	No
Included in master program	Telecommunication Systems
Begin month	October

Contact information

Tel. +49 30 314 28 459

Email: Holger.Boche@tu-berlin.de

Web address: http://www-mk.ee.tu-berlin.de/en/Lectures/Lecture_Digital_Mobile_ Communi/ lecture_digital_mobile_communi.html

Digital Mobile Communication II

Course outline

- Selected radio mobile communication systems are presented and discussed
- Furthermore, aspects of CDMA-based (Code Division Multiple Acccess) systems, for instance, receiver structures, capaticity questions, power control and others are presented
- Furthermore, views on future mobile radio communication systems are given.

Course focus

- Signal Processing
- Wireless Systems

Course details

University	Berlin University of Technology
Department	Electrical Engineering and Computer Science
Country	Germany
Lecturer	Holger Boche
Course language	German
Material in English?	No
Course in English planned?	No
Included in master program	Telecommunication Systems
Begin month	April

Contact information

Tel. +49 30 314 28 459

Email: Holger.Boche@tu-berlin.de

Web address: http://www-mk.ee.tu-berlin.de/en/Lectures/Lecture_Digital_Mobile_ Communi/lecture_digital_mobile_communi.html

Digital Mobile Radio Communications (Communication Numerique Radio Mobile)

Course outline

- Mobile radio channel modelling : multiple paths, fading, delay spread/Doppler

- Combatting multiple paths: equalizers

- Combatting multiple paths: diversity

- Modulations designed to combat difficult channels: spread spectrum, multi carrier modulation

- Multi user access systems: TDMA, FDMA, CDMA

Course focus

- Wireless Systems

Course details

University	L'Institut National Polytechnique de Grenoble
Department	Telecommunication
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. (33)04 76 82 72 49

Email: Scolarite.telecom@inpg.fr

Web address: www-telecoms.inpg.fr

Digital Modulation Techniques And Applications (Techniques De Modulation Numerique Et Applications (Ts3 12))

Course focus

- Information Theory
- Applications

Course details

University	Ecole Nationale Superieure Electronique, Informatique & Radiocommunications Bordeaux (ENSEIRB)
Department	Ecole Nationale Superieure Electronique, Informatique & Radiocommunications Bordeaux (ENSEIRB)
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. +33 (0)5 56 84 65 00

Email: webmaster@enseirb.fr

Web address: www.enseirb.fr

Digital Signal Processing

Course outline

- Fundamental system theory : linearity, time invariance, causality, correlation and convolution

- Spectrum estimation and analysis : Discrete Fourier Transform, matrix descriptions of the DFT, spectral analysis using the DFT, the fast Fourier transform (FFT), spectral leakage and spectral smearing, windowing, periodogram method, correlation method

- Digital Filters : structures of FIR and IIR filters, choosing between FIR and IIR filters, FIR filters design techniques (direct design, windowing, frequency sampling), IIR filter design (pole-zero placement method, bilinear z-transform method, analogue prototype method)

- Adaptive filters : Basic Wiener filter theory, the LMS algorithm

Course focus

- Signal Processing

Course details

University	Technical University of Lodz
Department	International faculty of Engineering: Telecommunication and Computer Science
Country	Poland
Lecturer	Slawomir Hausman, PhD
Course language	English
Material in English?	Yes
Course in English planned?	No

Contact information

Tel. +48 42 636 53 08

Email: admin@ife.p.lodz.pl

Web address: http://oizet.p.lodz.pl/h/des.asp?module=314

Digital Signal Processing (Traitement Numerique De Signaux)

Course outline

- Main principles of digital signal processing

- Theory and practice of digital signal processing, with a massive use of computer tools.

- Applications and examples of digital systems in the context of digital TV and satellite communications

Course details

University	Institut Supérieur de TechNologie Luxembourg University of Applied Sciences
Department	Département d'électrotechnique
Country	Luxemburg
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. (00352)(0)42 01 01-1

Email: info@ist.lu

Web address: www.ist.lu

Digital Transmission (Transmission numérique)

Course outline

- Classical and advanced signal processing
- Modulation
- Adaptive Filtering ansd Equalization
- Channel coding
- Source coding

Course focus

- Signal Processing
- Information Theory

Course details

University	ENIC
Department	Communications mobiles
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. +33 (0) 493002666

Email: maisenic@enic.fr

Web address: www.enic.fr

Electromagnetic Compatibility

Course outline

- Brief repetition of necessary electrical engineering basics with special reference to EMC problems

- Signal representations in the time and frequency domains

- Kirchoff's rules for EMC, wave propagation, units and dimensions of EMC

- Limitations of estimates and approximations

- Description of sources of interference and their characteristic features

- Fundamentals of electrical coupling

- Fundamentals and effectiveness (mechanisms) of EMC protective measures

- Description of EMC problems by means of EMC circuit representations

Course details

University	ETHZ
Department	-
Country	Switzerland
Lecturer	Klaus G.
Course language	German
Material in English?	No
Course in English planned?	No
Keywords	EMC problems
Remarks	Fundamentals needed to understand and solve EMC problems. Lecture number : 35-768

Contact information

Tel. 0041 1 632 5002

Email: dept-sekr@ee.ethz.ch

Web address: http://www.ee.ethz.ch/students/courses.en.html

Electronics For Telecommunication Systems (Est : Electronique Pour Les Sytemes De Telecommunications)

Course focus

- Antenna Design
- RF Design

Course details

University	ParisTech
Department	École Nationale Supérieure des Télécommunications (ENST)
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. +33 (0)1 45 81 77 77

Email: communication@enst.fr

Web address: www.enst.fr

Electronics Of Radiocommunication Systems (Electronique Des Systemes De Radiocommunication (Ea2 09))

Course focus

- Antenna Design
- RF Design

Course details

University	Ecole Nationale Superieure Electronique, Informatique & Radiocommunications Bordeaux (ENSEIRB)
Department	Ecole Nationale Superieure Electronique, Informatique & Radiocommunications Bordeaux (ENSEIRB)
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. +33 (0)5 56 84 65 00

Email: webmaster@enseirb.fr

Web address: www.enseirb.fr

Embedded Software For Nomadic Applications (Logiciel Embarque Pour Application Portables)

Course focus

- Applications

Course details

University	ParisTech
Department	École Nationale Supérieure de Techniques Avancées
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. (33) (0) 1 45 52 54 01

Email: webmaster@ensta.fr

Web address: www.ensta.fr

Engineering and Management of Telecommunication Networks (Ingenierie et management des reseaux de telecommunications)

Course focus

- Wireless Systems
- Protocols
- Applications

Course details

University	Institut National des Télécommunications
Department	Resaux et Services de Telecommunication
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. +33 1 60 76 40 40

Email: webmaster@int-evry.fr

Web address: www-rst.int-evry.fr

Error Control Coding

Course focus

- Antenna Design
- RF Design
- Signal Processing

Course details

University	Aalborg University
Department	Communication Department
Country	Denmark
Lecturer	Hans Ebert
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Included in master program	Digital Communications and Mobile Communications
Tuition fee	No
Remarks	course 8th semester

Contact information

Tel. + 45 96 35 86 40

Email: heb@kom.auc.dk

Web address: http://kom.auc.dk/~heb/kurser/Kof-02/

Fields, Waves and Antennas

Course outline

- Maxwell equations
- Media classification
- Plane wave propagation
- Electromagnetic energy and power flow
- Waves at media boundaries, reflection
- TEM transmission lines
- Waveguides and resonators
- Antennas
- Lightwave propagation

Course focus

- Antenna Design
- RF Design

Course details

University	Warsaw University of Technology
Department	Faculty of Electronics and Information Technology
Country	Poland
Lecturer	Dr. Malgorzata Celuch-Marcysiak
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Keywords	maxwell equations; plane wave; TEM wave; guided waves; transmission lines; resonators; antennas
Included in master program	Yes
Other courses needed beforehand	Physics (electrostatics, magnetostatics); Calculus (partial differential equations, vector operators)
Tuition fee	0

Contact information

Tel. +48 22 660 76 31

Email: m.celuch@ire.pw.edu.pl

Future Mobile Communication Systems and Services

Course outline

- The course will give the students an introduction to wireless technologies (GSM and the future systems EDGE, TETRA and UMTS) and to the radio channel.

- Furthermore, the course will give an introduction to wireless services and their platforms, the media and services convergences and the "mobile Internet".

- The need for "integrated networks" will be discussed.

- The course includes project works and visits to mobile exchanges and radio base stations.

- Companies in the wireless industry will be involved in giving the students up-to-date information about the future mobile technology and mobile services and will contribute with a number of guest lectures.

Course focus

- Wireless Systems
- Applications

Course details

University	Technical University of Denmark
Department	Research Center COM
Country	Denmark
Lecturer	The course is given by Ole Mørk Lauridsen, External professor, director of R&D at GN Nettest, and as
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Keywords	Wireless technologies, mobile communication, GSM, UMTS, terminals, PDA, media and service convergence, services, mobile Internet, content, users, next generation networks (NGN)
Included in master program	Telecommunications
Tuition fee	No

Contact information

Tel. (+45) 4525 5179

Email: olesen@cti.dtu.dk

Global Information Systems

Course outline

- The course studies examines how various existing and emerging technologies can be combined to provide effective information systems on the Internet.

- Specifically, the course will cover Internet programming in Java, agent technologies, Internet databases, information extraction techniques and intelligent caching.

- Various aspects of agent technologies will be studied including the use of agents as personal assistants, learning agents and cooperative agents.

- In addition, the course examines various architectures for global information systems.

Course details

University	ETHZ
Department	-
Country	Switzerland
Lecturer	Norrie M.C.
Course language	German
Material in English?	No
Course in English planned?	No
Keywords	Internet programming in JAVA
Remarks	Lecture number : 37-372

Contact information

Tel. 0041 1 632 5002

Email: dept-sekr@ee.ethz.ch

Web address: http://www.ee.ethz.ch/students/courses.en.html

High Speed Networks and Multimedia

Course focus

- Protocols
- Applications

Course details

University	Institut National des Siences Appliquees de Lyon
Department	Télécommunications
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. (33) 04 72 43 83 83

Email: dic@insa-lyon.fr

Web address: www.insa-lyon.fr

Highfrequency and Microwave Electronics I

Course outline

- Linear microstrip devices : matching circuits, couplers, resonators and filters.

- Properties of Schottky, PIN, and varactor diodes and their application as mixers, detectors, switches and frequency multipliers in hybrid and monolithic integrated circuits.

- Introduction to noise properties of active devices.

- Computer aided design of linear microwave circuits.

Course focus

- Knowledge of the properties and applications of basic linear and nonlinear microwave electronic devices and circuits.

Course details

University	ETHZ
Department	-
Country	Switzerland
Lecturer	Baechtold W.
Course language	German
Material in English?	No
Course in English planned?	No
Keywords	microwave electronic devices and circuits
Other courses needed beforehand	Recommended: Antennas and Propagation
Remarks	Lecture number : 35-457

Contact information

Tel. 0041 1 632 5002

Email: dept-sekr@ee.ethz.ch

Web address: http://www.ee.ethz.ch/students/courses.en.html

History of Communications Technology

Course outline

- Communications engineering in antiquity, renaissance and modern history
- Optical telegraphs in the 18th and 19th century
- Development of electrical telegraphy - land lines and submarine cables
- Development of the telephone network - wireless electrical communications - valves - beginnings of audio and TV broadcasting

Course focus

- Basic knowledge about the history of communications engineering

Course details

University	Vienna University of Technology
Department	Faculty of Electrical Engineering and Information Technology
Country	Austria
Lecturer	BRAUNBECK Joseph, Dipl.-Ing. Dr.techn.
Course language	German
Material in English?	No
Course in English planned?	No
Keywords	History of communications engineering
Course hours	1,5

Contact information

Tel. 0043 1 58801 38901

Email: sekretariat@titanic.nt.tuwien.ac.at

Web address: http://www.lzk.ac.at/lecture/tuwien/382855

III European Summer School on Telecommunications

Course outline

- Latest aspects in Third mobile Generation communication sistems (UMTS), dealing with resources, systems and technology.

Course focus

- Applications

Course details

University	University of Cantabria
Department	Communications Engineering Department (DICOM)
Country	Spain
Lecturer	José Luis García García and Ana García Armada
Course language	Spanish
Material in English?	No
Course in English planned?	No
Keywords	UMTS, 3G
Included in master program	Communications Engineering
Begin month	June
Course hours	30
Average number of students	8
Tuition fee	110 EUR
Remarks	This course could be in English if most of students ask for it.

Contact information

Tel. 34-942201491

Email: jlgarcia@dicom.unican.es

Web address: http://www.dicom.unican.es

Information Security Technology

Course focus

- Information Theory

Course details

University	Helsinki University of Technology
Department	Department of Electrical and Communications Engineering and Department of Computer Science
Country	Finland
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Included in master program	The Master's Programme in Telecommunication
Tuition fee	No
Remarks	Telecommunications Software major

Contact information

Tel. 358 9451 5256

Email: sanna.yliheljo@hut.fi

Web address: http://keskus.tct.hut.fi/masters/maskur1.html

Information Systems

Course details

University	Dublin Institute of Technology
Department	Faculty of Engineering
Country	Ireland
Course language	English
Material in English?	No
Course in English planned?	No
Included in master program	M.Sc. in Applied Computing for Technologies
Other courses needed beforehand	A minimum of Second Class Honours degree (2.2 grade or higher) in engineering or a related discipline.
Begin month	Oct 2003
Course hours	10

Contact information

Tel. 353-1-402-3654

Email: John.Turner@dit.ie

Web address: http://www.dit.ie/DIT/study/graduate/courses/ft120.html

Information Theory

Course focus

- Information Theory

Course details

University	Poznan University of Technology
Department	Electrical Engineering Dept, Institute of Electronics & Telecommunications
Country	Poland
Lecturer	Prof. Krzysztof Wesolowski
Course language	Polish
Material in English?	No
Course in English planned?	Yes
Tuition fee	0
Remarks	Size of the course: 30h lecture + 15h problem sessions It is currently given in Polish, however, it is possible to give it in English.

Contact information

Tel. +4861 6652741

Email: wesolows@et.put.poznan.pl

Information Theory and Coding

Course outline

- Baseband digital communications.
- Digital modulation systems.
- Multiple access, TDMA, FDMA & CDMA.
- Adaptive equalisation.
- Fundamentals of information theory channel coding.

Course focus

- Information Theory

Course details

University	University of Limerick
Department	Department of Electronic & Computer
Country	Ireland
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Included in master program	Master of Engineering in Computer and Communications Systems
Other courses needed beforehand	Honours undergraduate degree in a numerate discipline.
Course hours	9
Remarks	Course hours in credits

Contact information

Web address: http://www.ece.ul.ie/

Information Transfer

Course outline

- Analog Modulation (AM, FM, DSB).

- A block diagram of a digital cellular mobile phone system.

- The Nyquist Criterion for no ISI and the Matched Filter.

- Counting bits/dimension, bits/sec, bits/sec/Hz in base-band.

- Power Spectral Density, and the energy-per-bit parameter.

- Passband communication (QAM).

- Detection in white Gaussian noise.

- The Chernoff and Bhattacharyya bounds.

- Signals as a vector space : continuous time Inner products and the Gram-Schmidt algorithm.

- Block and Convolutional Codes for the Gaussian channel. Multi-accessing schemes such as FDMA, TDMA, and CDMA.

Course details

University	ETHZ
Department	-
Country	Switzerland
Lecturer	Lapidoth A.
Course language	German
Material in English?	No
Course in English planned?	No
Keywords	modern digital communication
Remarks	Lecture number: 35-104

Contact information

Tel. 0041 1 632 5002

Email: dept-sekr@ee.ethz.ch

Web address: http://www.ee.ethz.ch/students/courses.en.html

Information Transport Protocols : SDH, ATM, IP (Protocoles de transport de l'information : SDH, ATM, IP)

Course focus

- Protocols

Course details

University	Ecole NationaleSuperieure d`Ingenieurs de Limoges ENSIL
Department	Ecole Nationale Superieure d`Ingenieurs de Limoges ENSIL
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. (33)0555423670

Web address: www.ensil.unilim.fr

Integrated Circuits and Telecoms Systems (Circuits Intégrés et Systèmes de Télécoms)

Course focus

- Antenna Design
- RF Design
- Signal Processing

Course details

University	Ecole Nationale Superieure des Telecommunications de Bretagne
Department	Ecole Nationale Superieure des Telecommunications de Bretagne
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. 33 (0)2 29 00 11 11

Web address: www.enst-bretagne.fr

Integrated Circuits for High Speed Communication

Course outline

- The properties and limits of state-of-the-art Silicon and compound IC technologies (GaAs, InP, GaN) for high-speed data communication are reviewed and compared.

- The characteristics and modeling of transistors (BP, HBT, FET and HEMT), lumped elements, distributed elements, packages and interconnects are discussed.

- Theoretical basics, design concepts and circuit topologies for analog wireless transceiver ICs (LNA, Mixer, PA, VCO) and optical transceiver ICs (laser driver, detector, multiplexer, demultiplexer and clock recovery.

- The design of PLL circuit blocks.

- Insights in high-speed measurement techniques and leading-edge IC fabrication.

Course focus

- The course teaches the design of analog and digital integrated circuits (ICs) for high-speed wireless and optical data communication in the multi-GHz and -Gb/s range.

Course details

University	ETHZ
Department	-
Country	Switzerland
Lecturer	Jaeckel H., Ellinger F.
Course language	German
Material in English?	No
Course in English planned?	No
Keywords	Design of analog and digital integrated circuits
Other courses needed beforehand	Knowledge in the area of circuit theory (e.g. Analog Integrated Circuits) and transmission lines and filters is helpful.
Remarks	Lecture number : 35-137

Contact information

Tel. 0041 1 632 5002

Email: dept-sekr@ee.ethz.ch

Web address: http://www.ee.ethz.ch/students/courses.en.html

Introduction To Communication Systems (Introduction Aux Systemes De Communication)

Course outline

- Telephony and telephone networks.
- Computer communication, the Internet, the world wide web.
- Software engineering.
- Electrical components.
- Signal and image processing.
- Networks and mobiles.
- Security of communication systems.
- Audio-visual communications.

Course details

University	EPFL
Department	1er cycle - Systèmes de communication
Country	Switzerland
Lecturer	Jean-Pierre HUBAUX, professeur EPFL/DSC
Course language	French
Material in English?	Yes
Course in English planned?	Yes
Keywords	Introduction aux systemes de communication - Introduction to communication systems
Course hours	14

Contact information

Tel. 0041 21 693 5637

Email: dsc@epfl.ch

Web address: http://dscwww.epfl.ch/students/1er-cycle-01-02.pdf

Introduction to Radar (Introduction aux radars)

Course focus

- Wireless Systems

Course details

University	Universite de Rennes 1
Department	Institut de Formation Superieure en Informatique et Communication (IFSIC)
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. (33)2 99 84 71 00

Email: webmaster@ifsic.univ-rennes1.fr

Web address: www.ifsic.univ-rennes1.fr

Introduction to Software Engineering

Course focus

- Antenna Design
- RF Design

Course details

University	Helsinki University of Technology
Department	Department of Electrical and Communications Engineering and Department of Computer Science
Country	Finland
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Included in master program	The Master's Programme in Telecommunication
Tuition fee	No
Remarks	Radio Communication major

Contact information

Tel. +3589451 5381

Email: anita.bisi@hut.fi

Web address: http://keskus.tct.hut.fi/masters/maskur1.html

Introduction to Wireless Engineering

Course outline

- Introduce the applications, systems, sub-systems, and components in the wireless field in a comprehensive manner.

- To give an insight into the methods, tools, and procedures of modern wireless engineering.

Course focus

- To refresh and enhance the knowledge within the foundations to ensure that the prerequisites for the other courses in the program are fulfilled.

- Wireless Systems.

