



TECHNISCHE UNIVERSITÄT CHEMNITZ

SOCRATES



ECTS

EUROPEAN CREDIT
TRANSFER SYSTEM



INFORMATION PACKAGE 2003

Faculty of Computer Science
Computer Science Studies





CONTENT

PART I

I. General Introduction	5
A. What Is ECTS?	5
B. The ECTS Credits	5
C. ECTS Students.....	5
D. Participating Institutions	6
II. GENERAL INFORMATION ABOUT THE UNIVERSITY	7
A. Institution	7
B: Admission Procedure	7
C. Reception - Registration.....	7
1. International Students' Office	7
2. Students' Service Office	8
3. Residents' Registration Office	8
4. Foreigners' Office: Registering with the civil authorities.....	8
5. ECTS-Coordinator	8
D. Students Administration (Studentenwerk).....	9
1. Accommodation / Housing.....	9
2. Catering	10
3. Cost Of Living	10
E. Study Facilities	10
1. Libraries	10
2. Computer Facilities.....	11
F. Leisure Activities.....	11
1. Sports	11
2. Clubs.....	11
3. Associations.....	11
4. Cultural Activities	12
5. Churches	12
G. Linguistic Requirements – Language Courses	12
H. Insurances.....	13
1. Health Insurance	13
2. Liability Insurance.....	13
I. Practical Information	13
1. Public Transport	13
2. Banks.....	14
3. Tourist Information Office	14
J. History	14

PART II

III. FACULTY OF COMPUTER SCIENCE	16
A. General Information.....	16
1. Address.....	16
2. ECTS Coordinator	16
B. Faculty Structure	16
C. Work and Research Fields	16
D. Structure Of Studies	18
IV. DESCRIPTION OF LECTURES	20
A. General Description.....	20
B. Stage I - Courses.....	21
1. Mathematics.....	21
2. Practical Computer Science	21
3. Technical Computer Science.....	22
4. Theoretical Computer Science	22
5. Basic seminar	23
6. Secondary Subject Field.....	23
C. Stage II Studies - Courses	24
1. Compulsory Subjects.....	24
2. Optionally Required Subjects	28
3. Secondary Subjects.....	51

I. General Introduction

This information package describes the Chemnitz University of Technology and the courses offered by its Faculty of Computer Science in order to help prospective ECTS students to prepare for his/her study period at this institution. All given information represents the current state, changes are always possible.

Further information can be obtained under www.tu-chemnitz.de/international/nach-chemnitz.

A. What Is ECTS?

ECTS, the European Credit Transfer System, was developed by the European Community in order to provide common procedures to be followed in all EC countries to evaluate academic qualifications and to guarantee their recognition abroad. It provides a method for measuring and comparing learning achievement and transferring credits from one institution to another.

ECTS is based on the principle of mutual trust and understanding between the participating institutions of higher education. The few rules of ECTS, which concern a scope of information to be provided on available courses, the conditions for agreement between the home and host institutions and the use of credit points to indicate the workload of students, are designed to reinforce this mutual trust and understanding. Each ECTS department provides information about the courses it offers in terms of content as well as by assigning credits to each of them.

B. The ECTS Credits

ECTS credits are numerical values allocated to course units to measure the student's workload required to complete these. They reflect the quantity of work which each course unit requires in relation to the total quantity of work necessary to complete a full year of academic study at the institution, including lectures, practical work, seminars, tutorials, field work, private work - in the library or at home - and examinations or other assessment activities. ECTS credits reflect a relative value of student's workload.

In ECTS, 60 credits represent the workload of one academic year of study and usually 30 credits are given for a semester (6 months). It is important that no special courses are set up for ECTS purposes, but that all ECTS courses are mainstream courses of the participating institutions, as followed by the local students.

It is up to the participating institutions to subdivide the credits for the different courses. Laboratory work and optional courses which form an integral part of the course of study also receive academic credit. Laboratory sessions and optional courses which do not form an integral part of the course of study do not receive academic credit.

Credits are awarded only when the courses have been completed and all required exams have been taken successfully.

C. ECTS Students

Students participating in ECTS will receive full credits for all academic work successfully carried out at any of the ECTS partner institutions, and they will be able to transfer these academic credits from one participating institution to another as long as there is agreement between the institutions involved. All students of the participating faculties who would like to take part in ECTS may do so if their institution agrees.

Most students participating in ECTS will study at one host institution in an EC Member State or EFTA country for a limited period and then return to their home institution. Some may decide to stay at the

host institution and finish their degree there. Some may also decide to proceed to a third institution to continue their studies there. In each case, students are required to comply with the legal and institutional requirements of the country and institution where they graduate.