Course details

University	Chalmers University of Technology
Department	Chalmers University of Technology
Country	Sweden
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Included in master program	Hardware in Wireless Communications
Other courses needed beforehand	Should have a B.Sc. or equivalent in electrical engineering or engineering physics.
Begin month	Fall Semester
Course hours	6
Remarks	Course hours given in 6 cu! (course unit)

Contact information

Tel. +46 31 772 1834

Email: piotr@ep.chalmers.se

Web address: http://www.chalmers.se/masters.html

Konservatorium Mobile Radio Communications (389.136)

Course details

University	Vienna University of Technology
Department	Faculty of Electrical Engineering and Information Technology
Country	Austria
Lecturer	RUPP Markus, Dipl.-Ing. Dr.techn., WEINRICHTER Johann, Dipl.-Ing. Dr.techn., SALCIC Zoran, Dr.techn.
Course language	German
Material in English?	No
Course in English planned?	No
Keywords	Mobile Radio Communications
Course hours	3

Contact information

Tel. 0043 1 58801 38967

Email: mrupp@nt.tuwien.ac.at

Web address: http://www.lzk.ac.at/lecture/tuwien/389136

Konservatorium Mobilfunk (381.431)

Course details

University	Vienna University of Technology
Department	Faculty of Electrical Engineering and Information Technology
Country	Austria
Lecturer	BONEK Ernst, Dipl.-Ing. Dr.techn., RUPP Markus, Dipl.-Ing. Dr.techn., WEINRICHTER Johann, Dipl.-Ing.
Course language	German
Material in English?	No
Course in English planned?	No
Keywords	Mobifunk
Course hours	3

Contact information

Tel. 0043 1 58801-0

Web address: http://www.lzk.ac.at/lecture/tuwien/381.431

Laboratory Antennentechnik (389.031)

Course details

University	Vienna University of Technology
Department	Faculty of Electrical Engineering and Information Technology
Country	Austria
Lecturer	SCHOLTZ Arpad, Dipl.-Ing. Dr.techn.
Course language	German
Material in English?	No
Course in English planned?	No
Keywords	Laboratory Antennentechnik
Course hours	2

Contact information

Tel. 0043 1 58801 38945

Email: ascholtz@pop.tuwien.ac.at

Web address: http://www.lzk.ac.at/lecture/tuwien/389031

Laboratory Communication Engineering - Laboratory Exercises A (389.081)

Course outline

- Filters
- Digital signal processing
- Signal analysis and speech acoustics
- Audio devices
- Stochastic processes
- Opto-electronics
- Modulation, Oscillators
- Heterodyning
- Waves on transmission lines
- Transistors

Course focus

- Signal Processing
- Wireless Systems

Course details

University	Vienna University of Technology
Department	Faculty of Electrical Engineering and Information Technology
Country	Austria
Lecturer	MECKLENBRÄUKER Wolfgang, Dipl.-Ing. Dr.techn., MATZ Gerald, Dipl.-Ing. Dr.techn.
Course language	German
Material in English?	Yes
Course in English planned?	No
Keywords	Filters, DSP, Signal Analysis
Course hours	5
Remarks	Costs 280 euro

Contact information

Tel. 0043 1 58801-0

Web address: http://www.lzk.ac.at/lecture/tuwien/389081

LAN, MAN, WAN :Architectures and Protocols

Course focus

- Wireless Systems
- Protocols

Course details

University	Institut National des Siences Appliquees de Lyon
Department	Télécommunications
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. (33) 04 72 43 83 83

Email: dic@insa-lyon.fr

Web address: www.insa-lyon.fr

Management of Mobile Networks

Course outline

- Application of network management to mobile networks

- Management of functions and resources

- Subscriber management

- Security management

- Architectures and standards

- Management of future networks : in case of UMTS

Course focus

- Wireless Systems

Course details

University	EURECOM
Department	Mobile Communications
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. +33 (0) 493002608

Email: christian.bonnet@eurecom.fr

Web address: www.eurecom.fr

Management Of Mobile Networks (Administration Des Reseaux Mobiles)

Course outline

- Application of network management to mobile networks Administration

- Management of functions and resources

- Subscriber management

- Security management

- Architectures and standards

- Management of future networks : in case of UMTS

Course details

University	EPFL
Department	2ème cycle Eurecom - Com. Mobiles
Country	Switzerland
Lecturer	Christian BONNET
Course language	French
Material in English?	Yes
Course in English planned?	Yes
Keywords	l'architecture des systèmes, mécanismes de sécurité - management elements in mobile radio systems, the architecture of management systems
Course hours	15

Contact information

Tel. 0041 21 693 5637

Email: dsc@epfl.ch

Web address: http://dscwww.epfl.ch/students/2eme-cycle-Eurecom-sanction-etudes-01-02.pdf

Microwave Techniques

Course details

University	Technical University of Lodz
Department	nternational faculty of Engineering: Telecommunication and Computer Science
Country	Poland
Course language	English
Material in English?	No
Course in English planned?	No
Included in master program	Telecomunication and Computer Science

Contact information

Tel. +48 42 636 53 12

Email: admin@ife.p.lodz.pl

Web address: http://oizet.p.lodz.pl/h/des.asp?module=417

Mobile Advanced Topics

Course outline

- Algorithms and tools to locate base stations

- Frequency and channel allocation : static, adaptive and dynamic

- Handover and power control strategies

- Speech burst radio transmission networks (PRNET)

- Use of multiple element antenna

Course focus

- Wireless Systems

Course details

University	EURECOM
Department	Mobile Communication
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. +33 (0) 493002608

Email: christian.bonnet@eurecom.fr

Web address: www.eurecom.fr

Mobile and Wireless Information System

Course focus

- Information Theory
- Wireless Systems

Course details

University	University of Karlsruhe
Department	Computer Science
Country	Germany
Lecturer	Birgitta König-Ries
Course language	German
Material in English?	No
Course in English planned?	No
Included in master program	Systems of the information administration
Begin month	October

Contact information

Tel. +49 721 608 4065

Email: koenig@ira.uka.de

Web address: http://www.ira.uka.de/I3V_HTML/VERANSTALTUNGEN/01008935.htm

Mobile And Wireless Networking (262001)

Course outline

- This subject concentrates on networking aspects of wireless and mobile technologies. Although the focus is on the network layer, and particularly on mobility support in the context of IP, the relevant physical aspects are briefly reviewed, medium access issues are described, and the effect of mobility on end-to-end transport protocols such as TCP is included.

- Part of this subject is devoted to the description of different existing and future technologies, like GPRS, UMTS, Wireless LANs, or Bluetooth, but this is done to support general concepts.

- Some lectures are dedicated to new subjects, such as ad hoc networking or mobile applications.

Course focus

- Wireless Systems
- Protocols

Course details

University	University of Twente
Department	Electrical Engineering
Country	Netherlands
Lecturer	G J HEIJENK
Course language	English
Material in English?	No
Course in English planned?	No
Keywords	Networking, mobility support in the context of IP

Contact information

Email: s.m.heemstradegroot@cs.utwente.nl

Web address: http://www.el.utwente.nl/en/study_programmes/courses/index-afs.htm

Mobile And Wireless Networks (Reseaux Mobiles Et Sans Fil)

Course focus

- Wireless Systems

Course details

University	Ecole Superieure Chimie Physique Electronique De Lyon
Department	Informatique et
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. (33) 472431700

Web address: www.cpe.fr

Mobile Communication

Course focus

- Information Theory
- Wireless Systems
- Protocols

Course details

University	University of Bonn
Department	Computer Science VI
Country	Germany
Lecturer	Peter Martini, Matthias Frank
Course language	German
Material in English?	No
Course in English planned?	No
Included in master program	Communication Systems
Other courses needed beforehand	Vordiplom
Begin month	April

Contact information

Tel. +49 228 73-4334

Email: Peter.Martini@cs.uni-bonn.de

Web address: http://web.informatik.uni-bonn.de/IV/martini/Lehre/Veranstaltungen/ SS02/index.html#Vorlesung2

Mobile Communication

Course outline

- Mobile radio channels as linear deterministic/stochastic systems
- WSSUS property
- Fading models
- Diversity and combining
- Interference
- Binary signalling
- Spread spectrum and CDMA in cellular mobile radio systems
- Receiver design
- Conventional and joint detection
- Synchronisation
- Demodulation in UMTS
- Channels of wireless narrowband and broadband systems, modelling;
- Theory and application of spread-spectrum techniques
- Propagation of electromagnetic waves (reflection, refraction, scattering, absorption); antenna structures, characteristics, feeding
- Impedance matching
- Design of radio links
- Electromagnetic compatibility of wireless systems with the environment.

Course focus

- Fundamentals of concepts for wireless transmission systems.

Course details

University	ETHZ
Department	-
Country	Switzerland
Lecturer	Dahlhaus D., Meyer G.
Course language	German
Material in English?	No
Course in English planned?	No
Keywords	Fundamentals of concepts for wireless transmission systems
Other courses needed	Transmission Technology I.

beforehand	
Remarks	Lecture number : 35-437

Contact information

Tel. 0041 1 632 5002

Email: dept-sekr@ee.ethz.ch

Web address: http://www.ee.ethz.ch/students/courses.en.html

Mobile Communication

Course focus

- Information Theory
- Protocols

Course details

University	Technical University Carolo-Wilheimina at Brunswik
Department	Computer Science
Country	Germany
Lecturer	Lars Wolf
Course language	German
Material in English?	No
Course in English planned?	No
Included in master program	Operating Systems and Computer Networks
Other courses needed beforehand	Operation System und Networks, Communication Systems/ Telematic
Begin month	April
Course hours	120

Contact information

Tel. +49 531 391-3288

Email: wolf@ibr.cs.tu-bs.de

Web address: http://www.ibr.cs.tu-bs.de/lehre/ss03/mk/index.html

Mobile Communication Networks

Course focus

- Signal Processing
- Information Theory
- Wireless Systems

Course details

University	Dresden University of Technology
Department	Electrical Engineering and Information Technology
Country	Germany
Lecturer	Heinrich Nuszkowski
Course language	German
Material in English?	No
Course in English planned?	No
Included in master program	Communications Laboratory
Other courses needed beforehand	Communications technology, system theory III, digital signal transmission
Begin month	October

Contact information

Tel. +49 (351) 463-32117

Email: nuszkows@ifn.et.tu-dresden.de

Web address: http://www.ifn.et.tu-dresden.de/MNS/lehre/mns1.html

Mobile Communication Networks Ii

Course focus

- Wireless Systems
- Protocols

Course details

University	Dresden University of Technology
Department	Electrical Engineering and Information Technology
Country	Germany
Lecturer	Gerhard Fettweis
Course language	German
Material in English?	No
Course in English planned?	No
Keywords	planning and optimization
Included in master program	Communications Laboratory
Other courses needed beforehand	Communications technology, system theory III, digital signal transmission
Begin month	April

Contact information

Tel. +49 351 463 33943

Email: fettweis@ifn.et.tu-dresden.de

Web address: http://www.ifn.et.tu-dresden.de/MNS/lehre/mns2.html

Mobile Communication Systems

Course focus

- Antenna and RF Design
- Signal Processing

Course details

University	Helsinki University of Technology
Department	Department of Electrical and Communications Engineering and Department of Computer Science
Country	Finland
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Included in master program	The Master's Programme in Telecommunication
Tuition fee	No
Remarks	Radio Communication major

Contact information

Tel. +3589451 5381

Email: anita.bisi@hut.fi

Web address: http://keskus.tct.hut.fi/masters/maskur1.html

Mobile Communication Systems

Course details

University	Poznan University of Technology
Department	Electrical Engineering Dept, Institute of Electronics&Telecommunications
Country	Poland
Lecturer	Prof. Krzysztof Wesolowski (regular studies);Dr Hanna Bogucka (extramural studies)
Course language	Polish
Material in English?	No
Course in English planned?	Yes
Tuition fee	0
Remarks	Undergraduate course Size of the course: 30h lectures + 15h problem sessions It is currently given in Polish, however, it is possible to give it in English.

Contact information

Tel. +4861 6652741

Email: wesolows@et.put.poznan.pl

Mobile Communication Systems (Services De Communications Mobiles)

Course focus

- The purpose of this course is to know how to define the various types of service and the different markets for mobile communications

- To know the architecture of the systems related to these services

Course outline

- Trunks

- Terrestrial cellular systems

- Local access, personal communications

- Data packet communication

- Satellite based systems

- Wireless networks

- Positioning and paging

Course details

University	EPFL
Department	2ème cycle Eurecom - Com. Mobiles
Country	Switzerland
Lecturer	Christian BONNET
Course language	French
Material in English?	Yes
Course in English planned?	Yes
Keywords	segmentation des services offerts, principes d'architecture - various types of service, the architecture of the systems
Course hours	10

Contact information

Tel. 0041 21 693 5637

Email: dsc@epfl.ch

Web address: http://dscwww.epfl.ch/students/2eme-cycle-Eurecom-sanction-etudes-01-02.pdf

Mobile Communication Systems (Systemes De Communications Mobiles)

Course outline

- The purpose of this course is to present a series of mobile systems in their entirety to synthetize the knowledge gained in the previous modules

- To know the standards being developed, and to follow the evolution of various mobile services

Course focus

- GSM and IS-95

- Cordless telephone systems, DECT

- Satellite systems

- Network pocket radio

- Data transmission systems

- Emerging standard : TETRA, ERMES, etc…

Course details

University	EPFL
Department	2ème cycle Eurecom - Com. Mobiles
Country	Switzerland
Lecturer	Christian BONNET
Course language	French
Material in English?	Yes
Course in English planned?	Yes
Keywords	Follow the evolution of various mobile services (l'évolution des divers services mobiles)
Course hours	25

Contact information

Tel. 0041 21 693 5637

Email: dsc@epfl.ch

Web address: http://dscwww.epfl.ch/students/2eme-cycle-Eurecom-sanction-etudes-01-02.pdf

Mobile Communication Systems: 2G and 3G Cellular Systems-courses for industry

Course outline

- Resume of the foundation of digital communication systems
- Wireless channels - properties, characterization and modelling
- ntennas for wireless communications
- Cellular concept
- 2G GSM system architecture and operation
- Data transmission in GSM
- GPRS and EDGE system
- Foundations of spread spectrum systems
- Architecture and operation of IS-95
- Trunking systems (MTP, Tetra)
- Cordless Telephony (CT-2, DECT)
- Personal Satellite Communications(IRIDIUM, GLOBALSTAR,Teledesic)
- Evolution towards 3G systems
- Architecture and operation of UMTS, information on cdma2000
- Wireless LAN systems (IEEE 802.11, HIPERLAN) and Bluetooth
- Basic information on smart antennas

Course focus

- Antenna and RF Design
- Wireless Systems
- Applications

Course details

University	Poznan University of Technology
Department	Electrical Engineering Dept, Institute of Electronics&Telecommunications
Country	Poland
Lecturer	Prof. Krzysztof Wesolowski, Dr. Hanna Bogucka, Dr. Rafal Krenz, Dr. Piotr Tyczka,

Course language	Polish
Material in English?	Yes
Course in English planned?	Yes
Keywords	Wireless systems, GSM, UMTS, trunking systems, satellite systems,cellular systems
Included in master program	Yes
Other courses needed beforehand	Knowledge on communication systems
Tuition fee	subject of negotiation, depends on the number of students attending
Remarks	So far Polish, can be prepared in English

Contact information

Tel. +4861 6652741

Email: wesolows@et.put.poznan.pl

Web address: www.et.put.poznan.pl

Mobile Communications

Course focus

- Information Theory
- Wireless Systems

Course details

University	Ludwig-Maximilian University of Munich
Department	Computer Science
Country	Germany
Lecturer	Claudia Linnhoff-Popien
Course language	German
Material in English?	Yes
Course in English planned?	Yes
Included in master program	Communication systems and systems programming
Other courses needed beforehand	Basic knowledge in computer science, Knowledge in computer networks and telecommunication systems is favourable.
Begin month	October

Contact information

Tel. +49 89 2180 9149

Email: linnhoff@informatik.uni-muenchen.de

Web address: http://www.nm.informatik.uni-muenchen.de/Vorlesungen/ws0203/mk.shtml

Mobile Communications

Course outline

- Private Mobile Radiotelephony sistems (PMR).
- Trunk telephony radiotelephony.
- Mobile channels propagation.
- Coverage evaluation and calculation.
- Cellular systems.
- GSM system.
- Introduction to UMTS.

Course focus

- Antenna and RF Design
- Wireless Systems

Course details

University	University of Cantabria
Department	Communications Engineering Department (DICOM)
Country	Spain
Lecturer	Rafael Pedro Torres Jiménez .
Course language	Spanish
Material in English?	No
Course in English planned?	No
Keywords	Cellular, 3G, UMTS
Included in master program	Radiocommunications specialization
Begin month	February
Course hours	60
Average number of students	25
Tuition fee	108 EUR

Contact information

Tel. 34-942201558

Email: torresrp@unican.es

Web address: http://www.gsr.unican.es

Mobile Communications

Course outline

- GSM
- The new data network GPRS
- Current developing technologies : WLAN, WAP, Bluetooth
- The new communications system UMTS, which enables much faster multimedia mobile communications.

Course focus

- Protocols
- Applications

Course details

University	Polytechnic foundation of Cataluña (FPC)-Polytechnic University of Cataluña (UPC)
Department	Signal Theory and communications
Country	Spain
Lecturer	Ramon Agustí Comes (Course Management)
Course language	Spanish
Material in English?	Yes
Course in English planned?	No
Keywords	3G, Wireless-LAN, UMTS
Included in master program	Mobile communications
Begin month	October
Course hours	450
Tuition fee	6600 EUR

Contact information

Tel. 34-934012529

Email: angels.tejada@fpc.upc.es

Web address: http://www.fpc.upc.es

Mobile Communications

Course outline

- Traffic analysis in mobile radio : Traffic characterization. Grade of service.,Erlang-B Erlang-C and other traffic formulas.

- Propagation : Units of EM power, field strength, voltage and their conversion. Use of decibels.

- Major physical phenomena involved in propagation of radio waves : reflections, refraction, diffraction. Fast and slow fading. Statistical description of field strength. Empirical propagation models of ITU-R, Okumura, and Lee. Theoretical propagation models based on geometrical optics and unified theory of diffraction. COST 231 models. Computer programs for propagation prediction. Digital terrain models. Radio survey.

- Noise and interference: Receiver sensitivity. Slow and fast fading. Man-made and natural noise. Co-channel interference. Service range and interference range. Noise limited and interference limited radio coverage. Minimum field strength. Cell arrangements. Sectored antennas. Adjacent channel interference and intermodulation interference.

- Base station equipment: Antennas and antenna systems. Influence of reflections in feeder systems. Calculation and measurement of VSWR. Transmitter combiners, receiver multicouplers, duplexers, isolators. Transmitters.

- Private mobile radio : conventional and trunked (MPT1327/43, EDACS, TETRA, etc).

- Cellular radio : analogue and digital (NMT450/900, AMPS, TACS, GSM, DCS 1800, IS-95, PCN, etc). Cordless telephones (CT2, DECT). Paging systems.

Course focus

- Wireless Systems

Course details

University	Technical University of Lodz
Department	International faculty of Engineering: Telecommunication and Computer Science
Country	Poland
Lecturer	Slawomir Hausman, PhD
Course language	English
Material in English?	No
Course in English planned?	No
Included in master program	Telecomunication and Computer Science

Contact information

Tel. +48 42 636 53 11

Email: admin@ife.p.lodz.pl

Web address: http://oizet.p.lodz.pl/h/des.asp?module=416

Mobile Communications

Course outline

- Introduction to mobile communication systems with a focus on the physical layer.

Course focus

- Signal Processing
- Wireless Systems

Course details

University	Ilmenau University of Technology
Department	Electrical Engineering and Information Technique
Country	Germany
Lecturer	Martin Haardt
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Included in master program	Communications Research Laboratory
Begin month	April
Course hours	180
Remarks	It is given in English to familiarize the students with the linguistic requirements of a global economy, where technical discussions between international partners are usually conducted in English. Moreover, the students have the opportunity to participate in projects, where they get to know international research papers about this exciting topic.

Contact information

Tel. +49 3677 69-2613

Email: martin.haardt@tu-ilmenau.de

Web address: http://ikmcip1.e-technik.tu-ilmenau.de/nt/de/teachings/ vorlesungen/ mobile_comm/index.html

Mobile Communications (125160)

Course outline

- Principles of radio transmission in the ever changing mobile environment.
- The signalling and modulation techniques

Course focus

- Wireless Systems

Course details

University	University of Twente
Department	Electrical Engineering
Country	Netherlands
Lecturer	Prof Dr. Haartsen J.C.
Course language	English
Material in English?	No
Course in English planned?	No
Other courses needed beforehand	Transmission and modulation (125156)

Contact information

Email: j.c.haartsen@el.utwente.nl

Web address: http://www.el.utwente.nl/en/study_programmes/courses/index-afs.htm

Mobile Communications Airtel-UPM

Course outline

- Fundamentals of radio transmision
- Design of communications networks
- Indepth study of Mobile networks systems
- The GSM system, GPRS, UMTS
- The recent technologies: WAP, Bluetooth.
- Importance of the convergence with fixed networks.
- Fundamentals and design techniques of fixed networks.

Course focus

- Protocols
- Applications

Course details

University	Polytechnic University of Madrid (UPM)
Department	Telematic sistems Engineering (SIT) and Signal, sistems and Radiocommunications (SSR)
Country	Spain
Lecturer	Juan B.Riera García
Course language	Spanish
Material in English?	No
Course in English planned?	No
Keywords	Wireless-LAN, 3G, UMTS, Fixed-Wireless
Included in master program	Mobile communications Airtel-UPM
Begin month	October
Course hours	60
Average number of students	35
Tuition fee	6010 EUR

Contact information

Tel. 34-913367364

Email: postgrado@master.etsit.upm.es

Web address: http://www.master.etsit.upm.es, http://www.fundacionairtel.es

Mobile Communications I/ Wireless Communication

Course focus

- Signal Processing
- Wireless Systems

Course details

University	Christian-Albrechts-University of Kiel
Department	Elektrotechnik und Informationstechnik
Country	Germany
Lecturer	Peter Adam Höher
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Included in master program	Information and Coding Theory Lab
Other courses needed beforehand	Fundamentals on digital communications, channel coding, and system theory
Begin month	October

Contact information

Tel. +49-431-880-6127

Email: ph@tf.uni-kiel.de

Web address: http://www-lns.tf.uni-kiel.de/ict/lehre_e.html

Mobile Communications II

Course focus

- Wireless Systems

Course details

University	Chistian- Albrechts- University of Kiel
Department	Elektrotechnik und Informationstechnik
Country	Germany
Lecturer	Peter Adam Höher
Course language	German
Material in English?	No
Course in English planned?	No
Included in master program	Information and Coding Theory Lab
Other courses needed beforehand	Mobile Communications I
Begin month	October

Contact information

Tel. +49-431-880-6127

Email: ph@tf.uni-kiel.de

Web address: http://www-lns.tf.uni-kiel.de/ict/lehre_e.html

Mobile Communications Networks

Course outline

- Wireless access networks of first and second generation.
- Use of the radio resources.
- Channel assigning techniques.
- Third generation wireless packet switching systems.
- Mobility model analysis for IP networks.