Students can continue their studies at their home institution with no loss of time or credit once they have successfully completed the study programme previously agreed between the home and host institutions. On the other hand, if a student decides to stay at the host institution and to complete her or his degree, she or he may have to adapt his or her studies due to the legal, institutional and departmental rules of the host country, institution and faculty.

For further details on ECTS, please consult the ECTS Brochure which is available from:
ECTS Department, Erasmus Bureau, Rue Montoyer 70, B-1040 Brussels, Belgium
phone: (+32)-2-233 01 11; fax.: (+32)-2-233 01 50

D. Participating Institutions

The following universities are our partners within the SOCRATES / ERASMUS programme in the field of Computer Science.

- | | |
|-----------|--------------------------------------|
| A | Johannes Kepler Universität Linz |
| CZ | České vysoké učení technické v Praze |
| F | Université de Poitiers |
| NL | Katholieke Universiteit Nijmegen |

II. GENERAL INFORMATION ABOUT THE UNIVERSITY

A. Institution

Chemnitz University of Technology - Technische Universität Chemnitz / Germany

- Straße der Nationen 62 phone: (+49)-(0)371-531-1303 fax: (+49)-(0)371- 531-1868
D - 09107 Chemnitz **Internet:** www.tu-chemnitz.de

There is a map of the campus at the beginning of the package, which provides more information about the locations of different university buildings, see page 4.

B: Admission Procedure

Students who wish to take part in the ECTS programme at Chemnitz University of Technology should contact the ECTS coordinator of their home university.

Application forms are available either from the ECTS coordinator of the relevant faculty or from the International Students' Office (IUK). Application deadlines are always at the beginning of each semester.

The academic year consists of a winter semester (October to March) and a summer semester (April to September). Each semester includes a 15-week period of formal coursework and 3-week examination period. In addition, several weeks are set aside for scientific work.

The exact dates for each semester are available from the International Students' Office.

1. International Students' Office	Internationales Universitätskolleg (IUK) (registration / Foreign Students' Office)
2. Students' Service Office	Studentensekretariat (Registrar's Office)
3. Residents' Registration Office	Einwohnermeldeamt
4. Foreigner's Registration Office	Ausländerbehörde (Alien registration authority)
4. ECTS Coordinators	

C. Reception - Registration

Upon arrival, the following institutions should be contacted:

1. International Students' Office

- Straße der Nationen 62 / Room 003+004 phone: (+49)-(0)371-531-1303
D-09107 Chemnitz fax: (+49)-(0)371-531-1868
- contact: Frau E. Auerbach
- office hours: Mon, Tue, Thu 9.00-12.00 a.m.

The "Application for University Admissions" or the reservation for it must be handed in at the International Students' Office as soon as possible. The following documents must be submitted:

- a. identification documents;
- b. 1 passport photo;
- c. registration certificate from the home university (Student Identity Card);
- d. "Application for University Admission" (Antrag auf Zulassung zum Studium)
- e. a written statement from the home university, indicating that the student receives a grant from the EC and giving the amount of the grant
- f. a certified copy of the secondary school diploma (qualification for university entrance)

including an official transcript (indicating all completed subjects and grades) and the certified translations in German or English.

If the student does not have such a secondary school diploma he or she must take an assessment test ("Feststellungsprüfung").

- g. an official copy of a certificate indicating the student's level of German proficiency. (see page 15 - language courses).
- h. proof of payment for the semester fee

2. Students' Service Office

- Straße der Nationen 62 / Room 042 phone: (0371) 531-1634, -1635
D-09107 Chemnitz fax: (0371) 531-1300
 - office hours: Mon-Wed 8.30-11.00 a.m. and 12.30-3 p.m., Thu from 12.30 - 5 p.m
- Here you will receive your Student Identity Card.

3. Residents' Registration Office

- Elsasser Straße 8
D-09120 Chemnitz

All students have to register with the police. The following documents are required:

- a. identity papers or passport
- b. a tenancy agreement

4. Foreigners' Office: Registering with the civil authorities

- Elsasser Straße 8 phone: (0371) 488-3243
09120 Chemnitz
- office hours: Mon, Tue, Wed, Fri: 8.30-12.00 a.m. and Thu. 2.00-6.00 p.m.

Upon registration at the University students have to register at the foreigners' registration office and should bring the following documents:

- a. identity papers or passport;
- b. a certificate of the ECTS grant;
- c. proof of registration at the Chemnitz University of Technology.

5. ECTS-Coordinator

The institutional ECTS coordinator is

Prof. Dr. Rainhart Lang
phone (0371)-531-4152, fax (0371)-531-3987.

In addition, each faculty has its own ECTS coordinator, i.e. an academic adviser who coordinates all the ECTS activities within his or her faculty. The student may contact the adviser for information about courses, timetables, student organizations, etc. In some departments, the coordinator is assisted by an (administrative) ECTS contact person.

The ECTS coordinators and contact persons are:

- Faculty of Electrical Engineering **Dr. Wolfgang Seckel**
and Information Technology: Reichenhainer Str. 70; Room 339p
phone (0371) 531-3261
fax (0371) 531-3131
- Faculty of Computer Science: **Prof. Dr. Hanno Lefmann**
Str. der Nationen 62; Room 347
phone (0371) 531-1276
fax (0371) 531-1810

- Faculty of Mechanical and
Process Engineering:

Prof. Dr. Michael Dietzsch
Reichenhainer Str. 70; Room A7
phone (0371) 531-2202
fax (0371) 531-2201

- Faculty of Economics and
Business Administration:

Prof. Dr. Rainhart Lang
Reichenhainer Str. 39; Room 613
phone (0371) 531-4152
fax (0371) 531-3987

Ronald Hartz
Reichenhainer Str. 39; Room 411
phone (0371) 531-4491
fax (0371) 531-3987

- Faculty of Mathematics:

Dr. Klaus-Dieter Blume
Reichenhainer Str. 41 , Room 720
phone (0371) 531-2721
fax (0371) 531-2140

Dr. Jürgen Schulz
Reichenhainer Str. 39, Room 708
phone (0371) 531-4107

- Faculty of Natural Sciences:

Dr. Eckart Fromm
Reichenhainer Str. 70; Room 360
phone (0371) 531-3207
fax (0371) 531-3233

- Faculty of Humanities:

Prof. Dr. Josef Schmied
Reichenhainer Str. 39; Room 223
phone (0371) 531-4226
fax (0371) 531-4233

Prof. Dr. Bernhard Nauck
Reichenhainer Str. 41; Room 308
phone (0371) 531-4225
fax (0371) 531-2387

Prof. Dr. Matthias Niedobitek
Reichenhainer Str. 39; Room 305
phone (0371) 531-4912

The persons listed above meet regularly with student representatives and with representatives of the involved University services (International Students' Office: AAA - Student Administration: Studentenwerk - Students' Services: Studentensekretariat - Rector's office) and discuss proposals for the university's ECTS policy.

D. Students Administration (Studentenwerk)

1. Accommodation / Housing

The Studentenwerk Chemnitz (Chemnitz Student Administration) is in charge of the social and cultural well-being of all students.

Thüringer Weg 3 - 2nd floor - 09126 Chemnitz
phone: (0371) 5628-829 - fax.: (0371) 5628-102
office hours: Mon-Fri 7.30-11.00 a.m. and 12.30-3.00 p.m.

The Studentenwerk is responsible for the accommodation of the students. It manages 4000 beds and offers various types of rooms.

The monthly rates range between 65 EUR and 150 EUR, depending on the kind of room and hall of residence.

- a single room: 110 EUR (in a non-renovated house) to 150 EUR (in a renovated house);
- a double room (shared): 65 EUR (non-renovated) to 95 EUR (renovated) per person.

In all the new halls of residence (N-D), each room is furnished with a bathroom and a kitchenette (with a refrigerator and 2 hotplates). In the non-reconstructed ones (O-D), the bathrooms and a common kitchen are located on each floor. All dormitories are located on campus.

2. Catering

All University residences are self-catering. A good and inexpensive hot lunch can be taken in one of two refectories (Mensa). During the term 3.000 students eat there. A choice of four meals is provided, in addition to salads and desserts. Prices for a meal vary between 1.25 EUR and 1.95 EUR.

- Mensa Reichenhainer Str. 55: Mon-Fri: 10.45 a.m. - 2.00 p.m.
- Mensa Straße der Nationen 62: Mon-Fri: 10.45 a.m. - 1.30 p.m.

In two cafeterias you can enjoy a wide range of snacks, drinks and sweets.

- cafeteria Reichenhainer Str. 55: Mon-Fri: 8.00 a.m. - 10.00 p.m.
- cafeteria Straße der Nationen 62: Mon-Fri: 8.00 a.m. - 2.00 p.m.

3. Cost Of Living

The cost of living in Chemnitz is comparatively low. It is estimated that a single student should have a budget of 300 EUR to 450 EUR each month to cover all living expenses.