Course focus

- Protocols

Course details

University	Polytechnic University of Valencia (UPV)
Department	Communications
Country	Spain
Lecturer	Vicente Casares, Pablo García and Jorge Martínez
Course language	Spanish
Material in English?	No
Course in English planned?	No
Keywords	Wireless-network, spectrum-usage/requirements, 3G, IP
Included in master program	Postgraduate studies
Other courses needed beforehand	knowledge of :FDMA,TDMA, and CDMA access sistem; modulation techniques; Markov processes and IP networks would be and advantage.
Begin month	March
Course hours	45
Average number of students	9

Contact information

Tel. +34 963877300

Email: depcom@dcom.upv.es

Web address: http://www.dcom.upv.es

Mobile Communications Planning and Methods

Course details

University	Helsinki University of Technology
Department	Department of Electrical and Communications Engineering and Department of Computer Science
Country	Finland
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Included in master program	The Master's Programme in Telecommunication
Tuition fee	No
Remarks	Digital signal Processing major

Contact information

Tel. +3589451 5381

Email: anita.bisi@hut.fi

Web address: http://keskus.tct.hut.fi/masters/maskur1.html

Mobile Communications Services

Course outline

- Trunks
- Terrestrial cellular systems
- Local access, personal communications
- Data packet communication
- Satellite based systems
- Wireless networks
- Positioning and paging

Course focus

- Wireless Systems

Course details

University	EURECOM
Department	Mobile Communication
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. +33 (0) 493002608

Email: christian.bonnet@eurecom.fr

Web address: www.eurecom.fr

Deliverable 3.1: Identification of interchangeable modules and lectures NexWay:IST-2001-37944

Mobile Communications Systems

Course outline

- GSM and IS-95
- Cordless telephone systems, DECT
- Satellite systems
- Network pocket radio
- Data transmission systems
- Emerging standard : TETRA, ERMES, etc...

Course focus

- Wireless Systems

Course details

University	EURECOM
Department	Mobile Communication
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. +33 (0) 493002608

Email: christian.bonnet@eurecom.fr

Web address: www.eurecom.fr

Work package 3: Education 201

Mobile Communications Systems and Services

Course details

University	Helsinki University of Technology
Department	Department of Electrical and Communications Engineering and Department of Computer Science
Country	Finland
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Included in master program	The Master's Programme in Telecommunication
Tuition fee	No
Remarks	Networking Technology major

Contact information

Tel. +3589451 5381

Email: anita.bisi@hut.fi

Web address: http://keskus.tct.hut.fi/masters/Mas-2003-networking.html

Mobile Computing

Course objectives

- To study the wireless systems
- To study the architectures and protocols for wireless computing

Course outline

- Basic concepts
- Wireless transmission
- Medium access
- Public wireless communication systems
- WLAN's
- IP mobility
- Mobile transport protocols
- Support for mobility

Course details

University	Technical University of Lisbon
Department	Department of Electrical and Computer Engineering
Country	Portugal
Lecturer	Prof. Mário Nunes
Course language	Portuguese
Included in master program	Electrical and Computer Engineering

Contact information

Tel. +351 213100259

Email: joao.lemos@inesc.pt

Web address: http://www.deec.ist.utl.pt/meec/meec/programa0405.html

Mobile Computing

Course focus

- Information Theory
- Wireless Systems
- Protocols
- Applications

Course details

University	University of Stuttgart
Department	Computer Science
Country	Germany
Lecturer	Kurt Rothermel
Course language	German
Material in English?	No
Course in English planned?	No
Included in master program	Parallel and distributed systems (IPVS)
Other courses needed beforehand	Nothing
Begin month	April
Course hours	90
Remarks	This lecture is orally examined.

Contact information

Tel. +49-711-7816-434

Email: Kurt.Rothermel@informatik.uni-stuttgart.de

Web address: http://www.informatik.uni-stuttgart.de/ipvr/vs/de/teaching/ ss02/ lectures/ MobileComputing/

Mobile Digital Communication

Course outline

- Characterization of the transmission channel
  - Non-selective (flat) fading
  - Selective (multipath) fading
  - Doppler-spread
  - Delay-spread
  - Coherence time
  - Coherence bandwidth
  - Suitable examples will be studied
- Systems for mobile digital communications
  - Modulation and access techniques (FDMA, TDMA, CDMA)
  - Receiver structures
  - Performance
  - Suitable examples will be studied
- Methods for improving performance
  - Diversity
  - Coding
  - Interleaving
  - Suitable examples will be studied

Course focus

- Wireless Systems

Course details

University	Ghent University
Department	Electrical Engineering
Country	Belgium
Lecturer	Marc Moeneclaey
Course language	Dutch
Material in English?	No
Course in English planned?	No

Contact information

Tel. +3292643413

Email: Marc.Moeneclaey@rug.ac.be

Web address: http://aivwww.rug.ac.be/Studentenadministratie/Studiegids/2001/ EN/ FACULTY/E_TW/COURSE/EPELEK/03O00027/INDEX.HTM

Mobile Network Architecture

Course focus

- Wireless Systems
- Protocols

Course details

University	Institut National des Siences Appliquees de Lyon
Department	Télécommunications
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. (33) 04 72 43 83 83

Email: dic@insa-lyon.fr

Web address: www.insa-lyon.fr

Mobile Networks

Course outline

- To understand the technical bases of mobile networks.

Course focus

- Information Theory
- Wireless Systems
- Protocols
- Applications

Course details

University	University of Mannheim
Department	Mathematics und Computer Science
Country	Germany
Lecturer	Martin Mauve, Hannes Hartenstein
Course language	German
Material in English?	No
Course in English planned?	No
Included in master program	Computer Science/ Computer network & Multimedia
Begin month	April
Course hours	180

Contact information

Tel. +49-621 181-2616

Email: mauve@informatik.uni-mannheim.de

Web address: http://www.informatik.uni-mannheim.de/informatik/pi4/stud/veranstaltungen/ss2002/mobnets/index.html

Mobile Networks (**Réseaux mobiles**)

Course focus

- Wireless Systems

Course details

University	L'Institut National Polytechnique de Grenoble
Department	Ecole Nationale Superieure d`Infornatique et de Mathematique Appliquee de Grenoble (ENSIMAG)
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. (33)04 76 82 72 66

Email: Scol@ensimag.imag.fr

Web address: www.ensimag.fr

Mobile Networks ans Services (Réseaux, services mobiles)

Course focus

- Wireless Systems
- Applications

Course details

University	Ecole Nationale Superieure des Telecommunications de Bretagne
Department	Ecole Nationale Superieure des Telecommunications de Bretagne
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. 33 (0)2 29 00 11 11

Web address: www.enst-bretagne.fr

Mobile Networks Design, Planning and Dimensioning.

Course outline

- General design vision.
- Dimensioning and planning (DD&P) of telecommunication networks.
- Design practices with tools.

Course focus

- Protocols

Course details

University	University of Cantabria
Department	Communications Engineering Department (DICOM)
Country	Spain
Lecturer	Klaus D. Hackbarth
Course language	Spanish
Material in English?	No
Course in English planned?	No
Keywords	Wireless-network
Included in master program	Communications Engineering
Begin month	November
Course hours	30
Average number of students	6
Tuition fee	110 EUR
Remarks	This course could be in English if most of students ask for it.

Contact information

Tel. 34-942201494

Email: klaus@tlmat.unican.es

Web address: http://www.dicom.unican.es

Mobile Phones (Mobiles)

Course focus

- Wireless Systems

Course details

University	Institute National Polytechnique de Toulouse
Department	École Nationale Supérieure d}Électrotechnique, d}Électronique, d}Informatique,
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. (+33)05 62 24 21 00

Email: inp@inp-toulouse.fr

Web address: www.inp-toulouse.fr

Planning of Cellular Systems

Course objectives

- To provide a global view about the evolution of mobile communications

- To identify the main components of a cellular network

- To understand the architecture and operation of the GSM system

- To understand the architecture and operation of the UMTS system

- To understand the architecture and operation of the main standards for WLAN's

Course outline

- Evolution of mobile communication systems
- The components of a cellular network
- 2G systems – GSM
  - Fundamental aspects
  - Channels in the GSM
  - GSM air interface
  - Link control
  - Security
  - GSM evolution (EDGE, GPRS)
- Basic aspects of othe 2G systems (IS-95, PDC)
- 3G systems – UMTS
  - Fundamental aspects of UMTS
  - UMTS network architecture
  - Channels in UMTS
  - UMTS air interface (FDD, TDD)
  - Resource management in UMTS
- WLAN's
  - Main requiremenst and differences relatively to cellular networks
  - High Performance Radio LAN (HIPERLAN)
  - IEEE 802.11
- Wireless Internet
  - Internet basics
  - Internet access and mobility – requirements and problems
  - Mobile IP
- Trends towards the evolution of wireless systems

Course details

University	Universidade de Aveiro
Department	Dept. of Electronics and Telec.
Country	Portugal

Lecturer	Atílio Gameiro
Course language	Portuguese
Material in English?	No
Course in English planned?	Yes
Keywords	GSM, UMTS, WLAN
Course hours	36
Tuition Fee	350€
Included in master program	Electronics and Telecom.

Contact information

Tel. +351 234 370 355

Email: acosta@det.ua.pt

Web address: http://www.det.ua.pt/pg/msc/p_prc.html

Mobile Radio Network Planning (Conception Planification Des Reseaux Mobiles)

Course focus

- Wireless Systems

Course details

University	Institut National des Télécommunications
Department	Resaux et Services de Telecommunication
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. +33 1 60 76 40 40

Email: webmaster@int-evry.fr

Web address: www.rst.int-evry.fr

Mobile Radio Networks and Protocols I

Course focus

- Signal Processing
- Wireless Systems
- Protocols

Course details

University	Aachen University of Technology
Department	Electrical Engineering and Information Technology
Country	Germany
Lecturer	Bernhard Walke
Course language	German
Material in English?	Yes
Course in English planned?	Yes
Included in master program	Communication Networks
Other courses needed beforehand	Communication Networks and Traffic Theory I, Communication Networks and Traffic Theory II
Begin month	April
Course hours	135

Contact information

Tel. +49-241-80 27910

Email: walke@comnets.rwth-aachen.de

Web address: http://www.comnets.rwth-aachen.de/Lehre/SS/MUP1.html

Mobile Radio Networks and their Protocols

Course focus

- Information Theory
- Wireless Systems
- Protocols
- Applications

Course details

University	Aachen University of Technology
Department	Electrical Engineering and Information Technology
Country	Germany
Lecturer	Bernhard Walke
Course language	German
Material in English?	Yes
Course in English planned?	Yes
Included in master program	Communication Networks
Other courses needed beforehand	Communication Networks and Traffic Theory I, Communication Networks and Traffic Theory II, Mobile Radio Networks and Protocols
Begin month	October
Course hours	270

Contact information

Tel. +49-241-80 27910

Email: walke@comnets.rwth-aachen.de

Web address: http://www.comnets.rwth-aachen.de/Lehre/Lectures.html#GSM

Mobile Radio System Concepts

Course focus

- Signal Processing
- Information Theory

Course details

University	Aachen University of Technology
Department	Electrical Engineering and Information Technology
Country	Germany
Lecturer	Peter Vary
Course language	German
Material in English?	Yes
Course in English planned?	Yes
Included in master program	Communications Engineering
Begin month	October

Contact information

Tel. (+49) (0)241 80 26 956

Email: vary@rwth-aachen.de

Web address: http://www.ind.rwth-aachen.de/education/lectures/lectures.html#MSK

Mobile Radio Telephone Networks (Réseaux de radiotéléphonie mobile)

Course focus

- Wireless Systems

Course details

University	Universite de Rennes 1
Department	Institut de Formation Superieure en Informatique et Communication (IFSIC)
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. (33)2 99 84 71 00

Email: webmaster@ifsic.univ-rennes1.fr

Web address: www.ifsic.univ-rennes1.fr

Mobile Satelite Communication Systems (Systemes De Communication De Satelites Mobiles)

Course outline

- Introduction to satellite communication
- Space, orbit and ground segment
- Mobile satellite channel
- multipath, shadowing, Doppler spread, and delay spread
- System design drivers and issues
- Services, waveform, link budget, architecture
- Multiple access techniques
- FDMA, TDMA and CDMA
- Capacity (users) issues and trades
- Mobile satellite multiple access control (MAC) issues
- traffic models, throughput and delay
- Random access, FAMA, DAMA and hybrid protocols
- CAC, RRA, traffic based capacity (Erlangs)
- Modulation, demodulation, error correction and control
- MPSK, MPSK TCM, ML receiver
- Convolutional coding, Viterbi decoding, error control
- Mobile SATCOM antenna consideration
- Space segment, mobile terminals
- Diversity combining techniques
- IP/ATM over satellite networks
- Introduction to IP/ATM over satellite systems and issues
- Satellite IP enhancements, routing and congestion control
- IP/ATM over satellite performance
- IP/ATM-satellite systems
- SATCOM and mobile SATCOM standards
- INMARSAT, INTELSAT, ITU
- Satellite UMTS (S-UMTS)
- Introduction to UMTS and WCDMA

- S-UMTS and emerging systems

- SATCOM system cost considerations

- Mass model, design and development and launch cost and other relevant topics

- Ultra Wide Band (UWB)

- OFDM modulation

Course details

University	EPFL
Department	2ème cycle - Orientation Internet et Systèmes d'information - Technologie
Country	Switzerland
Lecturer	John FARSEROTU, professeur EPFL/DSC
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Keywords	IP / ATM Mobile Satellite communication systems - IP /ATM Mobile Satellite communication systems
Course hours	42

Contact information

Tel. 0041 21 693 5637

Email: dsc@epfl.ch

Web address: http://dscwww.epfl.ch/students/2eme-cycle-01-02.pdf

Mobile Services (EDT 013)

Course details

University	Blekinge Institute of Technology
Department	Department of Telecommunications and Signal Processing
Country	Sweden
Course language	Swedish
Material in English?	No
Course in English planned?	No
Included in master program	M.Sc. in Electrical Engineering

Contact information

Tel. +46 457 38 57 28

Email: jan.mark.de.haan@bth.se

Web address: http://www.its.bth.se/ets/index-eng.html

Mobiles GSM

Course focus

- Wireless Systems

Course details

University	Ecole des Technologies de l`Information et du Management EFREI Paris
Department	Ecole des Technologies de l`Information et du Management EFREI Paris
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. (33) (0)1 46 77 64 67

Email: informations@efrei.fr

Web address: www.efrei.fr

Mobility

Course outline

- Localization problems
    - o Roaming
    - o Paging
    - o Handover
- Extension of the concepts to intelligent networks
- Mobility problems in data communication networks
    - o Routing
    - o Insertion
    - o Consistency
- Interconnection

Course details

University	EURECOM
Department	Mobile Communications
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. +33 (0) 493002608

Email: christian.bonnet@eurecom.fr

Web address: www.eorecom.fr

Mobility

Course outline

- To understand the mechanisms related to mobility in the contexts of cellular communication and of wireless data transmission.

Course outline

- Localization problems
    - Roaming
    - Paging
    - Handover
- Extension of the concepts to intelligent networks
- Mobility problems in data communication networks
    - Routing
    - Insertion
    - Consistency
- Interconnection

Course details

University	EPFL
Department	2ème cycle Eurecom - Com. Mobiles
Country	Switzerland
Lecturer	Christian BONNET
Course language	French
Material in English?	Yes
Course in English planned?	Yes
Keywords	mobilité, environment cellulaire - mobility, context cellular
Course hours	15

Contact information

Tel. 0041 21 693 5637

Email: dsc@epfl.ch

Web address: http://dscwww.epfl.ch/students/2eme-cycle-Eurecom-sanction-etudes-01-02.pdf

Modelling, Optimisation and Evaluation of Networks (Modélisation/ Optimisation/ Evaluation des Réseaux)

Course focus

- Protocols

Course details

University	Institut Supérieur d'Informatique de Modélisation et de leurs Applications (ISIMA)
Department	Institut Supérieur d'Informatique de Modélisation et de leurs Applications (ISIMA)
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. (33)0473405000

Email: mrue@isima.fr

Web address: www.isima.fr

Modulation and Coding Methods

Course focus

- Antenna and RF Design
- Signal Processing

Course details

University	Helsinki University of Technology
Department	Department of Electrical and Communications Engineering and Department of Computer Science
Country	Finland
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Included in master program	The Master's Programme in Telecommunication
Tuition fee	No
Remarks	Radio Communication major

Contact information

Tel. +35894515381

Email: Anita.Bisi@hut.fi

Web address: http://keskus.tct.hut.fi/masters/maskur1.html

Multiple Access Techniques

Course objectives

- To understand the fundamental characteristics of multiple access techniques in wireless systems (cellular, WLAN,...)

Course outline

- Introduction to radio communications and wireless systems
    - The radio communication Channel
    - Wireless Systems – categories and requirements
- Multiple access techniques: basic aspects
    - Interference
    - Classification of different multiple access techniques
        - Multiplexing vs random access
        - Basic techniques (TDMA; FDMA; CDMA, ..)
- CDMA techniques
    - Basics of spread spectrum communications
    - CDMA for cellular
- Alternative multiple access techniques for future wireless systems
- Capacity evaluation in cellular networks
- Random access techniques
-

Course details

University	Universidade de Aveiro
Department	Dept. of Electronics and Telec.
Country	Portugal
Lecturer	Atilio Gameiro
Course language	Portuguese
Material in English?	No
Course in English planned?	Yes
Keywords	Multiple access, TDMA, FDMA , CDMA,, random access
Course hours	48
Tuition Fee	500€
Included in master program	Electronics and Telecom.

Contact information

Tel. +351 234 370 355

Email: Acosta@det.ua.pt

Web address: http://www.det.ua.pt/pg/msc/p_tam.html

Multi-Service and Multimedia Networks

Course outline

- Overview of multiservice and multimedia networks
- Information encoding techniques
- Network hierarchy
- Transmission methods
- Protocols for voice
- Data and video transmission
- Backbone and access networks
- Last mile technologies, DSL, FITL, WLL
- key issues of network design including exercises and case study

Course focus

- Information Theory
- Wireless Systems
- Protocols
- Applications

Course details

University	Warsaw University of Technology
Department	Faculty of Electronics and Information Technology
Country	Poland
Lecturer	Dr. Krzysztof Puczko
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Keywords	Information coding, backbone & access networks, fibre, radio xDSL, PDH, SDH, ATM, IP, data, voice, video transmission
Tuition fee	0

Contact information

Tel. (48 22) 660 7795

Email: Puczko@ire.pw.edu.pl

Multi-User Communication (389.038)

Course details

University	Vienna University of Technology
Department	Faculty of Electrical Engineering and Information Technology
Country	Austria
Lecturer	MÜLLER Ralf, Dipl.-Ing. Dr.techn.
Course language	German
Material in English?	No
Course in English planned?	No
Keywords	Multi - user communications
Course hours	2

Contact information

Tel. 0043 1 58801 38901

Email: mueller@ftw.at

Web address: http://www.lzk.ac.at/lecture/tuwien/389038

Multiple Courses within the Department

Course focus

- Antenna and RF Design
- Signal Processing
- Information Theory
- Wireless Systems

Course details

University	TU WIEN
Department	Department of Communications and Radio Frequency Engineering
Country	Austria
Lecturer	Various
Course language	English
Material in English?	No
Course in English planned?	No
Keywords	Propagation, Mobile Radio, Radio Frequency, Information Theory, Signal Processing, Multi-User

Contact information

Tel. 58801-38901

Email: sekretariat@nt.tuwien.ac.at

Web address: http://www.lzk.ac.at/lecture/E389.html

Nanoscale Materials Physics

Course outline

- Crystal lattices
- Reciprocal space and X-ray diffraction
- Phonons
- Heat capacity
- Heat conduction, and anharmonic effects.
- Electronic structure
- Free-, nearly-free-, and tight-binding models
- The diatomic molecule
- Metallic binding, and the Friedel model
- Boltzmann's equation
- Transport theory
- Optical properties of metals and semiconductors
- Itinerant magnetism and mean-field approximation
- Superconductivity
- BCS theory
- Minor projects of relevance for engineers

Course details

University	Technical University of Denmark
Department	Department of Physics
Country	Denmark
Lecturer	Hans Lomholt Skriver
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Included in master program	Telecommunications
Tuition fee	No

Contact information

Tel. (+45) 4525 3176

Email: skriver@fysik.dtu.dk

Network Dimensioning And Performance (Performance De Reseaux, Dimensionnement)

Course focus

- Signal Processing
- Information Theory
- Protocols

Course details

University	Ecole des Technologies de l`Information et du Management EFREI Paris
Department	Ecole des Technologies de l`Information et du Management EFREI Paris
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. (33) (0)1 46 77 64 67

Email: informations@efrei.fr

Web address: www.efrei.fr

Network Protocols and Architecture (Protocole Réseau Et Architecture)

Course outline

- GSM
    - o Architecture
    - o Logical channels
    - o Identity
    - o Billing
    - o Switching systems such as MSC/VLR, GMSC, HLR/AVR
    - o Signalling
- General Packet Radio Services
    - o Services and architecture
    - o Protocols
    - o Control functions of the radio interface
    - o Network and flow control functions

Course focus

- Wireless Systems
- Protocols

Course details

University	ENIC
Department	Communications mobiles
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. +33 (0) 493002666

Email: maisenic@enic.fr

Web address: www.enic.fr

Networking And Mobility (Reseaux Et Mobilite)

Course outline

- Structure and mechanisms of communication networks for fixed and mobile users.

Course focus

- Part I
    - Fundamentals of Networking
    - IPv6 and the global internet architecture
    - The nature of congestion and methods used in the Internet to avoid congestion. TCP friendly applications.
    - Best effort, differentiated services and reservation services. The nature of a guarantee.
    - Multicast at the network layer. Reliable multicast at the transport layer.
    - Routing and bridging algorithms. Intra-domain and interdomain methods. The case of multicast.
    - Overlaid Architectures. Coexistence of IPv4 and IPv6.
    - Multi-protocol label switching (MPLS). Transport and application layer gateways. Firewalls.
    - Internet Engineering Skills: Raw Sockets, Packet Analysis, Configuration and operation of a network.
- Part II
    - Purpose of mobility, intended services
    - Major technical challenges
    - Summary of wireless communication techniques
    - Addressing and routing
    - Localization of mobiles, mobility management
    - Security
    - Billing
    - Dimensioning
    - Usage of mobile code.
    - Examples: GSM/UTMS, Mobile IP, IEEE 802.11.
    - Mobile ad hoc networks; terminodes.