E. Study Facilities

1. Libraries

The library is divided into a Central library, several smaller branches, a patent information center and a collection of standardizations. It provides books, journals, audio-visual material and electronic information services. The computerized central catalogue system comprises the holdings of all libraries and is accessible at all library locations as well as via the Internet.

- Central Library (University), Straße der Nationen (entrance Bahnhofstr. 2)
office hours: Mon - Thu: 9.00 a.m. - 9.00 p.m. / Fri: 9.00 a.m. - 6.00 p.m. / Sat: 10.00 a.m. - 1.00 p.m.

Branch Libraries (TB):

- Economics / Business Studies / Jurisdiction, Reichenhainer Str. 39/41 (floor 4)
office hours: Mon - Thu: 9.00 a.m. - 9.00 p.m. / Fri: 9.00 a.m. - 6.00 a.m.
- Humanities / Mathematics, Pegasus-Business-Center, Reichenhainer Str. 29a
office hours: Mon - Thu: 9.00 a.m. - 7.00 p.m. / Fri: 9.00 a.m. - 4.00 p.m.
- Electrical / Mechan. Engineering and Physics / Natural Sc., Reichenhainer Str. 70, Weinhold - Bau
office hours: Mon - Thu: 9.00 a.m. - 9.00 p.m. / Fri: 9.00 a.m. - 6.00 a.m.

- Mechanical Engineering II / Materials Science, Erfenschlager Str. 73

office hours: Mon, Tue, Thu: 9.00 a.m. - 4.00 p.m., Wed: 9.00 a.m. - 7.00 p.m., Fri: 9.00 a.m. - 2.00 p.m.

- Chemistry, Bahnhofstr. 2

office hours: Mon - Tue: 9.00 a.m. - 11.00 a.m., and 12.00 - 4.30 p.m. / Fri: 9.00 - 11.00 a.m.

- Patent Information Center - PIZ, Bahnhofstr. 8

office hours: Mon, Wed - Fri: 9.00 a.m. - 4.00 p.m. / Tue: 9.00 a.m. - 6.00 p.m.

2. Computer Facilities

Office: Str. der Nationen 62 - Room B307
 phone: (0371) 531-1551
 fax: (0371) 531-1629

The University Computer Network is a central, scientific facility at the Chemnitz University of Technology. It connects the on-campus network with national and world-wide communication webs, effectively catering to the university's technical demands. The computer labs have developed into a leading facility providing consulting and services for users of today's modern data processing systems. They are accessible to both students and research staff. Student dormitory rooms can be connected to the Internet. Furthermore, tuition-free computer classes are available.

F. Leisure Activities

1. Sports

The university sports center offers a wide range of indoor and outdoor sports, including karate, alpine sports, hiking, climbing, paragliding, tennis, swimming, dancing, volleyball, and many more. The complete programme is available in the dining halls at the beginning of each semester.

For information please contact:

Sportbüro der USG Chemnitz e.V.	phone: (0371) 531-2073-	- Thüringer Weg 11
Universitätssportzentrum	phone: (0371) 531-2430	- Thüringer Weg 11
		- D-09126 Chemnitz

2. Clubs

The various student clubs are a good and easy way to meet new people, talk to other students, listen to music, or just relax. They are managed by students and include social as well as more academic events, for example movie evenings, slide shows and dancing.

beispielsweise: Vetterstr. 70/72

bit boutique: Vetterstr. 64/66

Filmclub „Mittendrin“: Reichenhainer Str. 35/37

FPM-Club: Vetterstr. 70/72

PEB-Studentenkeller: Reichenhainer Str. 37

Windkanal e.V.: Vetterstr. 52/54

In addition there are many pubs, restaurants and cafés with a friendly atmosphere located in the city.

3. Associations

The Chemnitz University of Technology runs a big number of associations and student groups. Joining one is a great way to meet people and learn from each other. The **English club** meets in the Vetterstr. 64/66 (3rd floor) every Tuesday at 7.30 p.m. During these gatherings, students can improve and practise their English and discuss aspects of English, American and German culture.

More associations are listed below:

- **VDE** Verband Deutscher Elektrotechniker, Bezirksverein Chemnitz
(Union of German Electrical Engineers of the District of Chemnitz)
The members of VDE are engineers, (natural) scientists, technicians, major companies of the electronics and power industries, high-technology firms, as well as numerous research institutions.