Course details

University	EPFL
Department	2ème cycle - Orientation Internet et Systèmes d'information - Bloc D
Country	Switzerland
Lecturer	Jean-Yves LE BOUDEC, Christian BONNET, Jean-Pierre HUBAUX
Course language	French
Material in English?	Yes
Course in English planned?	Yes
Keywords	Reseaux et mobilite - networking and mobility
Other courses needed beforehand	Préalable requis: Réseaux informatiques
Course hours	84

Contact information

Tel. 0041 21 693 5637

Email: dsc@epfl.ch

Web address: http://dscwww.epfl.ch/students/2eme-cycle-01-02.pdf

Networks and Protocols (Réseaux et Protocoles)

Course focus

- Protocols

Course details

University	Institut Supérieur d'Informatique de Modélisation et de leurs Applications (ISIMA)
Department	Institut Supérieur d'Informatique de Modélisation et de leurs Applications (ISIMA)
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. (33)0473405000

Email: mrue@isima.fr

Web address: www.isima.fr

New Standards for Future Mobile Communication Systems

Course focus

- Signal Processing
- Wireless Systems
- Protocols

Course details

University	University of Bremen
Department	Electrical and Information Engineering
Country	Germany
Lecturer	Rodolfo Mann Pelz
Course language	German
Material in English?	Yes
Course in English planned?	Yes
Included in master program	Communications Engineering
Begin month	October

Contact information

Tel. +49 421 218-3356

Email: Rodolfo.Mann_Pelz@fr.bosch.de

Web address: http://www.ant.uni-bremen.de/teaching/nsfzm/index.html

Numerical Methods in Field Theory and Propagation

Course focus

- Antenna and RF Design
- Signal Processing

Course details

University	Aalborg University
Department	Communication Department
Country	Denmark
Lecturer	Patric Eggers
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Keywords	UWB,small antenas
Included in master program	Mobile Radio Communications
Tuition fee	No
Remarks	9semester

Contact information

Tel. + 45 96 35 86 40

Email: cpk@cpk.auc.dk

Web address: http://cpk.auc.dk/antennas/teach_9sem_2002.html

Numerical Methods in Radio-Frequency and Microwave Engineering (381.496)

Course details

University	Vienna University of Technology
Department	Faculty of Electrical Engineering and Information Technology
Country	Austria
Lecturer	RENNER Alexander, Dipl.-Ing. Dr.techn., FRÖHLING Peter, Dipl.-Ing. Dr.techn.
Course language	German
Material in English?	No
Course in English planned?	No
Keywords	Numerical Methods in Radio-Frequency and Microwave
Course hours	1,5

Contact information

Tel. 0043 1 58801 38901

Email: alexander.renner@siemens.at

Web address: http://www.lzk.ac.at/lecture/tuwien/381496

Operating Systems, Networks and Communications

Course focus

- Protocols

Course details

University	Dublin Institute of Technology
Department	Faculty of Engineering
Country	Ireland
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Included in master program	M.Sc. in Applied Computing for Technologies
Other courses needed beforehand	A minimum Second Class Honours degree (2.2 grade or higher) in engineering or a related discipline.
Begin month	October 2003
Course hours	10

Contact information

Tel. 353-1-402-3654

Email: John.Turner@dit.ie

Web address: http://www.dit.ie/DIT/study/graduate/courses/ft120.html

Optical Communication

Course outline

- Optical fibres
    - o Structure
    - o Conditions of propagation
    - o Attenuation and pulse dispersion
- Optical amplifiers
    - o Construction
    - o Amplification and noise
- Light sources and transmitters
    - o Construction
    - o Modulation bandwidth
    - o Spectral properties
- Photodiodes and receivers
    - o Construction
    - o Electrical bandwidth
    - o Nise and sensitivity
- Optical communication systems with digital modulation formats:
    - o Construction and system budgets
    - o Multichannel systems
    - o Laboratory exercises with optical fibers
    - o Optical amplifiers and systems experiments
    - o Computer simulations of optical transmission

Course details

University	Technical University of Denmark
Department	COM
Country	Denmark
Lecturer	Palle Jeppesen
Course language	English
Material in English?	Yes
Course in English planned?	Yes

Keywords	optical fibres, optical amplifiers, light sources, photodiodes, receivers, transmission systems, WDM systems
Included in master program	M.Sc. in Telecommunications
Tuition fee	No
Remarks	Recommended semester: 4th -7th semester

Contact information

Tel. (+45) 45 25 36 29

Email: kjl@com.dtu.dk

Web address: http://www.com.dtu.dk/education/intmsc/

Parallel and Distributed Systems

Course focus

- Information Theory

Course details

University	Helsinki University of Technology
Department	Department of Electrical and Communications Engineering and Department of Computer Science
Country	Finland
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Tuition fee	No
Remarks	Telecommunications Software major

Contact information

Tel. 358 9451 5256

Email: sanna.yliheljo@hut.fi

Web address: http://keskus.tct.hut.fi/masters/maskur1.html

Personal and Mobile Communication Systems

Course objectives

- To give formation in the field of wireless terrestrial communication systems with emphasis on cellular

Course outline

- Cellular communications. Basic aspects

- GSM and UMTS

- Multiple access techniques

- Cellular planning

Course details

University	Technical University of Lisbon
Department	Department of Electrical and computer Engineering
Country	Portugal
Lecturer	Prof. Luís Correia
Course language	Portuguese
Included in master program	Electrical and Computer Engineering

Contact information

Tel. +351 213100259

Email: joao.lemos@inesc.pt

Web address: http://www.deec.ist.utl.pt/meec/meec/programa0405.html

Planning of Cellular Systems

Course objectives

- To identify and understand the main parameters that affect the planning of a cellular network
- To understand the steps and methodologies to be followed in the design of a cellular network
- To gain practical experience in the designo f cellular networks through the use of commercial planning tool

Course outline

- Basic Concepts of traffic theory
- Propagation models
- Management of radio resources in cellular networks
- Performance metrics
- Methodoly for planning a cellular network
- Case studies

Course details

University	Universidade de Aveiro
Department	Dept. of Electronics and Telec.
Country	Portugal
Lecturer	José Neves
Course language	Portuguese
Material in English?	No
Course in English planned?	Yes
Keywords	Radio Frequency, RF
Course hours	48
Tuition Fee	500€
Included in master program	Electronics and Telecom.

Contact information

Tel. +351 234 370 355

Email: acosta@det.ua.pt

Web address: http://www.det.ua.pt/pg/msc/p_prc.html

Principles of Digital Communications (Principes Des Communications Numeriques)

Course outline

- Learn the fundamentals of digital point-to-point communications as seen from a modern point of view.

- The setup consists of a source, a transmitter, a channel, and a receiver. We will follow a new approach which consists of several passes over the above setup, changing focus at each pass.

- The advantage of this approach is that we quickly get a rough picture of all components of a communication system, and then refine the initial picture as the semester proceeds.

- At the end of the course the student should be familiar with key design choices and should be able to evaluate the impact of those choices on the performance of the resulting system.

Course focus

- Optimal receiver for vector channels

- Optimal receiver for waveform (AWGN) channels

- Various signaling schemes and their performance

- Efficient signaling via finite-state machines

- Efficient decoding via Viterbi algorithm

- Communicating over bandlimited AWGN channels

    o Nyquist

    o Root raised cosine pulses

    o Whitening matched filter and Viterbi decoder

- Communicating over passband AWGN channels

- Communicating over fading channels

- Bluetooth

Course details

University	EPFL
Department	2ème cycle - Bloc A
Country	Switzerland

Lecturer	Bixio RIMOLDI, professeur EPFL/DSC
Course language	French
Material in English?	Yes
Course in English planned?	Yes
Keywords	Principes des communications numeriques - principles of digital communications
Other courses needed beforehand	Préalable requis: Cours « Traitement des signaux pour les communications » et « Processus stochastiques pour les communications »
Course hours	84

Contact information

Tel. 0041 21 693 5637

Email: dsc@epfl.ch

Web address: http://dscwww.epfl.ch/students/2eme-cycle-01-02.pdf

Propagation, Antennas and Diversity

Course focus

- Antenna and RF Design
- Signal Processing

Course details

University	Aalborg University
Department	Communication Department
Country	Denmark
Lecturer	Patric Eggers
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Included in master program	Digital Communications and Mobile Communications
Tuition fee	No
Remarks	8th semester

Contact information

Tel. + 45 96 35 86 40

Email: cpk@cpk.auc.dk

Web address: http://cpk.auc.dk/antennas/teach_8sem_2002.html

Protocols for Broadband Networks (Protocoles pour les réseaux haut débit)

Course focus

- Protocols

Course details

University	ParisTech
Department	École Nationale Supérieure de Techniques Avancées
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. (33) (0) 1 45 52 54 01

Email: webmaster@ensta.fr

Web address: www.ensta.fr

Protocols for Multimedia Communications

Course outline

- Details of protocols for multimedia communications supportive networks, and multimedia architectures.

- More specifically, the contents is oriented towards the current state of the art in research.

- Necessary methods and prerequisites for developing efficient and global multimedia communications are discussed.

- Latest research protocols and mechanisms.

Course focus

- Distributed systems, and networks

- Principles and concepts for the development of efficient protocols, data formats, and communication procedures in the high-speed environment.

- An integrative point of view of an entire communication subsystem including end-system issues and protocol issues, focussing on close relationships between gigabit networks, Internet protocols, ATM, application requirements, Quality-of-Service aspects, and architectural topics.

- Details on protocols for resource reservation, flexible protocol architectures, and economics of integrated services networks are discussed.

Course details

University	ETHZ
Department	-
Country	Switzerland
Lecturer	Stiller B.
Course language	German
Material in English?	No
Course in English planned?	No
Keywords	protocols for multimedia communications, and multimedia architectures
Other courses needed beforehand	Computer Networks.
Remarks	Lecture number : 35-647

Contact information

Tel. 0041 1 632 5002

Email: dept-sekr@ee.ethz.ch

Web address: http://www.ee.ethz.ch/students/courses.en.html

Radio Frequency Circuits

Course focus

- Antenna and RF Design

Course details

University	Technical University of Lodz
Department	International faculty of Engineering: Telecommunication and Computer Science
Country	Poland
Lecturer	Michal Strzelecki, Piotr Szczypiñski
Course language	English
Material in English?	No
Course in English planned?	No
Included in master program	Telecomunication and Computer Science

Contact information

Tel. +48 42 636 53 08

Email: admin@ife.p.lodz.pl

Web address: http://oizet.p.lodz.pl/h/des.asp?module=315

Radio Frequency Circuits

Course outline

- To introduce transmission lines theory and modern high frequency circuits comprising amplifiers, mixers and oscillators

Course focus

- Antenna and RF Design

Course details

University	Technical University of Lodz
Department	International faculty of Engineering: Telecommunication and Computer Science
Country	Poland
Lecturer	Michal Strzelecki, PhD
Course language	English
Material in English?	No
Course in English planned?	No

Contact information

Tel. +48 42 636 53 10

Email: admin@ife.p.lodz.pl

Web address: http://oizet.p.lodz.pl/h/des.asp?module=414

Radio Frequency Measurement Systems

Course objectives

- Study of the instrumentation and techniques for measurement in radio frequency systems

Course outline

- Materials for high frequencies
- Instrumentation
- Measurements at the receiver
- Measurements at the transmitter

Course details

University	Technical University of Lisbon
Department	Department of Electrical and computer Engineering
Country	Portugal
Lecturer	Prof. Pedro Manuel Brito da Silva Girão/Francisco Correa Alegria
Course language	Portuguese
Included in master program	Electrical and Computer Engineering

Contact information

Tel. +351 213100259

Email: joao.lemos@inesc.pt

Web address: http://www.deec.ist.utl.pt/meec/meec/programa0405.html

Radio Net Planning

Course focus

- Information Theory
- Wireless Systems

Course details

University	Dresden University of Technology
Department	Electrical Engineering and Information Technology
Country	Germany
Lecturer	Gerhard Fettweis, Wolfgang Rave
Course language	German
Material in English?	No
Course in English planned?	No
Included in master program	Communications Laboratory
Other courses needed beforehand	Communications technology, digital signal transmission, mobile of communication networks I+II
Begin month	April

Contact information

Tel. +49 351 463 33943

Email: fettweis@ifn.et.tu-dresden.de

Web address: http://www.ifn.et.tu-dresden.de/MNS/lehre/funknetzplanung.html

Radio Network Planning Methods

Course focus

- Antenna and RF Design

Course details

University	Helsinki University of Technology
Department	Department of Electrical and Communications Engineering and Department of Computer Science
Country	Finland
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Tuition fee	No
Remarks	Radio Communication major

Contact information

Tel. +3589451 5381

Email: anita.bisi@hut.fi

Web address: http://keskus.tct.hut.fi/masters/maskur1.html

Radio Propagation

Course objectives

- Give advanced formation in the field of terrestrial electromagnetic propagation

Course details

University	Technical University of Lisbon
Department	Department of Electrical and computer Engineering
Country	Portugal
Lecturer	Prof. Carlos Fernandes
Course language	Portuguese
Included in master program	Electrical and Computer Engineering

Contact information

Tel. +351 213100259

Email: joao.lemos@inesc.pt

Web address: http://www.deec.ist.utl.pt/meec/meec/programa0405.html

Radio Propagation and Engineering (Ingénierie radio et propagation)

Course outline

- Radio Channel
    - o Characteristics
    - o Modelling
- Micro waves
- Cellular networks engineering (antennas and networks)

Course focus

- Signal Processing

Course details

University	ENIC
Department	Communications mobiles
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. +33 (0) 493002666

Email: maisenic@enic.fr

Web address: www.enic.fr

Radio Transmitting Technique and its Applications

Course outline

- Properties of radio

- TV and radiocommunication transmitters

- Parameters of transmitters power stages

- Principles of operation and design methods of conventional h.f. power amplifiers (Class C, Class AB linear amplifiers), power amplitude modulators, wideband amplifiers, high-efficiency switch-mode power amplifiers (Class-D, Class-DE and Class-E).

- Methods of simulation and calculation of basic parameters and characteristics of power amplifiers.

- Methods of resonant-circuits design.

- Principles of construction of power amplifiers.

- Measurement methods

Course focus

- Antenna and RF Design

- Signal Processing

Course details

University	Warsaw University of Technology
Department	Faculty of Electronics and Information Technology
Country	Poland
Lecturer	Dr. Juliusz Modzelewski
Course language	Polish
Material in English?	No
Course in English planned?	No
Keywords	radio transmitters, high-frequency power amplifiers, power modulators
Included in master program	Yes
Other courses needed beforehand	Theory of Signals and Modulations, Electronics, Basics of High-Frequency Technique
Tuition fee	0

Contact information

Tel. (48 22) 6607793

Email: juliuszm@ire.pw.edu.pl

Radio-Frequency Engineering II (381.628)

Course outline

- Receiver and transmitter techniques (block diagrams).

- Modulation and demodulation circuits.

- Oscillators.

- Frequency transducers (mixers).

- Phase-locked loops (PLL).

- Receiver and transmitter elements.

- Receiver properties in case of (sinusoidal) interferences (signal-to-noise (S/N), carrier-to-noise (C/N), carrier-to-interference (C/N), signal-to-noise-and-distortion (SINAD)).

- Phase portraits.

- Frequency synthesis.

- Noise performance of receivers.

- Digital modulation formats and their spectra.

Course details

University	Vienna University of Technology
Department	Faculty of Electrical Engineering and Information Technology
Country	Austria
Lecturer	EHRLICH-SCHUPITA Walter, Dipl.-Ing. Dr.techn.
Course language	German
Material in English?	No
Course in English planned?	No
Keywords	Radio frequency
Course hours	2

Contact information

Email: wehrlich@nt.tuwien.ac.at

Web address: http://www.lzk.ac.at/lecture/tuwien/381628

Radio Frequency Techniques

Course objectives

- To identify and understand the different blocks of the radio sub.system and their impact on the performance of wireless systems

Course outline

- Introduction
  - o Block diagram of a radio system
  - o The main characteristics and limitations of the radio channel
- Causes and characteristics of the interferences in radio
  - o Noise (AM, FM; ..)
  - o Adjacent interference
  - o Non-linear distortion
- Architectures for the radio subsystem
- Electronic components for the radio subsystem
- Experimental characterization of the radio components
- Impacto f the non-idealities on the wireless system

Course details

University	Universidade de Aveiro
Department	Dept. of Electronics and Telec.
Country	Portugal
Lecturer	Nuno Borges
Course language	Portuguese
Material in English?	No
Course in English planned?	Yes
Keywords	Radio Frequency, RF
Course hours	36
Tuition Fee	350€
Included in master program	Electronics and Telecom.

Contact information

Tel. +351 234 370 355

Email: acosta@det.ua.pt

Web address: http://www.det.ua.pt/pg/msc/p_trf.html

Radiocommunication Systems

Course details

University	Warsaw University of Technology
Department	The Faculty of Electronics and Information Technology
Country	Poland
Course language	English
Material in English?	No
Course in English planned?	No

Contact information

Tel. +48 22 825 37 60

Email: ece@elka.pw.edu.pl

Web address: http://www.ire.pw.edu.pl/zejim/ece/gr_prog.html

Radio Communication Systems (Systèmes De Radio communications)

Course focus

- Wireless Systems

Course details

University	Ecole Nationale Superieure d`Ingenieurs de Limoges ENSIL
Department	Ecole Nationale Superieure d`Ingenieurs de Limoges ENSIL
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. (33)0555423670

Web address: www.ensil.unilim.fr

REMOTE – Real Time Mobile Telecommunication

Course focus

- Wireless Systems
- Protocols
- Applications

Course details

University	Halmstad University
Department	Computer & Electrical Engineering
Country	Sweden
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Included in master program	Optical and Wireless Technology
Course hours	40
Remarks	Course hours in 40 credits, which correspond to 40 weeks of studies during one year

Contact information

Tel. +46 35 16 71 00

Web address: http://www.hh.se/staff/remote/

RF & Microwave Communication Systems

Course focus

- Antenna and RF Design
- Signal Processing

Course details

University	University of Ulm
Department	Electrical Engineering
Country	Germany
Lecturer	Michael.Hoffmann
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Included in master program	Communications Technology
Other courses needed beforehand	RF & Microwave Engineering

Contact information

Tel. +49-731-50-26352

Email: Michael.Hoffmann@ieee.org

Web address: http://www.uni-ulm.de/uni/studenten/fs-et/kvv/ss99/vorlesungen/rf&microwave_communication_systems.html

RF Circuit Design for Mobiles (conception de circuits rf pour les portables)

Course focus

- Antenna and RF Design

Course details

University	ParisTech
Department	École Nationale Supérieure de Techniques Avancées
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. (33) (0) 1 45 52 54 01

Email: webmaster@ensta.fr

Web address: www.ensta.fr

RF Communication Circuits

Course outline

- RF signals in analogue and digital modulations.
- RF circuits including linear amplifiers, mixers, oscillators, detectors, limiters, and power amplifiers.
- Transmitter and receiver structures.
- Phase locked loops.
- Design of RF integrated circuits.
- Circuit concepts like stability, noise, distortion, intermodulation, and dynamic range.
- System concepts including signal to noise ratio, thresholds, and bit error rates.

Course focus

- Antenna and RF Design

Course details

University	Technical University of Denmark
Department	COM
Country	Denmark
Lecturer	Jens Vidkjær
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Keywords	RF communication circuits, RF integrated circuits
Other courses needed beforehand	31405 / 48110 Wireless Communication or Introductory Electromagnetic Theory
Tuition fee	No
Remarks	Recommended semester: 4th -7th semester

Contact information

Tel. (+45) 4525 3799

Email: jv@oersted.dtu.dk

Web address: http://www.oersted.dtu.dk/31415

Routing in Communication Networks

Course focus

- Protocols

Course details

University	Helsinki University of Technology
Department	Department of Electrical and Communications Engineering and Department of Computer Science
Country	Finland
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Included in master program	The Master's Programme in Telecommunication
Tuition fee	No
Remarks	Networking Technology major

Contact information

Tel. +3589451 5381

Email: anita.bisi@hut.fi

Web address: http://keskus.tct.hut.fi/masters/Mas-2003-networking.html

Satelite Networks (Réseaux satellitaires)

Course focus

- Wireless Systems

Course details

University	Ecole Superieure Chimie Physique Electronique De Lyon
Department	Informatique et
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. (33) 472431700

Web address: www.cpe.fr

Satellite Communication Systems

Course outline

- Segment
- Types of orbits
- Link analysis
  - o Transmitter characteristics
  - o Receiver characteristics
  - o Influence of propagation medium
  - o Compensation of atmospheric effects
  - o Link budget of a non-regenerative satellite networks
- Regenerative satellite networks
  - o Link budget of a regenerative satellite network
  - o Comparison of conventional and regenerative satellites
- Transmission techniques for a satellite channel
  - o Analogue systems (telephone, television, radio)
  - o Multiplexing
  - o Modulation techniques
  - o Digital systems (telephone, radio, data)
  - o Source coding
  - o Forward error correction
  - o Modulation
  - o Automatic repeat request procedures
  - o Energy spreading techniques
  - o Comparison of analog and digital transmission;
- Multiple access
  - o Frequency division multiple access
  - o Time division multiple access
  - o Code division multiple access
  - o Direct sequence CDMA
  - o Frequency hopping CDMA
  - o Channel assignment
- Multibeam satellite networks

- o Transponder hopping
- o Onboard switching
- o Beam scanning
- o Intersatellite links

Course focus

- Wireless Systems

Course details

University	Technical University of Lodz
Department	International faculty of Engineering: Telecommunication and Computer Science
Country	Poland
Lecturer	Mariusz Czarnecki, M.Sc.
Course language	English
Material in English?	No
Course in English planned?	No
Included in master program	Telecomunication and Computer Science

Contact information

Tel. +48 42 636 53 13

Email: admin@ife.p.lodz.pl

Web address: http://oizet.p.lodz.pl/h/des.asp?module=423

Satellite Communication Systems (Scs : Systemes De Communications Par Satellites (A Toulouse))

Course focus

- Antenna and RF Design
- Applications

Course details

University	ParisTech
Department	École Nationale Supérieure des Télécommunications (ENST)
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. +33 (0)1 45 81 77 77

Email: communication@enst.fr

Web address: www.enst.fr

Satellite Communications

Course outline

- Orbital aspects

- Space segment

- Satellite link

- Terrestrial segment

- User segment.