- **VDI** Verein Deutscher Ingenieure (Association of German Engineers)
The VDI was founded in 1856. With 120.000 members it is one of the biggest technical and scientific associations in Europe for studentes and young engineers. Among other things, it represents the interests of the engineering profession.

- **AIIESEC** Association Internationale des Etudiants en Siences Economiques et Commerciales
(International Association of Economics and Marketing Students)
This international association, with more than 70,000 members in 85 countries, provides opportunities for exposure and interaction between young people of different cultures and nations worldwide; it assists young people in acquiring skills and knowledge through management education, and it allows students to develop some practical experience in various social and economic environments. Reichenhainer Str. 41; Room 04: Tue 12.30 - 1.30 p.m. / Thu 10.00 - 11.30 a.m.

- **GI** The Gesellschaft für Informatik e. V. (GI) is the organization of the computer scientists. The GI supports Computer Science in research, education and application. Prof. Dr. Peter Köchel, Chemnitz University of Technology, Faculty of Computer Science, leads the regional group Chemnitz.

- **MTP e.V.** Die Marketing - Studenteninitiative. TU Chemnitz (The students' marketing initiative)
Reichenhainer Str.39; Room 101
MTP is an initiative with more than 600 members and 14 agencies throughout Germany. The abbreviation MTP stands for **M**arketing between **T**heory and **P**ractice. At the moment there are 16 members at the Chemnitz agency.

- **MUKU** Multikulturelle Studentengemeinschaft (Multicultural Student Community)
TU Chemnitz - Reichenhainer Str. 52/6th floor.
This association was founded to provide foreign students with help in any problems they might have to become familiar with the university community. The MUKU also organizes cultural and sporting meetings.

4. Cultural Activities

The particular strengths of Chemnitz are its cabaret scene and the opera company. Other cultural traditions are also well-represented in theater, galleries, and museums. Two unique museums of particular interest to students of science are the "Industrie Museum" (museum of industry) and the "Spiele Museum" (games and toys museum). Information on these and on special events is available at the city's theater service: (0371) 488-4665.

There are pubs, restaurants, and cafes of various cuisines and styles distributed throughout Chemnitz. Several movie theaters show foreign and art movies (e.g., CineStar Filmpalast, ClubKino Siegmars).

5. Churches

On campus, several rooms have been reserved for weekly religious meetings of students of the Protestant and Catholic community. More information is posted on the board in the dining hall (Mensa) on Reichenhainer Str. 55.

G. Linguistic Requirements – Language Courses

When registering at the International Students' Office (IUK) of the Chemnitz University of Technology, students will be asked to provide proof of his/her German language proficiency. The following

certificates are accepted:

- the „Zentrale Oberstufenprüfung“ (ZOP) of the Goethe Institute
- the ”Kleines Deutsches Sprachdiplom“ of the Goethe Institute
- any language proficiency certificate equal level (at least senior high school / ”A-level“) from a recognized (scientific) institution
- the DSH certificate, which can be obtained at the Chemnitz University of Technology.

To prepare for the DSH examination, students have the possibility to take an intensive 90 days language course before the beginning of each semester. The courses are held in April and October. It is recommended that ECTS students have the necessary German language skills before they come to Chemnitz to be able to pass the DSH, and to follow classes. ECTS students who wish to improve their language skills can enrol in a two week intensive course at the end of September, or at the end of March. The University also offers language classes throughout the semester. In addition, a language laboratory and a video laboratory are available for independent studies. For further details on tuition etc., please contact:

Dr. Angela Minogue
Sprachzentrum
Reichenhainer Str. 39, Room 204
phone (0371) 531-4294

H. Insurances

1. Health Insurance

All residents of Germany must have health insurance. When registering at the International Students' Office (IUK) of the Chemnitz University of Technology, the student will be asked to show the necessary documents from his own health insurance organization (E111 or E107 form).

If a student does not have such documents, he or she is required to get a health insurance in Chemnitz (addresses can be obtained from the Studentenwerk).

2. Liability Insurance

At the Chemnitz University of Technology, there is no requirement for a third-party liability insurance policy. However, students are advised to subscribe to such an insurance in their home country.

I. Practical Information

1. Public Transport

The transportation network in Chemnitz (CVAG) is quite extensive with more than 30 bus lines and 6 tram lines. The same ticket is valid for either bus or tram with no transfer fees. The price of a ticket depends on the duration of the ride: 0.70 EUR for 10 minutes or 1.40 EUR for 1 hour. Weekly, monthly, and annual tickets are also available.

The trip to the campus from the center of town takes about 10 minutes (lines 32 or 42).

From the main bus station (Zentralhaltestelle) in the center of the city it is possible to get to two major shopping centers:

- Alt Chemnitz Center ACC: tram 6, 15 minutes.
- Chemnitz - Center Röhrsdorf: bus 21, 25 minutes

Dresden and Leipzig are at a distance of about 80 km (50 miles) from Chemnitz. There are regional trains and buses operating between Chemnitz and nearby cities.

2. Banks

Most major banks have branches in Chemnitz. There, an account can be opened at no charge and with a copy of a valid student ID fees may be reduced or waived.

3. Tourist Information Office

Bahnhofsstr. 6

phone: (0371) 690-680

office hours: Mon - Fri: 09.30 a.m. - 5.30 p.m.

J. History

Chemnitz was founded as a merchant city on the banks of the river Chemnitz, after which the city was named. It had the status of a free imperial town, and around 1136-1137, Emperor Lothar III founded a Benedictine monastery there. But the year 1165 is considered the official date of the foundation of Chemnitz.

After the city had obtained the bleaching monopoly in 1357, Chemnitz became a center of weaving and manufacture of linen. At the same time, the growth of iron ore extraction had great influence on the economic rise of the city. In the 15th century, a small copper processing factory was founded. During the 16th century, cotton came up in the textile industry, and at the end of the Middle Ages Chemnitz became an important center for the textile manufacture in Saxony; products were even exported abroad. From 1728 onward, the hosiery trade was developed and gradually became the main industrial branch. At the end of the 18th century and beginning of the 19th century, the textile manufacture was industrialized. From 1800 onward, Chemnitz took the lead in Germany's mechanical industry and production of machine tools.

In connection with the industrial development, the "Royal Industrial School" (*Königliche Gewerbeschule*) was founded on May 2nd, 1836. In the beginning, it had 14 students and 3 main subjects: Mechanical Technology, Chemical Technology, and Agriculture. Shortly afterwards, its name was changed into "Industrial High School" (*Höhere Gewerbeschule*). The city had almost 11,000 inhabitants at that time.

From 1882 onwards (Chemnitz had 103,000 inhabitants), Electrical engineering had been taught, and in 1892 the Department of Electrical Engineering was established. At the end of the 19th century with its industrial revolution, the number of students for the first time exceeded 1,000. The school received the status of "Royal Industrial Academy" (*Königliche Gewerbeakademie*) in 1900.

Due to the damages of World War II, the academy had to be closed. When it was reopened, it was called "Technical College" (*Technische Lehranstalten Chemnitz*) and had around 500 students.

In 1953, Chemnitz' name was changed into Karl-Marx-Stadt, and the school was now called "College of Mechanical Engineering" (*Hochschule für Maschinenbau Karl-Marx-Stadt*).

Ten years later already more than 1,500 students were enrolled in the Departments of Mathematics, Natural Sciences, Mechanical Engineering and in the newly founded Department of Electrical Engineering.

In 1986 around 8,000 students were studying at the institution, in the same year it received the status of a University of Technology.

After the re-unification of Germany on October 3rd, 1990, the city was renamed Chemnitz.

In 1992, the former College of Education at Zwickau joined the university, which was then named University of Technology Chemnitz-Zwickau. After that the Faculty of Economics and Business Administration and the Faculty of Humanities were added. In 1997, the institute was again renamed, this time into Chemnitz University of Technology.

Today, Chemnitz has approximately 250,000 inhabitants, and approximately 9,000 students are studying at the university. Among them there are around 700 foreign students from more than 30 countries.

There are 7 faculties at the university:

- Electrical Engineering and Information Technology
- Computer Science

- Mechanical Engineering and Process Technology
- Mathematics
- Natural Sciences
- Humanities
- Economics and Business Administration

The faculties are responsible for the correct completion of the respective courses of study. In some cases, they are subdivided into institutes that carry out teaching and research.

III. FACULTY OF COMPUTER SCIENCE

A. General Information

1. Address

The address is: Technische Universität Chemnitz
Fakultät für Informatik
Straße der Nationen 62
D-09107 Chemnitz
Germany

2. ECTS Coordinator

Prof. Dr. Hanno Lefmann

Theoretical Computer Science and Information Security
phone: +49-371-531-1276 (-1431)
fax: +49-371-531-1810
email: lefmann@informatik.tu-chemnitz.de