Course focus

- Antenna and RF Design

- Wireless Systems

- Applications

Course details

University	Polytechnic University of Madrid (UPM)
Department	Audio visual and Communications engineering
Country	Spain
Lecturer	Antonio Pérez Yuste and Pedro Pintó Marín
Course language	Spanish
Material in English?	No
Course in English planned?	No
Keywords	Satellite
Included in master program	Satellite communications specialization
Begin month	April
Course hours	170
Average number of students	25
Tuition fee	2600EUR

Contact information

Tel. 34-913367774

Email: ptorral@euitt.upm.es

Web address: http://www.euitt.upm.es/postgrado/satelite

Satellite Communications

Course focus

- Information Theory
- Wireless Systems

Course details

University	University of Ulm
Department	Electrical Engineering
Country	Germany
Lecturer	uwe fiebig
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Included in master program	Information Technology
Other courses needed beforehand	Communication

Contact information

Tel. +49 731 50-26250

Email: uwe.fiebig@dlr.de

Web address: http://www.uni-ulm.de/uni/studenten/fs-et/kvv/ss99/ vorlesungen/ Satellite_Communications.html

Security of Communication Protocols

Course focus

- Protocols

Course details

University	Helsinki University of Technology
Department	Department of Electrical and Communications Engineering and Department of Computer Science
Country	Finland
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Tuition fee	No
Remarks	Networking Technology major

Contact information

Tel. +3589451 5381

Email: anita.bisi@hut.fi

Web address: http://keskus.tct.hut.fi/masters/Mas-2003-networking.html

Selected Topics In Digital Communication (Chapitres Choisis En Communication Digitale)

Course outline

- Models and signalling methods for fading channels
    - Statistical characterization of fading channels
    - Delay and doppler spreads
    - Coherence time and bandwidth
    - Diversity transmission techniques
    - RAKE receiver.
- Software Defined Radio
    - Study of software defined radio platform being developed at EPFL
    - The basic principles behind software radio
    - Various implementation issues
    - Exercises
- Introduction to coding theory
    - Finite fields
    - Reed Solomon codes
    - Iterative coding systems
    - Belief propagation
    - Density evolution.

Course details

University	EPFL
Department	2ème cycle - Orientation Internet et Systèmes d'information - Théorie
Country	Switzerland
Lecturer	Bixio RIMOLDI, Emre TELATAR et Rüdiger URBANKE, professeurs EPFL/DSC
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Keywords	Communications numériques - digital communication
Other courses needed beforehand	Préalable requis: Advanced Digital Communications

Course hours	42

Contact information

Tel. 0041 21 693 5637

Email: dsc@epfl.ch

Web address: http://dscwww.epfl.ch/students/2eme-cycle-01-02.pdf

Self-Organized Networks (Reseaux Auto-Organises)

Course outline

- Definition and potential of self-organization

- The different kinds of mobility

- Mobile ad hoc networks; routing (DSR, AODV,...)

- Sensor networks; energy-efficient routing

- Self-organized security architecture

- PGP and mobile ad hoc networks

- Game theory

- Mobile agents

- The societal challenge of self-organization

- The Termin project

Course details

University	EPFL
Department	2ème cycle - Orientation Internet et Systèmes d'information - Théorie
Country	Switzerland
Lecturer	Hubaux
Course language	French
Material in English?	Yes
Course in English planned?	Yes
Keywords	Self-Organized Networks
Other courses needed beforehand	Réseaux informatiques
Course hours	84
Remarks	Ce cours n'est pas donné en 02-03

Contact information

Tel. 0041 21 693 5637

Email: dsc@epfl.ch

Web address: http://dscwww.epfl.ch/students/2eme-cycle-01-02.pdf

Seminar Research Projects in Advanced Signal Processing (382.012)

Course outline

- Development, analysis, implementation, adaptation, and/or comparison of signal processing methods within concrete research projects formulated around special topics in signal processing and communications technology.

Course details

University	Vienna University of Technology
Department	Faculty of Electrical Engineering and Information Technology
Country	Austria
Lecturer	HLAWATSCH Franz, Dipl.-Ing. Dr.techn.
Course language	German
Material in English?	No
Course in English planned?	No
Keywords	research topic in signal processing and/or communications technology
Course hours	3

Contact information

Tel. 0043 1 58801 38915

Email: fhlawats@pop.tuwien.ac.at

Web address: http://www.lzk.ac.at/lecture/tuwien/382012

Service Creation and Management

Course focus

- Applications

Course details

University	Helsinki University of Technology
Department	Department of Electrical and Communications Engineering and Department of Computer Science
Country	Finland
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Tuition fee	No
Remarks	Networking Technology major

Contact information

Tel. +3589451 5381

Email: anita.bisi@hut.fi

Web address: http://keskus.tct.hut.fi/masters/Mas-2003-networking.html

Signal and System Theory I

Course outline

- Characterization and classification of signals (continuous-time and discrete-time).

- Signal analysis in the time and frequency domain, Fourier and Laplace transforms.

- Linear time-invariant systems.

- Discrete-time signals and systems sampling theorems, discrete Fourier-transform, z-transform, DFT, FFT, digital filter structures, digital filter design.

Course details

University	ETHZ
Department	-
Country	Switzerland
Lecturer	Boelcskei H.
Course language	German
Material in English?	No
Course in English planned?	No
Keywords	Introduction to the mathematical description of signals and systems.
Remarks	Lecture number : 35-045

Contact information

Tel. 0041 1 632 5002

Email: dept-sekr@ee.ethz.ch

Web address: http://www.ee.ethz.ch/students/courses.en.html

Signal and System Theory II

Course outline

- Formal representation of systems
    - Systems as operators to transform input signals to output signals;
    - block-diagrams
    - Signalflow diagrams
    - Inputs
    - Outputs
- Description, representation and classification of systems
    - Time domain/frequency domain
    - State space / input-output
    - Transfer function
    - Bode
    - Nyquist
    - Event driven systems
    - Nonlinear systems
- Properties and Analysis
    - Linear
    - Non-linear
    - Causal
    - Stability
    - Relative degree
    - Zeroes
- Connecting systems
    - Feedback
- Introduction to automata
    - Synchronous and asynchronous behaviour
    - Nonlinear phenomena (chaos, bifurcation)

Course details

University	ETHZ
Department	-
Country	Switzerland
Lecturer	Schaufelberger W.
Course language	German
Material in English?	No
Course in English planned?	No
Keywords	Introduction to basic concepts of systems theory.
Remarks	Lecture number : 35-046

Contact information

Tel. 0041 1 632 5002

Email: dept-sekr@ee.ethz.ch

Web address: http://www.ee.ethz.ch/students/courses.en.html

Signal Processing For Communication (Traitement Des Signaux Pour Les Communications)

Course outline

- Establish the theoretical foundations of signal processing in continuous and in discrete time.

- Derive the basic algorithms used in discrete-time signal processing.

- Describe some of the important applications in communication systems.

Course focus

- Signal processing for communications

- Review of Fourier theory and linear systems

- Eigen functions of linear time invariant systems

- Continuous-time analog signal processing and discrete-time digital signal processing

- The sampling theorem

- Analog to digital conversion and quantization

- Discrete-time processing of continuous-time signals

- Discrete-time processing, difference equations and z-transform

- Digital filtering and filter design

- The convolution theorem

- Discrete-time Fourier series and DFT

- The fast Fourier transform

- Spectral analysis and the local Fourier transform

- Multirate signal processing and filter banks

- Linear predictionSignal compression

- An end-to-end example of signal processing in a communication system

Course details

University	EPFL
Department	2ème cycle - Bloc A
Country	Switzerland
Lecturer	Jérôme LEBRUN, chargé de cours EPFL/DSC

Course language	French
Material in English?	No
Course in English planned?	No
Keywords	traitement du signal temps continu - foundations of signal processing in continuous
Other courses needed beforehand	Préalable requis: Cours de base en probabilité, analyse et algèbre linéaire.
Course hours	84
Remarks	Préparation pour: Advanced signal processing, Digital communications

Contact information

Tel. 0041 21 693 5637

Email: dsc@epfl.ch

Web address: http://dscwww.epfl.ch/students/2eme-cycle-01-02.pdf

Signal Processing in GSM Terminals (Traitement Du Signal Dans Les Terminaux GSM)

Course focus

- Antenna and RF Design
- Signal Processing

Course details

University	L'Institut National Polytechnique de Grenoble
Department	Ecole Nationale Supérieure d'Electronique et de Radioélectricité de Grenoble (ENSERG)
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. (33)04 76 85 60 00

Web address: www.enserg.fr

Signal Processing in Telecommunications

Course focus

- Signal Processing

Course details

University	Helsinki University of Technology
Department	Department of Electrical and Communications Engineering and Department of Computer Science
Country	Finland
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Tuition fee	No
Remarks	Radio Communication major

Contact information

Tel. +3589451 5381

Email: anita.bisi@hut.fi

Web address: http://keskus.tct.hut.fi/masters/maskur1.html

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Signal Processing in Telecommunications

Course focus

- Signal Processing

Course details

University	Helsinki University of Technology
Department	Department of Electrical and Communications Engineering and Department of Computer Science
Country	Finland
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Included in master program	The Master's Programme in Telecommunication
Tuition fee	No
Remarks	Digital signal Processing major

Contact information

Tel. +3589451 5381

Email: anita.bisi@hut.fi

Web address: http://keskus.tct.hut.fi/masters/maskur1.html

Signal Processing in Telecommunications

Course details

University	Helsinki University of Technology
Department	Department of Electrical and Communications Engineering and Department of Computer Science
Country	Finland
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Included in master program	The Master's Programme in Telecommunication
Tuition fee	No

Contact information

Tel. +3589451 5381

Email: anita.bisi@hut.fi

Web address: http://keskus.tct.hut.fi/masters/maskur1.html

Signal Processing Systems

Course focus

- Signal Processing

Course details

University	Helsinki University of Technology
Department	Department of Electrical and Communications Engineering and Department of Computer Science
Country	Finland
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Included in master program	The Master's Programme in Telecommunication
Tuition fee	No
Remarks	Radio Communication major

Contact information

Tel. +3589451 5381

Email: anita.bisi@hut.fi

Web address: http://keskus.tct.hut.fi/masters/maskur1.html

Signal Processing Systems

Course focus

- Signal Processing

Course details

University	Helsinki University of Technology
Department	Department of Electrical and Communications Engineering and Department of Computer Science
Country	Finland
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Included in master program	The Master's Programme in Telecommunication
Tuition fee	No
Remarks	Digital signal Processing major

Contact information

Tel. +3589451 5381

Email: anita.bisi@hut.fi

Web address: http://keskus.tct.hut.fi/masters/maskur1.html

Signals and Communications (Signal et Communications)

Course focus

- Signal Processing
- Information Theory

Course details

University	Ecole Nationale Superieure des Telecommunications de Bretagne
Department	Ecole Nationale Superieure des Telecommunications de Bretagne
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. 33 (0)2 29 00 11 11

Web address: www.enst-bretagne.fr

Simulation of Transmission Systems (Simulation De Systèmes De Transmission (A3 01))

Course details

University	Ecole Nationale Superieure Electronique, Informatique & Radiocommunications Bordeaux (ENSEIRB)
Department	Ecole Nationale Superieure Electronique, Informatique & Radiocommunications Bordeaux (ENSEIRB)
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. +33 (0)5 56 84 65 00

Email: webmaster@enseirb.fr

Web address: www.enseirb.fr

Space-Time Signal Processing in Mobile Communication

Course focus

- Antenna and RF Design
- Signal Processing

Course details

University	Berlin University of Technology
Department	Electrical Engineering and Computer Science
Country	Germany
Lecturer	Holger Boche
Course language	German
Material in English?	No
Course in English planned?	No
Included in master program	Telecommunication Systems
Begin month	October

Contact information

Tel. +49 30 314 28 459

Email: Holger.Boche@tu-berlin.de

Web address: http://www-mk.ee.tu-berlin.de/en/lectures/ lecture_digital_mobile_communi/ lecture_digital_mobile_communi.html

Speech Transmission (Transmission De la Parole)

Course outline

- To study the speech transmission methods that are specific to radio links.

Course focus

- Quality measures for coded speech

- Motivation and considerations for speech coding

- Characterization of speech signals, production models

- Characterization of auditive perception

- Signal coding

- Decorrelating transformation
    - frequential approaches (DCT, filter banks)

- Linear prediction
    - Lattice filters
    - Reflection coefficients

- Voice coders
    - LPC, RELP

- Synthesis analysis methods
    - MPELP, RPELP, CELP

- Auxiliary transmission operations
    - Voice detection
    - Discontinued transmission
    - Insertion of comfort noise

- Examples of CCITT and GSM standards

- Additional processing of speech signals

- Background noise reduction

- Removal of acoustic echo for hands-off operation

Course details

University	EPFL
Department	2ème cycle Eurecom - Com. Mobiles
Country	Switzerland
Lecturer	Dirk SLOCK
Course language	French
Material in English?	Yes
Course in English planned?	Yes
Keywords	transmission de la parole - speech transmission
Course hours	15

Contact information

Tel. 0041 21 693 5637

Email: dsc@epfl.ch

Web address: http://dscwww.epfl.ch/students/2eme-cycle-Eurecom-sanction-etudes-01-02.pdf

Spread Spectrum and CDMA Systems

Course details

University	Poznan University of Technology
Department	Electrical Engineering Dept, Institute of Electronics & Telecommunications
Country	Poland
Lecturer	Dr. Rafal Krenz
Course language	Polish
Material in English?	No
Course in English planned?	Yes
Remarks	Graduate Course It is currently given in Polish, however, it is possible to give it in English. Size of the course: 30h lecture, 15 h lab

Contact information

Tel. +4861 6652741

Email: wesolows@et.put.poznan.pl

Deliverable 3.1: Identification of interchangeable modules and lectures

NexWay:IST-2001-37944

Spread Spectrum Techniques and Applications (CDMA)

Course outline

- Basic principles and concepts of spread-spectrum communications
- Theory and Application of pseudo-noise (PN) sequences
- Acquisiton in DS/CDMA
- Tracking in DS/CDMA
- Carrier synchronization in DS/CDMA
- The Rake Receiver Concept
- Introduction to UMTS

Course focus

- Wireless Systems
- Applications

Course details

University	Aalborg University
Department	Communication Department
Country	Denmark
Lecturer	Bernard Fleury
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Keywords	pseudo-noise sequences;spread-spectrum communications;UMTS, CDMA
Tuition fee	No
Remarks	9 semester

Contact information

Tel. + 45 96 35 86 40

Email: cpk@cpk.auc.dk

Web address: http://cpk.auc.dk/dicom/E02/CDMA.htm

299

Statistical Signal Processing

Course details

University	Helsinki University of Technology
Department	Department of Electrical and Communications Engineering and Department of Computer Science
Country	Finland
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Tuition fee	No
Remarks	Digital signal Processing major

Contact information

Tel. +3589451 5381

Email: anita.bisi@hut.fi

Web address: http://keskus.tct.hut.fi/masters/maskur1.html

Stochastic Fundamentals of Communication Signals - Exercises (382.767)

Course outline

- Fundamentals of Stochastic Communications

Course focus

- Randomness in communication
    - Transmitted information
    - Receiver techniques
- Random variables
    - Noise-corrupted signals
- Expectation
    - Moments
    - Estimations
- Probability distributions
    - Gaussian
    - Poisson
    - Binomial
- Estimation of distribution parameters, Fundamentals of Statistics, Random signals
    - Autocorrelation function
    - Power spectral density
    - Markoff chains
    - Noise
- Pseudo-random sequences

Course details

University	Vienna University of Technology
Department	Faculty of Electrical Engineering and Information Technology
Country	Austria
Lecturer	ZEITLHOFER Thomas, Dipl.-Ing.
Course language	German
Material in English?	No

Course in English planned?	No
Keywords	Fundamentals of Stochastic Communications
Course hours	1

Contact information

Tel. 0043 1 58801 38962

Email: tzeitlho@nt.tuwien.ac.at

Web address: http://www.lzk.ac.at/lecture/tuwien/382767

Stochastic Models and Signal Processing

Course outline

- Discrete-time linear systems and the z-transform

- Discrete time and continuous time : forth and back

- Digital filters

- Elements of probability theory

- Discrete-time stochastic processes

- Elements of detection and estimation theory

- Viterbi algorithm

- Linear estimation and filtering

- Wiener filter

- LMS algorithm.

Course details

University	ETHZ
Department	-
Country	Switzerland
Lecturer	Loeliger H.-A.
Course language	German
Material in English?	No
Course in English planned?	No
Keywords	topics of digital signal processing with a bias towards applications in telecommunications, "linearity" and "probability".
Other courses needed beforehand	Base studies.
Remarks	Lecture number : 35-101

Contact information

Tel. 0041 1 632 5002

Email: dept-sekr@ee.ethz.ch

Web address: http://www.ee.ethz.ch/students/courses.en.html

System Engineering in Wireless Communication

Course focus

- Wireless Systems

Course details

University	Helsinki University of Technology
Department	Department of Electrical and Communications Engineering and Department of Computer Science
Country	Finland
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Included in master program	The Master's Programme in Telecommunication
Tuition fee	No
Remarks	Radio Communication major

Contact information

Tel. +3589451 5381

Email: anita.bisi@hut.fi

Web address: http://keskus.tct.hut.fi/masters/maskur1.html

Technique of Emission and Receiving

Course outline

- Properties of radio
- TV and radiocommunication transmitters
- Parameters of transmitters power stages
- Principles of operation of conventional H.F. power amplifiers (Class C, Class AB linear amplifiers)
- Power amplitude modulators
- Wideband amplifiers
- High-efficiency switch-mode power amplifiers (Class-D, Class-DE and Class-E).
- Principles of construction of H.F. power amplifiers
- Resonant circuits
- Basic receiving circuits
    - High-frequency amplifiers
    - Frequency conversion
    - IF filters
    - Demodulators
    - Noise and intermodulation properties of RF circuits
    - Techniques of frequency synthesis (oscillators, PLL, DDS)
    - Measurement methods.

Course focus

- Signal Processing
- Wireless Systems
- Applications
- RF design

Course details

University	Warsaw University of Technology
Department	Faculty of Electronics and Information Technology
Country	Poland
Lecturer	Dr. Juliusz Modzelewski, Dr. Wojciech Kazubski

Course language	Polish
Material in English?	No
Course in English planned?	no
Keywords	radio transmitters, radio receivers, high-frequency power amplifiers, power modulators, mixers, frequency synthesis, selective amplifiers, noise factor, demodulators
Included in master program	No
Other courses needed beforehand	Theory of Signals and Modulations, Electronics, Basics of High-Frequency Technique
Tuition fee	0

Contact information

Tel. 48 22 6607793

Email: juliuszm@ire.pw.edu.pl

Telecommunication

Course outline

- Introduction to telecommunication systems
- Services and organization
- Deterministic signals
- Application of stochastic processes in the description of signals and noise
- Sampling and quantization of continuous stochastic signals
- Examples of user signals
- Linear estimation and prediction
- Baseband transmission of digital signals
    - Optimal receivers
    - Signal design
    - Line codes.
- Models for physical transmission channels
    - Metallic and optical transmission lines
    - Radio channels
    - Storage media
- Modulation techniques
    - Amplitude modulation
    - Quadrature modulation
    - Digital phase modulation
    - OFDM
- Digital networks
    - Component and multiplexing systems
    - Simple protocols for information exchange

Course focus

- Signal Processing

Course details

University	Technical University of Denmark
Department	COM
Country	Denmark
Lecturer	Knud J. Larsen
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Keywords	Keywords: telecommunication, transmission, signal analysis, signal processing
Included in master program	Telecommunications
Tuition fee	No

Contact information

Tel. (+45) 4525 3629

Email: kjl@com.dtu.dk

Web address: http://www.com.dtu.dk/education/34230

Telecommunication Systems

Course details

University	Helsinki University of Technology
Department	Department of Electrical and Communications Engineering and Department of Computer Science
Country	Finland
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Tuition fee	No
Remarks	Networking Technology major

Contact information

Tel. +3589451 5381

Email: anita.bisi@hut.fi

Web address: http://keskus.tct.hut.fi/masters/Mas-2003-networking.html

Telecommunications: The Transmission (Telecommunications : La Transmission)

Course focus

- Signal Processing

Course details

University	Universite de Rennes 1
Department	Institut de Formation Superieure en Informatique et Communication (IFSIC)
Country	France
Course language	French
Material in English?	No
Course in English planned?	no

Contact information

Tel. (33)2 99 84 71 00

Email: webmaster@ifsic.univ-rennes1.fr

Web address: www.ifsic.univ-rennes1.fr

Telephony, Narrow-band ISDN and Introduction to Broad-band (Téléphonie, RNIS Bande Étroite Introduction au Large Bande (RE3 03))

Course focus

- Signal Processing
- Protocols

Course details

University	Ecole Nationale Superieure Electronique, Informatique & Radiocommunications Bordeaux (ENSEIRB)
Department	Ecole Nationale Superieure Electronique, Informatique & Radiocommunications Bordeaux (ENSEIRB)
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. +33 (0)5 56 84 65 00

Email: webmaster@enseirb.fr

Web address: www.enseirb.fr

Terrestrial and Satellite Radiocommunication Systems (Syst. de Radiocom. Terrestres et Satellitaires)

Course focus

- Antenna and RF Design
- Wireless Systems

Course details

University	Ecole Nationale Superieure des Telecommunications de Bretagne
Department	Ecole Nationale Superieure des Telecommunications de Bretagne
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. 33 (0)2 29 00 11 11

Web address: www.enst-bretagne.fr

Theory and Designing of Antennae

Course outline

- Green Function Theory
- Integral equation
- Numerical methods for solving integral equation (e.g. method of moments)
- Antennas and Antenna arrays (including smart antennas and steering antennas).