B. Faculty Structure

The Faculty of Computer Science is structured as follows. It consists of

13 chairs

- Theoretical Computer Science and Information Security (TI1)
- Theoretical Computer Science (TI2)
- Practical Computer Science (PR)
- Systems Programming and Operating Systems (BS)
- Data Management Systems (DV)
- Computer Graphics and Visualization (CG)
- Modelling and Simulation (MS)
- Artificial Intelligence (KI)
- Information Systems and Software Engineering (IS)
- Computer Networks and Distributed Systems (RN)
- Computer Systems (RS)
- Computer Architecture and Microprogramming (RA)
- Media Studies (MI)

and the

Faculty's Computing and Information Center

C. Work and Research Fields

The chairs of the Faculty of Computer Science cover the following fields

- Applied Computer Science
- Practical Computer Science
- Technical Computer Science
- Theoretical Computer Science.
- Media Studies

(N.N. means „nomen nominandum“ - the chairperson is about to change)

Chair: Theoretical Computer Science and Information Security (Prof. Dr. H. Lefmann) (TI1)

- Design and analysis of efficient algorithms
- Mathematical methods of cryptology (design and analysis of methods for realization of confidence, integrity, and authenticity)

Chair: Theoretical Computer Science (Prof. Dr. A. Goerdt) (TI2)

- Algorithmic logics
- Efficiency of proof calculi
- Algorithms for integrated circuits design

Chair: Practical Computer Science (Prof. Dr. G. Rünger) (PR)

- Parallel Programming
- Design of Compilers

Chair: Systems Programming and Operating Systems (Prof. Dr. W. Kalfa) (BS)

- Object-oriented architectures of operating systems
- Distributed operating systems
- Man-machine communication
- Multimedia and operating systems

Chair: Data Management Systems (Prof. Dr. W. Benn) (DV)

- Database technology: concepts, methods, tools
- Distributed and heterogeneous database systems, interoperability
- Semantic and object-oriented database systems
- Database systems for AI applications (mainly image processing)
- Database systems for geographical information systems

Chair: Computer Graphics and Visualization (Prof. Dr. G. Brunnett) (CG)

- Virtual Reality
- Scientific and technical visualization

Chair: Modelling and Simulation (Prof. Dr. P. Köchel) (MS)

- Modelling and simulation of discrete processes
- Evaluation of complex systems
- Algorithms and data structures for discrete simulation
- Queueing networks

Chair: Artificial Intelligence (Prof. Dr. W. Dilger) (KI)

- Multi-agent systems
- Configuration of technical systems
- Knowledge-based teaching systems
- Machine learning
- Qualitative reasoning

Chair: Information Systems and Software Engineering (Prof. Dr. P. Kroha) (IS)

- Application of object-oriented database systems in CASE tools
- Support of early design phases of information systems by CASE tools

- Object-oriented methods of the software engineering
- Parallel concepts in CASE tools

Chair: Computer Networks and Distributed Systems (Prof. Dr. U. Hübner) (RN)

- Protocol interworking
- Network management
- Multimedia communication
- High speed networks
- Design and test tools for distributed systems

Chair: Computer Systems (N.N.) (RS)**Chair: Computer Architecture and Microprogramming (Prof. Dr. W. Rehm) (RA)**

- Multithreaded architectures
- Object-oriented massively parallel computer architectures
- Neural networks, simulation on parallel computers

Chair: Media Studies (Prof. Dr. C. Wolff) (MI)**D. Structure Of Studies**

Duration of Study: 4.5 years (standard period of study)

Degree: Diplom-Informatiker/Diplom-Informatikerin (Dipl.-Inf.)

The following remarks concern the degree course "**Informatik**", offered by the Faculty of Computer Science.

An academic year consists of a winter semester and a summer semester. Registration takes place at the beginning of the winter semester only.

Different kinds of courses are offered:

Lecture (L): A professor regularly lectures on the subject matter.

Exercise (E): The topics of the corresponding lecture are applied in practice, in order for the students to develop some practical experience. Students actively participate in the exercises.

Basic and Advanced Seminar (S): Students prepare and present talks using the relevant literature. Lecturers/professors are responsible for selecting topics and leading the discussion.

Practical Training (P): Here, students acquire the necessary abilities and skills.

Compact Course: A course running continuously for a certain period of time.

Term Project: A group of students realizes a scientific project. The project deepens and supplements the lectures, exercises, and practical training courses. The topics, which are treated in a term project, are so broad that problems such as task scheduling, interface definition, operation scheduling, and communication within the team must all be considered.

Diploma Thesis: The diploma thesis completes the scientific education. It shows that the candidate is able to apply scientific methods and to solve independently and within a fixed period of time a Computer Science problem. The diploma thesis consists of a written essay and a public defence of the results.