Course focus

- Antenna and RF Design

Course details

University	Warsaw University of Technology
Department	Faculty of Electronics and Information Technology
Country	Poland
Lecturer	Dr. Y. Yashchyhyn
Course language	Polish
Material in English?	No
Course in English planned?	No
Keywords	Antenna array, smart antennas, path, pattern synthesis
Tuition fee	0

Contact information

Tel. 48 22 6607833

Email: E.Jaszczyszyn@ire.pw.edu.pl

Third Generation Mobile Communication Networks (389-039)

Course outline

- Principles underlying mobile communication networks.

- The architecture of commercial mobile cellular communication networks is presented and the UMTS.

- The tasks of the three lower protocol layers.

- Coding, realtime-capable algorithms for optimizing the resource allocation and strategies for securing the quality of service on the fluctuating mobile radio channel.

Course outline

- Introduction and History

- UMTS Overview

- Radio Resource Management (RRM)

- Model of UTRAN protocol layers

- Tasks of the physical layer (PHY)

    o Physical layer for frequency division duplex (FDD) mode

    o Physical layer for time division duplex (TDD) mode

- Tasks of Layer 2 and its sublayers

- Tasks of Layer 3 (Radio Resouce Control)

Course details

University	Vienna University of Technology
Department	Faculty of Electrical Engineering and Information Technology
Country	Austria
Lecturer	MECKLENBRÄUKER Christoph
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Keywords	Third Generation Mobile Communication Networks
Other courses needed beforehand	Supplemental Courses 381431 - KO - Mobilfunk - BONEK Ernst a.o. 389032 - VO - Information theory for communications

	engineers - HLAWATSCH Franz
	389038 - VO - MULTI - USER COMMUNICATIONS - MÜLLER R
Course hours	2
Remarks	The language of the examination can be chosen by the student : german or english.

Contact information

Tel. 0043 1 58801 38901

Email: cfm@ftw.at

Web address: http://www.lzk.ac.at/lecture/tuwien/389039

Transceiver Architectures I

Course focus

- Antenna and RF Design
- Signal Processing

Course details

University	Aalborg University
Department	Communication Department
Country	Denmark
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Included in master program	Digital Communications and Mobile Communications
Tuition fee	No
Remarks	8th semester

Contact information

Tel. + 45 96 35 86 40

Email: cpk@cpk.auc.dk

Web address: http://cpk.auc.dk/antennas/

Transmission Lines and Filters

Course outline

- Signal properties on transmission lines in the time and frequency domain
- Basic knowledge of analog filter synthesis

Course focus

- Transmission line equations of the lossless and lossy TEM-transmission line.
- Introduction of current and voltage waves.
- Representation of reflections in the time and frequency domain.
- Application of the Smith chart.
- Behavior of low-loss transmission lines.
- Attenuation and impulse distortion due to skin effect.
- Transmission line equivalent circuits.
- Group delay and signal dispersion.
- Coupled transmission lines.
- Scattering parameters.
- Butterworth, Chebychev and Bessel filter approximations : filter synthesis from low-pass filter prototypes.
- Simple active filters.

Course details

University	ETHZ
Department	-
Country	Switzerland
Lecturer	Baechtold W.
Course language	German
Material in English?	No
Course in English planned?	No
Keywords	signal properties on transmission lines, analog filter synthesis
Remarks	Lecture number : 35-112

Contact information

Tel. 0041 1 632 5002

Email: dept-sekr@ee.ethz.ch, Web address: http://www.ee.ethz.ch/students/courses.en.html

Transmission Systems Engineering

Course focus

- Wireless Systems
- Applications

Course details

University	Delft University of Technology
Department	Electrical Engineering
Country	Netherlands
Lecturer	J.C. Arnbak
Course language	English
Material in English?	No
Course in English planned?	No
Keywords	Transmission system, link budget, channel model, multipplexing, multiple acces, channel coding
Included in master program	Telecommunications
Other courses needed beforehand	Telecommunication techniques, Telecom Networks
Begin month	september
Course hours	16

Contact information

Tel. +31152781698

Email: J.H.Weber@its.tudelft.nl

Web address: http://academics.its.tudelft.nl/nl/info2002/Master_Et.pdf

Transmission Technology II (Wireless Information Theory)

Course outline

- Wireless communications
- Elements of information theory
- Wireless channels (fading channels)
- Ergodic and outage capacity of fading channels
- Coded modulation for fading channels
- Adaptive modulation
- Interleaving
- Error probability
- Error exponent
- Cutoff rate
- Multiple antenna (MIMO) systems
- Space-time codes
- Orthogonal frequency division multiplexing (OFDM)
- Fading multi-access and broadcast channels

Course details

University	ETHZ
Department	-
Country	Switzerland
Lecturer	Boelcskei H.
Course language	German
Material in English?	No
Course in English planned?	No
Keywords	advanced concepts in statistical communication ,design of modern wireless systems
Other courses needed beforehand	Transmission Technology I.
Remarks	Lecture number : 35-438

Contact information

Tel. 0041 1 632 5002

Email: dept-sekr@ee.ethz.ch

Web address: http://www.ee.ethz.ch/students/courses.en.html

Video Processing And Communications (Imagerie Multimedia Et Communications)

Course outline

- Introduction to the tools and basic techniques used in Image Proceesing : segmentation, motion estimation, 3D-imaging

- Study video signals used in tele-video-conferecing

- Introduce the students to new emerging areas in the field of multimedia signal processing such as image watermaking and indexing, face cloning

- Lab and problem sessions.

Course details

University	EPFL
Department	2ème cycle Eurecom - Com. Multimédias
Country	Switzerland
Lecturer	Jean-Luc DUGELAY
Course language	French
Material in English?	No
Course in English planned?	No
Keywords	outils et techniques de base pour Traitement d'images fixes et/ou animées - introductory of the tools and basic techniques used in Image Proceesing
Course hours	20

Contact information

Tel. 0041 21 693 5637

Email: dsc@epfl.ch

Web address: http://dscwww.epfl.ch/students/2eme-cycle-Eurecom-sanction-etudes-01-02.pdf

Waves and Antennas

Course focus

- Antenna and RF Design

Course details

University	Poznan University of Technology
Department	Electrical Engineering Dept, Institute of Electronics&Telecommunications
Country	Poland
Lecturer	Dr. Jaroslaw Szostka
Course language	Polish
Material in English?	No
Course in English planned?	Yes
Tuition fee	0
Remarks	Undergraduate course : It is currently given in Polish, however, it is possible to give it in English. Size of the course : 30 h lecture + 30 h lab

Contact information

Tel. +4861 6652741

Email: wesolows@et.put.poznan.pl

Wearable Systems I

Course outline

- Concepts and methods of wearable mobile systems
    - o Heterogeneous systems and hardware platforms
    - o Context sensitivity
    - o Short distance communication
    - o Signal processing on digital signal processors
    - o Carrying out of a design project.

Course focus

- Miniaturisation using textile motherboards
- Heterogeneous computer and communication architectures
- Sensors for context aware system control.
- Design project
    - o Using a sensor module connnected with a combined palmtop/signal processor
    - o Detection of the current user environment
    - o Validation with MATLAB and testing with several user scenarios.

Course details

University	ETHZ
Department	-
Country	Switzerland
Lecturer	Troester G., Lukowicz P.
Course language	German
Material in English?	No
Course in English planned?	No
Keywords	wearable mobile systems, heterogeneous systems and hardware platforms, context sensitivity, short distance communication
Other courses needed beforehand	Stochastic models and signal processing.
Remarks	Lecture number : 35-197

Contact information

Tel. 0041 1 632 5002 Email: dept-sekr@ee.ethz.ch

Web address: http://www.ee.ethz.ch/students/courses.en.html

Wearable Systems II

Course outline

- Hardware platforms for wearable mobile systems.

- Design and implementation of a wearable computer.

Course focus

- Packaging technologies

  - o Flexible PWBs

  - o Multichip modules (MCM)

  - o Conductive fibers

  - o Smart textiles, MEMS technologies.

- Synchronisation of digital systems

  - o Synchronous and asynchronous communication techniques

- Design of a textile based computer

  - o System concept

  - o Simulation of signal transmission and clock distribution using SPICE.

  - o Business plan for the commercialisation of a mobile communication module.

Course details

University	ETHZ
Department	-
Country	Switzerland
Lecturer	Troester G., Thaler M.
Course language	German
Material in English?	no
Course in English planned?	No
Keywords	Hardware platforms for wearable mobile systems. Design and implementation of a wearable computer.
Other courses needed beforehand	Wearable systems I (recommended).
Remarks	Lecture number : 35-198

Contact information

Tel. 0041 1 632 5002 Email: dept-sekr@ee.ethz.ch

Web address: http://www.ee.ethz.ch/students/courses.en.html

Wideband CDMA Communications

Course details

University	Université Catholique de Louvain
Department	Graduate School in Electronics and Communications
Country	Belgium
Course language	English
Material in English?	No
Course in English planned?	No
Remarks	GSEC Phone number and email

Contact information

Tel. +3210472586

Email: Liliane.Vanderveren@elec.ucl.ac.be

Web address : http://www.gsec.ucl.ac.be/Post/AT8.php

Wireless and Mobile Communications

Course focus

- o Antenna and RF Design
- o Wireless Systems

Course details

University	Catholic University of Leuven
Department	TELEcommunications & MICrowaves
Country	Belgium
Lecturer	Bart Nauwelaers
Course language	Dutch
Material in English?	No
Course in English planned?	No

Contact information

Tel. +3216321114

Email: Bart.Nauwelaers@esat.kuleuven.ac.be

Web address: http://cwisdb.cc.kuleuven.ac.be/oo-bin/0102/searchvaknr.pl?lang=E&vaknr=H242

Wireless Communication

Course outline

- Introduction to wireless communication systems
- Transmitter and receiver
- RF circuits and antennas
- Radiowave propagation
- Modulation

Course details

University	Technical University of Denmark
Department	COM
Country	Denmark
Lecturer	Erik Lintz Christensen
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Keywords	Wireless communication, RF circuits, Antennas, Radiowave propagation, Modulation
Included in master program	Telecommunications
Tuition fee	No
Remarks	1. The course requires a thorough basic knowledge of electromagnetics (Maxwell's equations, plane waves, and transmission lines) and circuit theory
	2. The course is open for M.Sc. students from both the electrical engineering and technical physics preliminary four-semester programmes, and B.Sc.-students from the electrical engineering programme.

Contact information

Tel. (+45) 4525 3835

Email: elc@oersted.dtu.dk

Web address: http://www.oersted.dtu.dk/31405

Wireless Communication

Course outline

- Fadind mobile channel modeling
    - Multipath propagation
    - Doppler bandwidth
    - Coherence time
    - Delay-intensity profile and coherence bandwith
    - Rayleigh and Rice fading statistics
- Coherent detection over flat-fading channels
    - Performance analysis of (coded) modulation schemes
    - Use of quadratic forms of complex Gaussian random variables
- Differential and block-differential detection over Gaussian and fading channels
- Non-coherent detection over Gaussian and fading channels
- Joint data detection and channel estimation
    - maximum likelihood sequence estimation
    - Per-survivor processing
- Multiple access techniques
    - FDMA
    - TDMA
    - CDMA
    - Particular emphasis is devoted to the performance analysis of CDMA systems
    - Overview of the physical layer (coding, modulation, equalization and decoding) of GSM and IS-95

Course focus

- Wireless Systems

Course details

University	EURECOM
Department	Mobile Communications
Country	France
Course language	French

Material in English?	No
Course in English planned?	No

Contact information

Tel. +33 (0) 493002608

Email: christian.bonnet@eurecom.fr

Web address: www.eurecom.fr

Wireless Communications

Course focus

- Wireless Systems

Course details

University	Warsaw University of Technology
Department	The Faculty of Electronics and Information Technology
Country	Poland
Course language	English
Material in English?	No
Course in English planned?	No

Contact information

Tel. +48 22 825 37 61

Email: ece@elka.pw.edu.pl

Web address: http://www.ire.pw.edu.pl/zejim/ece/gr_prog.html

Wireless Communications (Communications Sans Fil)

Course outline

- Provides a theoritical knowledge of
  - o Coding
  - o Modulation
  - o Detection techniques over time-varying fading channels
  - o Typical of mobile cellular systems
- Multiple-access over radio channels is treated at the physical layer
- The overview of two important existing standards for cellular mobile communications
  - o GSM
  - o IS-95
  - o examples of the practical application of the theory developed during the course is provided.

Course details

University	EPFL
Department	2ème cycle Eurecom - Com. Mobiles
Country	Switzerland
Lecturer	Giuseppe CAIRE
Course language	French
Material in English?	Yes
Course in English planned?	Yes
Keywords	communications sans fil - Wireless communication
Course hours	25

Contact information

Tel. 0041 21 693 5637

Email: dsc@epfl.ch

Web address: http://dscwww.epfl.ch/students/2eme-cycle-Eurecom-sanction-etudes-01-02.pdf

Wireless Data Communication

Course outline

- Wireless LAN
- Ad hoc Networks
- Multiple Access Networks

Course details

University	Aalborg University
Department	Communication Department
Country	Denmark
Lecturer	Ramjee Prasad
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Keywords	AODV,ZRP,DSDV, protocols
Included in master program	Mobile Radio Communications
Tuition fee	No
Remarks	9 semester

Contact information

Tel. + 45 96 35 86 40

Email: cpk@cpk.auc.dk

Web address: http://cpk.auc.dk/master/mob_master.html;http://esn.auc.dk/ Studieordning_PDF/ specialer/4_12_mobile_communicaion.htm

Wireless LANs

Course outline

- Wireless LAN technologies (Infrared, Radio Frequency)
- Architectures and topologies (stand-alone networks, wireless extension)
- Networking with Ethernet
- Networking with ATM
- Issues (Hidden terminal, mobility, connectivity)
- Medium Access protocols for wireless LANs
- Mobility Handling (at link layer, at network layer)
- Illustrations are taken from standards (IEEE 802.11, HIPERLAN) or de facto standards (Wavelan), Laboratory (TP)
- Simulation of a wireless LAN (focus on the Medium Access Layer)
- Hands-on experience with Wavelan Recitation (TD)
- Performance evaluation and analysis of a wireless Medium Access protocol

Course focus

- Signal Processing
- Wireless Systems
- Protocols
- Applications

Course details

University	EURECOM
Department	Mobile Communications
Country	France
Course language	French
Material in English?	No
Course in English planned?	No

Contact information

Tel. +33 (0) 493002608

Email: christian.bonnet@eurecom.fr

Web address: www.eurecom.fr

Wireless Networks (ETC 019)

Course focus

- Wireless Systems

Course details

University	Blekinge Institute of Technology
Department	Department of Telecommunications and Signal Processing
Country	Sweden
Course language	English
Material in English?	No
Course in English planned?	No
Included in master program	M.Sc. in Electrical Engineering

Contact information

Tel. +46 457 38 57 28

Email: jan.mark.de.haan@bth.se

Web address: http://www.its.bth.se/ets/index-eng.html

Wireless System Engineering

Course outline

- Main ideas, methods, circuits, and components of microwave engineering from a system perspective

- Overview and understanding needed for a wireless hardware engineering

- Block schematic system design of receivers and transmitters for wireless communications and radar

- Link budget design of wireless communication and radar systems

- Wireless communication systems

    o Access principles

    o Cellular systems

    o Navigation

    o Transponders.

Course focus

- Antenna and RF Design

Course details

University	Chalmers University of Technology
Department	Chalmers University of Technology
Country	Sweden
Course language	English
Material in English?	Yes
Course in English planned?	Yes
Included in master program	Hardware for Wireless Communications
Other courses needed beforehand	Should have a B.Sc. or equivalent in electrical engineering or engineering physics.
Begin month	Fall semester
Course hours	4
Remarks	Course hours are in 4 course units

Contact information

Tel. +46 31 772 1834

Email: piotr@ep.chalmers.se

Web address: http://www.chalmers.se/masters.html

Wireless Telecommunication Systems

Course focus

- Wireless Systems

Course details

University	Catholic University of Leuven
Department	TELEcommunications & MICrowaves
Country	Belgium
Lecturer	Emmanuel Van Lil
Course language	Dutch
Material in English?	No
Course in English planned?	No

Contact information

Tel. +3216321113

Email: Emmanuel.VanLil@esat.kuleuven.ac.be

Web address: http://cwisdb.cc.kuleuven.ac.be/oo-bin/0102/searchvaknr.pl?ang=E&vaknr=HP31

WLAN Systems

Course details

University	Poznan University of Technology
Department	Electrical Engineering Dept, Institute of Electronics&Telecommunications
Country	Poland
Course language	Polish
Material in English?	No
Course in English planned?	Yes
Tuition fee	0
Remarks	It is currently given in Polish, however, it is possible to give it in English.

Contact information

Tel. +4861 6652741

Email: wesolows@et.put.poznan.pl

Appendix 2 - Master Programs

No.	Master program	University	Country
1	Advanced Photonics and Communications	University of Warwick	United Kingdom
2	Applied Computing for Technologies	Dublin Institute of Technology	Ireland
3	Broadband and Mobile Communication Networks	University of Kent at Canterbury	United Kingdom
4	Communication & Interactivity	Linköping Institute of Technology	Sweden
5	Communication and Media Engineering (CME)	University of Applied Sciences Offenburg	Germany
6	Communication Engineering	UMIST (University of Manchester Institute of Science and Technology)	United Kingdom
7	Communication Engineering	Budapest University of Technology and Economics	Hungary
8	Communication Networks and Systems (Systemes de Communication et Reseaux)	Institute National Polytechnique de Toulouse	France
9	Communication Systems	EPFL	Switzerland
10	Communication Systems and Sattelite Communication Technologies	University of Thraki	Greece
11	Communications and Information Technology	Dresden University of Technology	Germany
12	Communications and Real-Time Electronic Systems	University of Bradford	United Kingdom
13	Communications and Signal Processing	Imperial College of Science, Technology and Medicine, University of London	United Kingdom
14	Communications and Signal Processing	University of Newcastle upon Tyne	United Kingdom
15	Communications Engineering	University of Cantabria	Spain
16	Communications Engineering	Aachen University of Technology	Germany
17	Communications Engineering and Signal Processing	University of Plymouth	United Kingdom
18	Communications Systems and Networks	Polytechnic University Madrid	Spain
19	Communications Systems and Signal Processing	University of Bristol	United Kingdom
20	Communications Technology	University of Ulm	Germany
21	Communications Technology and Policy	University of Strathclyde	United Kingdom
22	Communications, Networks and Software	University of Surrey	United Kingdom
23	Components and Building Blocks of Communication Network(Composants et	ParisTech	France

	Dispositifs de Communications)		
24	Computer and Communication Networks	Institut National des Télécommunications	France
25	Computer Science and Communications Engineering	University of Duisburg	Germany
26	Computer Science and Telecommunications	L'Institut National Polytechnique de Grenoble	France
27	Computer Science Networks and Distributed Systems	Trinity College Dublin	Ireland
28	Comunication and Information Technology	University of Bremen	Germany
29	Data Communications	Kingston University	United Kingdom
30	Data Communications	University of Sheffield	United Kingdom
31	Digital Communication	University of Kiel	Germany
32	Digital Communication Systems (Systèmes de Communications Numériques)	ParisTech	France
33	Digital Communications	Aalborg University	Denmark
34	Digital Communications	University of Bath	United Kingdom
35	Electrical and Computer Engineering	Technical University of Lisbon	Portugal
36	Electrical Communication Engineering	University of Kassel	Germany
37	Electrical Engineering, with emphasis on Telecommunications/ Internet Systems/ Signal Processin	Blekinge Institute of Technology	Sweden
38	Electronics (by research)	School of Engineering, WIT,Waterford	Ireland
39	Electronics and Telecommunications	Technical University of Lodz	Poland
40	Electronics and Telecommunications Engineering	University of Aveiro	Portugal
41	Electronics for Telecommunication Systems (Electronique Pour les Systèmes de Télécommunications)	ParisTech	France
42	Engeneering of Computer Communication Systems (Ingénierie des Systèmes Informatiques Communicants)	Ecole Nationale Superieure des Telecommunications de Bretagne	France
43	Engineering in Computer and Communications Systems	University of Limerick	Ireland
44	European Master in Commun. (Mastère Européen en réseaux de télécommunications et datacoms optiques)	Ecole Nationale Superieure des Telecommunications de Bretagne	France
45	Hardware for Wireless Communications	Chalmers University of Technology	Sweden

46	Hardware systems Architecture (Architecture matérielle des systèmes)	ParisTech	France
47	HW Architecture for Digital Communications systems (Architecture Matérielle des Systèmes de Communication Numériques)	ParisTech	France
48	Information and Communication	Darmstadt University of Technology	Germany
49	Information and Communication	ETHZ	Switzerland
50	Information and Communication Engineering	University of Karlsruhe	Germany
51	Information and Communication Systems	Technical University of Hamburg-Harburg	Germany
52	Information and Communication Technology	International University in Germany	Germany
53	Information Engineering	University of Oulu	Finland
54	Information Engineering	University of Osnabrueck	Germany
55	Master of Technological Design (MTD), Information and Communication Technology	Technical University Eindhoven	Netherlands
56	Master of Technology Management in Telecommunications Strategy	Norwegian University of Science and Technology	Norway
57	Media and Knowledge Engineering	Delft University of Technology	Netherlands
58	Mobile and Personal Communications	King's College London	United Kingdom
59	Mobile Communication	Aalborg University	Denmark
60	Mobile Location Based Services	Kingston University	United Kingdom
61	Mobile Networks and Services (Réseaux et Services Mobiles)	Ecole Nationale Superieure des Telecommunications de Bretagne	France
62	Optical and Wireless Technology	Halmstad University	Sweden
63	Personal, Mobile and Satellite Communications	University of Bradford	United Kingdom
64	Radio Communication- and Hyperfrequencysystems (Systèmes de Communications Radio et Hyperfréquences)	ParisTech	France
65	Radio Frequency and Microwave Engineering	University of Bradford	United Kingdom
66	Radio Frequency Communications Engineering	University of Bradford	United Kingdom
67	School of Engineering	Jönköping University	Sweden
68	Telecommunication	Helsinki University of Technology	Finland
69	Telecommunication	TU WIEN	Austria

70	Telecommunication Engineering	Czech Technical University	Czech Republic
71	Telecommunication Networks	University of Twente	Netherlands
72	Telecommunication Systems and Networks	Warsaw University of Technology	Poland
73	Telecommunications	Technical University of Denmark	Denmark
74	Telecommunications	Delft University of Technology	Netherlands
75	Telecommunications Engineering	Dublin City University	Ireland
76	Telecommunications Engineering	University of Trento	Italy
77	WDM and All-Optical Networks (Réseaux WDM et tout-optiques)	ParisTech	France
78	Wireless Engineering	Technical University of Denmark	Denmark
79	Wireless Systems and Related Technologies	Politecnico di Torino	Italy

Advanced Photonics and Communications

Department

Electrical and Electronics Division

University

University of Warwick

Country

United Kingdom

Remarks

- Degree Offered: **M.Sc.**
- Taught / Research
  - o Taught Duration : 1 year full-time and 2 years part-time
- All candidates take two core modules: research methods in engineering and a supervised project
- Four optional modules from high performance programmable logic devices
- Mobile communications
- Optical communications systems
- Computational mathematics for engineers
- Signal processing
- Optical engineering and image processing
- Internet engineering
- Plus two others from a wide range of options within the department

Web address

http://www.eng.warwick.ac.uk/postgrad/apc/index.htm

Phone number

+44 (0)24 7652 2046

Email

pgadmissions@warwick.ac.uk

Applied Computing for Technologies

Department

Faculty of Engineering

University

Dublin Institute of Technology

Country

Ireland

Remarks

- Degree Offered: **M.Sc.**
- Course Outlines
  - o Operating systems, networks and Communications, (10 Credits)
  - o Software engineering, (10 Credits)
  - o Information systems, (10 Credits)
  - o Numerical methods, (10 Credits)
  - o Computer aided design, (10 Credits)
  - o Image processing and graphics, (10 Credits)
  - o Students will be required to complete a research dissertation in addition to the six taught modules (30 Credits)

Web address

http://www.dit.ie/DIT/study/graduate/courses/ft120.html

Phone number

353-1-402-3654

Email

John.Turner@dit.ie

Broadband and Mobile Communication Networks

Department

Department of Electronics

University

University of Kent at Canterbury

Country

United Kingdom

Remarks

- Degree Offered: **M.Sc.**

- This program and its constituent modules/ courses are supported by EPSRC (Masters Training Package Funding)

Web address

http://eleceng.ukc.ac.uk/MSc/msc.html

Phone number

+44 1227 823719

Email

N.J.Gomes@ukc.ac.uk

Communication & Interactivity

Department

Linköping Institute of Technology

University

Linköping Institute of Technology

Country

Sweden

Remarks

- Degree Offered : M.Sc.
- Focus on
  - o Data security and cryptology
  - o Human-computer interaction
  - o Computer networks
  - o Web programming databases
  - o Telecommunications theory

Web address

http://www.lith.liu.se/en

http://www.lith.liu.se/en/master/ci.html

Email

msc-ci@ida.liu.se

Communication and Media Engineering (CME)

Department

Electrical Engineering and Information Technology

University

University of Applied Sciences Offenburg

Country

Germany

Remarks

- Applicants should hold a Bachelor degree or an other academic degree either in Electrical Engineering, Media Engineering, Computer Sciences or in a related discipline

- In any case a basic knowledge in the field of Electrical / Telecommunication Engineering is essential to join the program

- All lectures in the CME-course are held in English. Therefore applicants should have a good proficiency in oral and written communication.

Web address

http://www.fh-offenburg.de/graduate-school/cme/

Phone number

+49 781 205 141

Email

cme@fh-offenburg.de

Communication Engineering

Department

Department of Electrical Engineering and Electronics

University

UMIST (University of Manchester Institute of Science and Technology)

Country

United Kingdom

Remarks

- Degree Offered: **M.Sc.**

- Taught/ Research: taught Duration: 12 months full-time

- Broad field of study from theoretical aspects of communication to realisation of particular systems through design of their constituent parts

- Special subjects include: transmission systems, optical communications, radio frequency devices and techniques

- Start Date: September

Web address

http://www.ee.umist.ac.uk/pgteach/coms/

Phone number

+44 (0)161 200 4800

Email

dkpaul@umist.ac.uk

Communication Engineering

Department

Electrical Engineering and Informatics

University

Budapest University of Technology and Economics

Country

Hungary

Web address

http://www.tanok.bme.hu/bulletin/elec/index.ssi#elective

Phone number

+36-1-4633548

Email

admission@tanok.bme.hu

Communication Networks and Systems (Systemes de Communication et Reseaux)

Department

École Nationale Supérieure d}Électrotechnique, d}Électronique, d}Informatique,

University

Institute National Polytechnique de Toulouse

Country

France

Web address

www.enseeiht.fr

Phone number

(+33)05 62 24 21 00

Email

inp@inp-toulouse.fr

Communication Systems

Department

School of Computer and Communication Sciences

University

EPFL

Country

Switzerland

Remarks

- The Ecole Polytechnique Federale de Lausanne (EPFL) plans to start a Master program in the fall of 2003.

Web address

www.epfl.ch

Phone number

+021 693 5223

Email

webmaster.ic@epfl.ch

Communication Systems and Satelite Communication Technologies

Department

Department of Electrical and Electronic Engineering

University

University of Thraki

Country

Greece

Web address

http://ipml.ee.duth.gr/~postgraduate/default.asp?page=19&parent=16

Phone number

+30 25410 23878

Email

info@ee.duth.gr

Communications and Information Technology

Department

Electrical Engineering and Information Technology

University

Dresden University of Technology

Country

Germany

Remarks

- This programme offers to acquire a Master's degree primarily to applicants having an excellent Bachelor degree certificate (BSc, UK: "with honours"). The programme is open to foreign and German students.

- The degree "Master of Science in Electrical Engineering" is equivalent to the German "Diplom-Ingenieur in Elektrotechnik". This means that the same topics (courses) have to be taken.

Web address

http://www.ifn.et.tu-dresden.de/~master/

Phone number

+49 351 463-33942

Email

master@et.tu-dresden.de

Communications and Real-Time Electronic Systems

Department

School of Engineering, Design and Technology

University

University of Bradford

Country

United Kingdom

Remarks

- Degree Offered: **M.Sc./PgDip**

- Course Duration : 12 months full-time (M.Sc.)

- Course includes

    o Real-time digital signal processing

    o Systems programming

    o Hardware systems design

    o Antennas

    o Radio transmission and reception

    o Signals and systems theory

    o Transmission systems

    o Real-time systems software

    o Network methods

    o Digital communications and spectrum management

    o RF communications applications

Web address

http://www.brad.ac.uk/university/pgpros/engineer/engineering.php#1

Phone number

+44 1274 234543

Email

pg-eng-enquiries@bradford.ac.uk

Communications and Signal Processing

Department

School of Electrical, Electronic and Computer Engineering.

University

University of Newcastle

Country

United Kingdom

Remarks

- Degree Offered: **M.Sc.**
- Course Duration : 1 year full-time
- Programme provides theoretical knowledge and practical experience
- Course contents
    - Compulsory modules
        - Digital signal processing
        - Data communications
        - Advanced communications systems
        - Digital electronics
    - optional modules
        - Analogue systems
        - Radio wave engineering
        - Satellite engineering
        - Telecommunications
        - Computer engineering
        - Optoelectronics
        - Plus individual project with dissertation.

Web address

http://128.240.17.25/mscpages.nsf

Phone number

+44 191 222 6000

Email

admissions-enquiries@ncl.ac.uk

Communications and Signal Processing

Department

Department of Electrical and Electronic Engineering

University

Imperial College of Science, Technology and Medicine, University of London

Country

United Kingdom

Remarks

- Course Duration : 12 months full-time (M.Sc.)
- Research projects available in following areas
    - Signal processing for mobile communications
    - Adaptive coding for time varying channels
    - Design and evaluation of communications networks
    - Design and application of mobile communication systems
    - Antenna array processing
    - Array communications
    - Adaptive signal processing
    - Stochastic filtering
    - Signal modelling
    - Spectral estimation
    - Acoustic echo cancellation
    - Speech enhancement
    - Speech recognition
    - Speaker identification
    - Image processing
    - Real-time signal processing.

Web address

http://www.ee.ic.ac.uk/courses/pg_courses.html

Phone number

+44 (0)20 7589 5111

Email

info@imperial.ac.uk

Communications Engineering

Department

Communications Engineering Department (DICOM)

University

University of Cantabria

Country

Spain

Remarks

- Fields of Study
  - o Microwaves
  - o Radiocommunications
  - o Local area networks
  - o Computational electromagnetism
  - o Advanced signal treatment

Web address

www.dicom.unican.es

Phone number

34-942201558

Email

torresrp@unican.es

Communications Engineering

Department

Electrical Engineering and Information Technology

University

Aachen University of Technology

Country

Germany

Remarks

- This programme provides in-depth theoretical and practical knowledge in modern communication technologies.
- Its particular focus is on advanced digital multimedia transmission systems.

Web address

http://www.rwth-aachen.de/zentral/aguid_ms_msegl_commegl.htm

Phone number

+49 241 80 22172

Email

swheadon@aaa.rwth-aachen.de

Communications Engineering and Signal Processing

Department

Faculty of Technology International Graduate School

University

University of Plymouth

Country

United Kingdom

Remarks

- Degree Offered: **M.Sc.**
- Course Duration : 1 year full-time, 2 to 3 years part-time
- Course contents
    - Digital communication
    - Mobile, personal and satellite communication
    - Data compression and error control code
    - Advanced signal processing
    - Optical communications systems
    - Security
    - Network design and management
    - Advanced networks
    - Networks and switching systems
    - Microwave and antenna systems
    - Multimedia communications
    - Business and management
    - Dissertation.

Web address

http://www.plymouth.ac.uk/courses/course.asp?al=2&id=2365

Phone number

+44 (0)1752 232558

Email

technology@plymouth.ac.uk

Communications Systems and Networks

Department

Telematic sistems Engineering (SIT) and Signal, sistems and Radiocommunications (SSR)

University

Polytechnic University Madrid

Country

Spain

Web address

www.master.etsit.upm.es

Phone number

34-913367364

Email

postgrado@master.etsit.upm.es

Communications Systems and Signal Processing

Department

Centre for Communications Research (CCR)

University

University of Bristol

Country

United Kingdom

Remarks

- Course contents
    - Principles of communications systems
    - Information theory
    - Radio wave propagation
    - Radio frequency and microwave techniques
    - Microwave antennas
    - Digital filters and spectrum analysis
    - Optimum signal processing, Coding theory
    - Performance of communication systems
    - Electro-magnetic compatibility
    - Implementation of digital signal processing
    - Speech processing
    - Satellite communications
    - Mobile radio techniques
    - Networks, protocols and distributed systems
    - Optical communications project management
    - 5-month research project which industrially sponsored students may be able to perform at place of work

Web address

http://www.een.bris.ac.uk/Research/research_index.htm

Phone number

+44 (0) 117 954 5175

Email

Chris.Railton@bris.ac.uk

Communications Technology

Department

Engineering Science

University

University of Ulm

Country

Germany

Remarks

- Foreign students holding Bachelor's degrees in Electrical Engineering and related fields, Physics, Mathematics or Computer Science are eligible for admission.

- For German students or foreign students graduating from a German institution of higher learning, a completed Vordiplom in Electrical Engineering or a Dipl.-Ing. degree from a Fachhochschule is expected.

Web address

http://www.uni-ulm.de/c-tech/

Phone number

+49 - 731 - 502 6004

Email

c-tech@uni-ulm.de

Communications Technology and Policy

Department

Electronic & Electrical Engineering

Computer and Information Sciences

Management Sciences

University

University of Strathclyde

Country

United Kingdom

Remarks

- Degree Offered: **M.Sc./ PgDip/ PgCert**
- Course Duration : 12 months full-time (M.Sc.); 9 months full-time (PgDip, PgCert)
- Course addresses issues concerning
  - o Technological change and rapid development of communications systems
  - o Demand for wide range of services that require variety of bandwidths and features
  - o Availability of new hardware supported by complex software
- Taught components (2 semesters) followed by project for M.Sc..

Web address

http://www.strath.ac.uk/eee/pg-info/CommTechPol.htm

Phone number

+44 (0)141 548 2688

Email

d.girma@eee.strath.ac.uk

Communications, Networks and Software

Department

Department of Electronics and Physical Sciences

University

University of Surrey

Country

United Kingdom

Remarks

- Course Duration : 12 months full-time, 2 to 4 years part-time
- Modular structure
    - Principles of telecommunication packet networks
    - Object-oriented design and C++
    - Microprocessor architectures
    - Network and service management and control
    - Mathematics of signal processing
    - Data and internet networking: options
    - Modulation and coding
    - Multimedia systems and computer technology
    - Advanced signal processing
    - Mobile and personal communications
    - Compulsory project.

Web address

http://www.ee.surrey.ac.uk/External/MSc/index.html

Phone number

+44 (0)1483 686142

Email

mscadmin@ee.surrey.ac.uk

Components and Building Blocks of Communication Network(Composants et dispositifs de communications)

Department

École Nationale Supérieure des Télécommunications (ENST)

University

ParisTech

Country

France

Web address

www.enst.fr

Phone number

+33 (0)1 45 81 77 83

Email

marie.baquero@enst.fr

Computer and Communication Networks

Department

Institut National des Télécommunications

University

Institut National des Télécommunications

Country

France

Remarks

- Degree Offered: **M.Sc.**
- Courses
    - Network I and II Courses
    - Mobile
    - Computer Science I and II
    - Internet Technology I and II
    - QOS - I Test
    - QOS - II Performance
    - Effective Communication
    - Management
- Seminars
    - Simulation
    - Security
    - Signal, Satellite
    - Interoperability Testing
    - Network Planning
    - OPNET
    - Internet III

Web address

www.int-evry.fr

Phone number

33 1 60 76 47 81

Email

monique.becker@int-evry.fr

Computer Science and Communications Engineering

Department

Electrical Engineering

University

University of Duisburg

Country

Germany

Remarks

- With the application form we need a curriculum vitae and officially authenticated copies of the following certificates in the original language as well as in translation (if in languages other than English, German or French)

    o School leaving certificate plus transcript

    o If available : university certificate plus transcript of academic record

    o German and English language certificates

- On the basis of these documents we can tell you whether you can be accepted to the degree course and in which semester you may start your studies.

- To enter the degree course in the summer semester is not always possible; it depends on the previous studies of the applicants.

Web address

http://www.fb9dv.uni-duisburg.de/ise/csce/csce.html

Phone number

+49 203 3792727

Email

csce@uni-duisburg.de

Computer Science and Telecommunications

Department

Ecole Nationale Superieure d`Infornatique et de Mathematique Appliquee de Grenoble (ENSIMAG

University

L'Institut National Polytechnique de Grenoble

Country

France

Remarks

- Degree Offered : M.Sc.
- Telecommunication Systems and Architecture
- Equipments
- Telecommunications and Distributed Applications
- Software Engineering and Information Systems

Web address

www.ensimag.imag.fr

Phone number

(33)(0)4 76 82 72 66

Computer Science Networks and Distributed Systems

Department

Department of Computer Science

University

Trinity College Dublin

Country

Ireland

Remarks

- Degree Offered : M.Sc.
- Course Duration : 1 year
- This is a fulltime M.Sc. programme in Computer Science focusing on Networks and Distributed Systems.

Web address

http://www.cs.tcd.ie/courses/mscnds/

Phone number

+353 (01) 608 1765

Email

mscnds-info@cs.tcd.ie

Comunication and Information Technology

Department

Electrical Engineering

University

University of Bremen

Country

Germany

Remarks

- Applications can be sent in over the whole year. Decision upon acceptance will be taken by December 2002 at the latest.

- Accepted candidates will get a letter of admission.

- Rejected candidates will be informed via email

Web address

http://www.msc-cit-iae.uni-bremen.de

Phone number

+49 421 2182277

Email

master@comnets.uni.bremen.de

Data Communications

Department

Faculty of Technology

University

Kingston University

Country

United Kingdom

Remarks

- The MSc in Data Communications is designed to provide students with the expertise and design experience necessary to satisfy the growing demand for specialists in networking and web based service design

- The course is accredited by the British Computer Society

Web address

http://technology.kingston.ac.uk/pg/mdc.html

Phone number

+44 (0)20 8547 7809

Email

mdc@kingston.ac.uk

Data Communications

Department

Department of Computer Science and the Department of Electronics and Electrical Engineering

University

University of Sheffield

Country

United Kingdom

Remarks

- Degree Offered: **M.Sc.**
- Course Duration : 1 year full-time

Web address

http://www.shef.ac.uk/eee/teach/grad/msceng.html

Phone number

+44 (0)114 222 1780

Email

infoeee@sheffield.ac.uk

Digital Communication

Department

Electrical Engineering and Information Technology

University

University of Kiel

Country

Germany

Remarks

- A 2-year master program with **M.Sc** degree from the department of "Electrical Engineering and Information Technology" in Digital Communications.

- Course and lab teaching in English

- Start of program: Mid October each year

- Participation in modern communications and information technology research including

  o Advanced signal and system theory

  o Digital transmission

  o System identification

  o Advanced digital signal processing

  o Array processing

  o Information and coding theory

  o Digital transmission via antennas and fibers

  o Wireless communications

  o Multi-media communications

  o IT-security, etc.

Web address

http://www.tf.uni-kiel.de/etech/NT/master/index_uk.html

Phone number

+49 431 - 880 - 6300

Email

digcom@tf.uni-kiel.de

Digital Communication Systems (Systèmes de communications numériques)

Department

École Nationale Supérieure des Télécommunications (ENST)

University

ParisTech

Country

France

Web address

www.enst.fr

Phone number

+33 (0)1 45 81 77 83

Email

marie.baquero@enst.fr

Digital Communications

Department

Department of Communication Technology

University

Aalborg University

Country

Denmark

Remarks

- The specialisation in Digital Communications aims at enabling the students to acquire a solid knowledge of the theoretical frameworks, the fundamental concepts, and the advanced methods that underlie the analysis and design of modern communication systems

- Fundamental courses are offered which present the basic concepts of digital communication theory, like the channel capacity, the cut-off rate, the error exponent as well as the significance of these notions in practical engineering terms.

- These courses also give the fundamental limitations of digital communications.

- Specific courses introduce the students to the most advanced methods currently employed in the following important areas of digital communications

  - Channel equalisation
  - Digital modulation
  - Error control coding
  - Spread spectrum technique
  - Multi-user detection
  - Filtering theory

- The complete curriculum aims at providing the students with the ability to perform comprehensive implementation and performance analysis of efficient and flexible communication systems

- 8. semester THEME:Communication Signals and Systems

- 9. Semester THEME:Advanced Techniques in Digital Communications

- Final semester: Master Thesis Work in Digital Communications

Web address

http://esn.auc.dk/Studieordning_PDF/specialer/4_05

Email

masters@kom.auc.dk

Digital Communications

Department

Electronic & Electrical Engineering

University

University of Bath

Country

United Kingdom

Remarks

- Degree Offered: **M.Sc.**

- The course aims to equip programme graduates with the academic and personal qualities required for them to make an immediate engineering contribution to industry in the field of digital communication systems, analysis and design.

Web address

http://www.bath.ac.uk/prospectus/postgrad/2002/taught/dig-comm.htm

Phone number

+44 (0) 1225 826615

Email

eesdem@bath.ac.uk

Electrical and Computer Engineering

Department

Electrical and Computer Engineering

University

Technical University of Lisbon

Country

Portugal

Remarks

- Degree offered: MSc
- Course duration: 24 month (1 year lectures, 1 year research or development work)

Web address

http://www.deec.ist.utl.pt/meec/meec/

Phone number

E+351 213100259

Email

joao.lemos@inesc.pt

Electrical Communication Engineering

Department

Electrical Engineering

University

University of Kassel

Country

Germany

Remarks

- If you have studied some course in Electrical Communications, e.g.Electronics & Communications Engineering and you have also got excellent academic marks then you may have a good chance to get admitted.

- In any case the course which has attended earlier should reflect subjects in the area of electrical communications

- We are planning to support the students with additional information about courses which would not fit to the intention and contents of the ECE programme. Because the notation and contents of a given course may differ from country to country we will add the country itself for clearness

Web address

http://www.uni-kassel.de/fb16/hft/msc.html

Phone number

+49 - 561 - 804 - 6318

Email

Petra.Castillo@uni-kassel.de

Electrical Engineering, with emphasis on Telecommunications/ Internet Systems/ Signal Processing

Department

Department of Telecommunications and Signal Processing

University

Blekinge Institute of Technology

Country

Sweden

Remarks

- Degree Offered: **M.Sc.**
- The program offers three branches
    - o Internet Systems
    - o Signal Processing
    - o Telecommunication

Web address

http://www.its.bth.se/ets/index-eng.html

Phone number

+46 457 38 57 28

Email

jan.mark.de.haan@bth.se

Electronics (by research)

Department

Department of Engineering Technology

University

School of Engineering, WIT,Waterford

Country

Ireland

Remarks

- Degree Offered : M.Sc.
- Course Outlines
  - o Microelectronics & Systems Research
  - o Mobile Telecommunications
  - o Semiconductor Process & Device Modelling

Web address

http://www.wit.ie/soe/

Phone number

353-051-302035

Email

abyrne@wit.ie

Electronics and Telecommunications

Department

Faculty of Electrical and Electronics Engineering

University

Technical University of Lodz

Country

Poland

Remarks

- Specialization in the following fields
  - o Signal and Image Processing
  - o Telecommunication Systems
  - o Industrial Electronic Systems
  - o Integrated Elements and Systems
  - o Technology of Applied Electronics.

Web address

http://www.p.lodz.pl/pol/ang/elektr_a.html

Phone number

+48 42 631 25 02

Email

deanelec@sir.p.lodz.pl

Electronics and Telecommunications Engineering

Department

Electronics, Telecommunications and Informatics

University

University of Aveiro

Country

Portugal

Remarks

- Degree offered: MSc
- Course duration: 24 month (1 year lectures, 1 year research or development work)
- 2004-05 edition offers specialization in the following areas
    - o Mobile Communications
    - o Computer and Telecommunication networks
    - o Information Systems
    - o Optical Communications
    - o Multimedia systems and communication

Web address

http://www.det.ua.pt/pg/msc/enqu.html

Phone number

+351 234 370355

Email

Acosta@det.ua.pt

Electronics for Telecommunication Systems (Electronique pour les Systèmes de Télécommunications)

Department

École Nationale Supérieure des Télécommunications (ENST)

University

ParisTech

Country

France

Web address

www.enst.fr

Phone number

+33 (0)1 45 81 77 83

Email

marie.baquero@enst.fr

Engeneering of Computer Communication Systems (Ingénierie des Systèmes Informatiques Communicants)

Department

Ecole Nationale Superieure des Telecommunications de Bretagne

University

Ecole Nationale Superieure des Telecommunications de Bretagne

Country

France

Web address

www.enst-bretagne.fr

Phone number

33 (0)2 29 00 11 11

Engineering in Computer and Communications Systems

Department

Department of Electronic & Computer

University

University of Limerick

Country

Ireland

Remarks

- Degree Offered : M.Sc.
- Both full time & Part time

Web address

http://www.ece.ul.ie/

European Master in Commun. (Mastère Européen en Réseaux de Télécommunications et Datacoms Optiques)

Department

Ecole Nationale Superieure des Telecommunications de Bretagne

University

Ecole Nationale Superieure des Telecommunications de Bretagne

Country

France

Web address

www.enst-bretagne.fr

Phone number

33 (0)2 29 00 11 11

385

Hardware for Wireless Communications

Department

Chalmers University of Technology

University

Chalmers University of Technology

Country

Sweden

Web address

http://www.chalmers.se/masters.html

Phone number

+46 31 772 1834

Email

piotr@ep.chalmers.se

Hardware Systems Architecture (Architecture Matérielle Des Systèmes)

Department

École Nationale Supérieure des Télécommunica

University

ParisTech

Country

France

Web address

www.enst.fr

Phone number

+33 (0)1 45 81 77 83

Email

marie.baquero@enst.fr

Hardware Architecture For Digital Communication Systems (Architecture Materielle Des Systemes De Communication Numeriques)

Department

École Nationale Supérieure des Télécommunications (ENST)

University

ParisTech

Country

France

Web address

www.enst.fr

Phone number

+33 (0)1 45 81 77 83

Email

marie.baquero@enst.fr

Information & Communication Engineering

Department

Electrical Engineering and Information Technology

University

Darmstadt University of Technology

Country

Germany

Remarks

- It is a study program tailored to foreign students intending to study in Germany, as well as to German students intending to pursue a degree with an international focus

- It is a four semester program: three semesters with lectures, seminars and projects; and a master thesis in the fourth semester

- All the lectures in the first year are given in English, in parallel with courses about German language and culture

- After that, in the third semester - which comprises of elective courses - the students can choose courses in German or English.

- The technical courses cover the following areas:
  - Microelectronics
  - Fabrication Technology
  - Systems Design
  - Communication Technology
  - Communication Systems
  - Computer Science & Media Technology
  - Information Technology

Web address

http://www.microelectronic.e-technik.tu-darmstadt.de/ice_master/

Phone number

+49 6151 16 4135

Email

ice@mes.tu-darmstadt.de

Information and Communication

Department

Computer Science/Electrical Engineering

University

ETHZ

Country

Switzerland

Remarks

- At present, ETHZ does not offer an M.S. in Communication.
- However, a common M.S. program in "Information and Communication" is on the cards between the CS and EE departments.

Web address

www.ethz.ch

Phone number

+41-1-632 72 11

Email

info@ethz.ch

Information and Communication Engineering

Department

Electrical Engineering and Information Technology

University

University of Karlsruhe

Country

Germany

Remarks

- Completion of the M.Sc. program requires three semesters of lecture and laboratory courses, followed by a Master's thesis of six months.

- In addition, candidates have to serve a six-week industrial internship

Web address

http://www-int.etec.uni-karlsruhe.de/~kroschel/mas_comeng.htm

Phone number

+49-721-608 2459

Email

kiencke@iiit.etec.uni-karlsruhe.de

Information and Communication Systems

Department

Northern Institute of Technology

University

Technical University of Hamburg-Harburg

Country

Germany

Remarks

- A bachelor or equivalent degree in engineering – preferably specializing in electrical or computer engineering – is generally expected from all applicants with an academic performance in the upper third of the undergraduate class

- All applicants must show sufficient proficiency in English, for example by passing the TOEFL with a paper-based score of at least 550

- For the TUHH Master's programs the application deadline is May 31st

Web address

http://www.tu-harburg.de/education/master/information_communication/

Phone number

(+49 40) 428 78 3499

Email

study@tu-harburg.de

Information and Communication Technology

Department

Information Technology

University

International University in Germany

Country

Germany

Remarks

- The MICT program is designed such that it can be completed within two years.

- Early graduation is possible, depending on the fulfillment of all the program requirements

Web address

http://www.i-u.de/programs/mict/index.htm

Phone number

+49 7251 700-110

Email

enrico.bocker@i-u.de

Information Engineering

Department

Electrical and Information Engineering

University

University of Oulu

Country

Finland

Remarks

- There are basic and advanced modules along with options
    - o Telecommunication engineering optional module
    - o Digital signal processing optional module

Web address

http://www.ee.oulu.fi/EE/DegreeProgrammes.html#Inf

Phone number

35885531011

Email

Sanna.Waris@oulu.fi

Information Engineering

Department

Mathematics / Computer Science

University

University of Osnabrueck

Country

Germany

Remarks

- The master program provides thorough knowledge and capabilities in the field of Information- and Communication technology

- Practical education in data- and content management as well as profound understanding of underlying theoretical concepts and strategies enable the student to deal with transmission, exchange, indexing, coding, authentication and content analysis of information.

- Special attention is paid to questions of retrieval and internet based applications.

Web address

http://www.mathematik.uni-osnabrueck.de/lehre/masterIE/

Phone number

+49 541 969 2526

Email

Judith.Pluemer@uos.de

Mobile Networks and Services (Réseaux et Services Mobiles)

Department

Ecole Nationale Superieure des Telecommunications de Bretagne

University

Ecole Nationale Superieure des Telecommunications de Bretagne

Country

France

Web address

www.enst-bretagne.fr

Phone number

33 (0)2 29 00 11 11

Media and Knowledge Engineering

Department

Electrical Engineering

University

Delft University of Technology

Country

Netherlands

Web address

http://www.tudelft.nl/msc/courses/2003-2005/index.cfm#fits

http://academics.its.tudelft.nl/nl/info2002/Master_Et.pdf

Phone number

+31152780000

Email

e.a.Hendriks@its.tudelft.nl

Mobile and Personal Communications

Department

Division of Engineering

University

King's College London

Country

United Kingdom

Remarks

- Degree Offered: **M.Sc.**

- This Master programme is designed for anyone wanting to extend their capabilities and qualifications in state-of-the-art themes in interdisciplinary engineering.

Web address

http://www.kcl.ac.uk/diveng/eleceng/msc/

Phone number

+44 (0)20 7848 2592

Email

pgadmissions.engineering@kcl.ac.uk

Mobile communication

Department

Department of Communication Technology

University

Aalborg University

Country

Denmark

Remarks

- Degree Offered : M.Sc.

- The M.Sc study at CPK/ AAU offers a strong practical element (involving design, testing and measurement of components, equipment and radio channels) - difficult to find elsewhere.

- Furthermore, all theoretical aspects are also covered in depth with emphasis on the relevance to the latest research.

- The study curriculum is divided into 3 semesters (semester 8 to 10). While the two first semesters have loads equally distributed between project and lectures, the last semester is dedicated to work on the master thesis.

- Applicants are expected to have a B.Sc. in electronic engineering or equivalent. The programme is an engineering programme, thus for example a strict computer science background will not be sufficient to follow the programme.

- The natural background to this programme is the telecommunications field. This involves familiarity with basics like

  o Tele communication theory (filter theory, analog/digital modulation, modems etc.)

  o Stochastic processes (random variables, moments, correlations, stationarity, filtering etc.)

  o Digital signal processing (sampling theory, digital filters, Fourier transform etc.)

  o Antenna theory (field to signal and vice versa, basic antennas, array antennas)

Web address

http://cpk.auc.dk/master/mob_master.html

Phone number

4596358690

Email

masters@kom.auc.dk

Mobile Location Based Services

Department

Faculty of Technology

University

Kingston University

Country

United Kingdom

Remarks

- Degree Offered: **M.Sc.**

- This is a joint course offered by the School of Computing and Information Systems, Faculty of Technology and the School of Earth Sciences and Geography, Faculty of Science.

Web address

http://technology.kingston.ac.uk/pg/mlbs.html

Phone number

+44 (0)20 8547 7809

Email

mdc@kingston.ac.uk

Optical and Wireless Technology

Department

Computer & Electrical Engineering

University

Halmstad University

Country

Sweden

Remarks

- Electro Physics Laboratory

- Optical measurements for industrial applications

- Spatio-temporal and volume shape analysis from 2D image sequences

- Remote Real-Time Mobile Telecommunication

- HiSPOT - High Speed Optoelectronics for Optical Interconnects

Web address

http://www.hh.se/ide/utbildning/Magister/index.htm#Optical_and_Wireless_Techology

Phone number

+46-035-16 72 29

Personal, Mobile and Satellite Communications

Department

School of Engineering, Design and Technology

University

University of Bradford

Country

United Kingdom

Remarks

- Degree Offered: **M.Sc./ PgDip**

- Course Duration : 12 months full-time (M.Sc.)

- Our new M.Sc. course in Personal, Mobile and Satellite Communications is designed for graduate engineers who are interested in joining this challenging and innovative sector of the telecommunications industry.

Web address

http://www.brad.ac.uk/university/pgpros/engineer/engineering.php#1

Phone number

+44 1274 234543

Email

pgadmissions.engineering@kcl.ac.uk

Radio Communication and Hyperfrequency systems (Systèmes de Communications Radio et Hyperfréquences)

Department

École Nationale Supérieure des Télécommunications (ENST)

University

ParisTech

Country

France

Web address

www.enst.fr

Phone number

+33 (0)1 45 81 77 83

Email

marie.baquero@enst.fr

Radio Frequency and Microwave Engineering

Department

School of Engineering, Design and Technology

University

University of Bradford

Country

United Kingdom

Remarks

- Degree Offered: **M.Sc./ PgDip**

- Course Duration : 12 months full-time (M.Sc.)

Web address

http://www.brad.ac.uk/university/pgpros/engineer/engineering.php#3

Phone number

+44 1274 234543

Email

pg-eng-enquiries@bradford.ac.uk

Radio Frequency Communications Engineering

Department

School of Engineering, Design and Technology

University

University of Bradford

Country

United Kingdom

Remarks

- Degree Offered: **M.Sc./ PgDip**

- Course Duration : 12 months full-time (M.Sc.)

- The primary objective of this course is to give a good grounding in the theory and techniques of design and implementation of radio frequency communication systems.

- Extensive hands-on experience in the design and implementation of communications systems is an attractive feature of this course.

Web address

http://www.brad.ac.uk/university/pgpros/engineer/engineering.php#4

Phone number

+44 1274 234543

Email

pg-eng-enquiries@bradford.ac.uk

School of Engineering

University

Jönköping University

Country

Sweden

Remarks

- Master of Science (with a major in Electrical Engineering)
    - o Specialisation: Embedded Electronics and C

Web address

http://www.ing.hj.se/eng

http://www.ing.hj.se/eng/kursereng2002.pdf

Phone number

+46 36 15 77 00

Email

susanne.wessen@ing.hj.se

Technological Design (MTD), Information and Communication Technology

Department

Stan Ackerman Institute, Center for Technological Design

University

Technical University Eindhoven

Country

Netherlands

Remarks

- Degree Offered : M.Sc.

Web address

http://www.sai.tue.nl/opleidingen/ict/

Phone number

+31402472452

Email

voorlichting.sai@tue.nl

Technology Management in Telecommunications Strategy

University

Norwegian University of Science and Technology

Country

Norway

Remarks

- Degree Offered : M.Sc.
- Main focus is on the technology management.

Web address

http://telestrategy.ntnu.no/2003/

Telecommunication

Department

Electrical and Communications and Computer Science Engineering Departments.

University

Helsinki University of Technology

Country

Finland

Remarks

- Degree Offered : M.Sc.
- Master's Programme in Telecommunication with following specialisations
  - Radio Communications
  - Telecommunications Software
  - Digital Signal Processing
  - Networking Technology (from 2003).
- The Programme has good ties to the Finnish Industry and will help students in finding summer trainee jobs as well as jobs which give them the opportunity to write M.Sc. thesis.

Web address

http://www.tct.hut.fi/masters/

Phone number

35894515256

Email

sanna.yliheljo@hut.fi

Telecommunication

Department

Department of Communications and Radio Frequency Engineering

University

TU WIEN

Country

Austria

Web address

http://www.nt.tuwien.ac.at/

http://www.tuwien.ac.at/ZV/STUD/Information_in_English.html

Phone number

58801-38901

Email

sekretariat@nt.tuwien.ac.at

Telecommunication Engineering

Department

Faculty of Electrical Engineering

University

Czech Technical University

Country

Czech Republic

Remarks

- Generally an eleven-semester programme
- Completed by submitting an M.Sc. thesis and passing the State Final Examination

Web address

http://www.feld.cvut.cz/en/FEE/

http://www.cvut.cz/ctu/international/prospectus/prof3.pdf

Phone number

+420 2 2435 1111

Email

pliskov@feld.cvut.cz

Telecommunication Networks

Department

Electrical Engineering

University

University of Twente

Country

Netherlands

Web address

http://www.el.utwente.nl/en/study_programmes/masters/telecommunication/

Telecommunication Systems and Networks

Department

Faculty of electronics and information technology

University

Warsaw University of Technology

Country

Poland

Remarks

- The graduate programmes leading to an M.SC. degree (2-4 semesters) and to a PhD degree.
- Maintains relations with academic and research institutions in more than 30 countries.

Web address

http://www.ire.pw.edu.pl/zejim/ece/gr_prog.html

Phone number

+48 22 825 3758

Email

dziekan@elka.pw.edu.pl

Telecommunications

Department

COM consists of: Center for Tele-Information (CTI), Dep. of Telecommunic. and Research Center COM

University

Technical University of Denmark

Country

Denmark

Remarks

- Degree Offered : M.Sc.

- The International M.Sc. in Telecommunication is a two-year education following a Bachelors degree in Engineering or related areas from universities all over the world.

- The programme is organized as a number of courses with regular teaching and projects of more individual nature under supervision of a teacher.

- The education leads to a Master thesis project of at least a half-year duration, which crowns the achievement.

Web address

http://www.com.dtu.dk/education/intmsc/

Email

kjl@com.dtu.dk

Telecommunications

Department

Electrical Engineering

University

Delft University of Technology

Country

Netherlands

Web address

http://www.tudelft.nl/msc/courses/2003-2005/index.cfm#fits

http://academics.its.tudelft.nl/nl/info2002/Master_Et.pdf

Email

h.w.j.russchenberg@irctr.tudelft.nl

Telecommunications Engineering

Department

DCU school of Electronic Engineering

University

Dublin City University

Country

Ireland

Remarks

- Degree Offered : M.Sc.
- 8 modules and project

Web address

http://www.eeng.dcu.ie/courses/post.html

Phone number

353-1-7008426

Email

David.Molloy@dcu.ie

Telecommunications Engineering

Department

Information and Communication Technology

University

University of Trento

Country

Italy

Web address

http://www.unitn.it/en/didattica/corsilaurea/ing_telecomunicaz_spec.htm

Phone number

+390461881919

Email

carlotta.deflumeri@ing.unitn.it

WDM and All-Optical Networks (Réseaux WDM et Tout-Optiques)

Department

École Nationale Supérieure des Télécommunications (ENST)

University

ParisTech

Country

France

Web address

www.enst.fr

Phone number

+33 (0)1 45 81 77 83

Email

marie.baquero@enst.fr

Wireless Engineering

Department

Ørsted•DTU department

University

Technical University of Denmark

Country

Denmark

Remarks

- An international **M.Sc.** Programme

- The aim of this programme is to provide the students with qualifications for performing research and development of advanced electromagnetic systems for wireless communication technologies such as satellite, tele- and mobile communication, broadcasting, and remote sensing

- The students will enrol in a two-year programme and study in parallel with Danish students.

- The majority of the courses involved in the programme is given (in English) by the Electromagnetic and Wireless communication Systems

- The students will typically obtain employment in companies working in

  o Wireless communication systems - satellite, mobile, broadcast

  o RF and Microwave circuit design

  o Remote sensing

  o Radar and navigation systems

  o Electromagnetic compatibility

Web address

http://www.emi.dtu.dk/education/masters_programme/

Phone number

4545253799

Email

info@emi.dtu.dk

Wireless Systems and related Technologies

Department

School of Information Engineering

University

Politecnico di Torino

Remarks

- Degree Offered : M.Sc.

Country

Italy

Web address

http://didattica.polito.it/master/locandina_master_wireless_eng_2002-25-03-02.doc

Phone number

+390115647913

Email

master.universitari@polito.it

Appendix 3 - Nexway Questionnaire

Wireless Communication Training Requirements

The purpose of NEXWAY is to build a strong and open team based upon a pool of Academic and Independent R&D Organisations with international reputation in the field of Wireless Communications in order to serve the European Society and Industry.

The main objectives of NEXWAY are:

- To consolidate academic research, eventually leading to Joint Activity Programmes, and

- To stimulate pan-European education activities in the area of Wireless Communications.

This questionnaire is prepared to help us identify the basic knowledge required for those working in wireless communication field and identify the training and educational needs of the industries. Please fill it out with your best possible effort. However if you are not able to answer some of the questions, please do not hesitate to provide partly filled questionnaire.

For more information concerning Nexway project please check our project homepage: http://www.nexway.net

All the information provided to us by your organisation will be kept confidential.

Please email the answers to *mitseva@cpk.auc.dk* or post it to the following address with Subject Line "NEXWAY Questionnaire":

Postal address:

Anelia Mitseva

Center for PersonKommunikation

Aalborg University

Niels Jernes Vej 12, room NOVI 03-009

DK-9220, Denmark

Below is a list of some areas in wireless communication which can be used to answer most of the questions. Either the whole names of topics (eg. *service*, *security*) or letters identifying them (eg. *d*, *f*) can be used as answers. Please note that these are only some examples and if required any other topics or its details can be specified.

 a. wireless network

 b. wireless communication protocols

 c. wireless IP

 d. wireless service

 e. wireless application

 f. wireless security

 g. wireless hardware

Topics and Developments in Wireless Communications

1. **Main topics** in the field of Wireless Communication your organisation (industry) is currently involved in.

  _____

2. What do you think is the most significant development in the **near future** in the field of wireless communication **in general**?

  _____

3. What do you think is the most significant development in the **near future** in the field of wireless communication directly related to **your company** current and upcoming plans?

  _____

4. In which area do you see the most important development in **long term future** of wireless communication?

  _____

5. In which area in the field of wireless communication **your company** is planning to invest or work in coming years?

_____

Requirements for education

6. Do you think it is easy to find employees with adequate knowledge in the wireless field?

Yes / No

Comments:

_____
_____
_____

7. Do you think that the current **level of education** in Wireless Communication is adequate?

Yes / No

Comments:

_____
_____
_____

8. What courses in Wireless Communications would you like to have covered by the universities that are not covered now?

_____

9. What **courses are offered** as training in Wireless Communications as company's internal training?

_____

Requirements for continuous education/training

10. Areas for **continuous educations** which should be stressed more in the future.

    _____

11. What **topics for workshops and seminars** on continuous education in wireless communication field do you think would be useful to be organised?

    _____

12. **Training needs for short and mid term** – what topics of interest to your company would you like to be covered?

    _____

13. Will your organisation be **willing to participate** in such workshops and seminars?

    Yes / No

    Comments:
    _____
    _____
    _____

If you have any questions regarding the questionnaire, please contact

Anelia Mitseva

CPK, University of Aalborg, Denmark

Email: mitseva@cpk.auc.dk

Or

Raju Vaidya

Fraunhofer FOKUS, Germany

Email: vaidya@fokus.fhg.de

General Statistics

Please email this part of the questionnaire along with the complete questionnaire or separately to *mitseva@cpk.auc.dk* **or post it to the following address:**

Postal address:

Anelia Mitseva

Center for PersonKommunikation

Aalborg University

Niels Jernes Vej 12, room NOVI 03-009

DK-9220, Denmark

1.   Number of personnel working in the field of wireless communication.

   Total Number: ____

   Female Percentage: ____ %

2.   Percentage personnel working in the field of wireless communication in respect to all staff working in IT sector.

   ____ %

3.   Qualification level of the personnel working in wireless communication and the percentage of female among them.

   Technician ____ %   Female   ____ %

   Bachelor   ____ %   Female   ____ %

   Masters   ____ %   Female   ____ %

   PhD   ____ %   Female   ____ %

   Others   ____ %   Female   ____ %

   Details if Others:

   _____
   _____

If you have any questions regarding the questionnaire, please contact

Anelia Mitseva

CPK, University of Aalborg, Denmark

Email: mitseva@cpk.auc.dk

Or

Raju Vaidya

Fraunhofer FOKUS, Gemany

Email: vaidya@fokus.fhg.de

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Surrey	Prof. Tafazolli
IMEC	Cees Lanting
CPK	Anelia Mitseva
DICOM	Elena de Cos, Prof. Garcia

Table 2. Authors List