Lectures, exercises, and seminars regularly run 90 minutes. This corresponds to 2 teaching hours per week.

The **Standard Period of Study** is 9 semesters. The studies consist of stage I studies (4 semesters) and stage II studies (5 semesters).

Stage I Studies are completed with an intermediate examination: the “Vordiplom”. The student has to prove that she or he successfully finished stage I studies. In particular, she or he has to show that he acquired the basic concepts of computer science and gained a systematic orientation to successfully continue his or her studies.

Stage II Studies are completed with the **Diploma Thesis**.

It is recommended that the period for students to enrol in an exchange programme is from the 3rd to the 5th year of studies. The duration can vary from 3 to 12 months

IV. DESCRIPTION OF LECTURES

A. General Description

In the tables, the figures indicate the number of hours per week for lectures (L), exercises (E), and practical training courses (P).

Each course is described as follows (Example):

TI1 Systems Theory **9 cr**
S 3-0-0

Explanation:

TI1 Abbreviation of the chair (in German) (see table on page 16)

Systems Theory Course Title (in English)

S 3-0-0 Time and workload in the form "**S L-E/S-P**" (here: Summer, **3** hours **Lecture**, **0** hours **Exercise** (or **0** hours seminar) and **0** hours **practical training** per week.

9 cr ECTS credit points.

This short description is supplemented by the verbal description of the topics and information about the required prerequisites, the examination, and the lecturer.

Allocation of Credits

Stage I (first 4 Semesters)	120 cr
Stage II (last 5 Semesters)	150 cr
where the 150 cr are divided as follows	
- all classes completed by passing an examination in obligatory subjects, optionally required and optional subjects of the respective specialization	108 cr
- term project	12 cr
- diploma thesis	30 cr
	<hr/> 270 cr (total)

B. Stage I - Courses

Subject	Semester				total	
	1. L-E-P	2. L-E-P	3. L-E-P	4. L-E-P	L-E-P	total
Mathematics	4-2-0	4-2-0	4-2-0	4-2-0	16-8-0	24
Practical Computer Science					10-4-4	18
Algorithms and Programming	4-2-0					
Data Structures		4-2-0				
Higher Programming Languages				2-0-0		
Software Engineering (practical tr.)				0-0-4		
Technical Computer Science					10-6-4	20
Digital Logics Design	4-2-0					
Computer Organization		4-2-0				
Programming in Assembler Language			2-2-0			
Hardware (practical training)			0-0-4			
Theoretical Computer Science					8-4-0	12
Theoretical Computer Science I			4-2-0			
Theoretical Computer Science II				4-2-0		
Basic Seminar		0-2-0	or 0-2-0	or 0-2-0	0-2-0	2
Secondary Subject	see below					10
total + 10 hours of minor subject	18	20	20	18	44-24-8	86

L hours of lectures per week

E hours of exercises (or seminar) per week

P hours of practical work per week

The courses in stage I are not outlined here in detail, because an ECTS student usually completes the stage I studies at the home university. Specification concerning contents is, however, necessary, in order to be able to estimate the qualifications for stage II.

1. Mathematics

Mathematics courses are dedicated especially for Computer Science students. The following areas of mathematics are included: Propositional logic, set theory, functions, relations, complex numbers, algebraic structures, analytic geometry (1st semester); linear spaces, linear operators, eigenvalue problems (2nd semester); differential calculus, integral calculus (3rd semester); probability theory, statistics (4th semester).

2. Practical Computer Science

The course **Algorithms and Programming** deals with the concept of algorithms. Algorithms are central in computer science, as well as their different kinds of description and evaluation. By using a higher procedural programming language, students are introduced into the systematics of programming and program design. These concepts are extended to modular and parallel programming. The course **Data Structures** covers the most essential data structures and algorithms as well as their applications. Apart from practical aspects and implementation, theoretical aspects also play an important role. The course **Higher Programming Languages** considers the different paradigms of programming on the basis of the well known concept of an algorithm: imperative, functional, relational and object-oriented programming. Selected programming languages are treated exemplarily (FORTRAN, PASCAL, ADA, C, LISP, PROLOG, Eiffel, C++, Java, ...) and discussed in view of their application. The practical course **Software Engineering** is based on the methodical concepts of programming and facilitates the acquisition of fundamental experiences with the principles and methods of software engineering. Particular emphasis is put on the design of a prototype of a software

system by a group of students according to a given procedure model with the stages analysis, specification, design, implementation and integration. As a result, the students will acquire knowledge and abilities for the successful practical application of techniques to the design of a larger software system.

3. Technical Computer Science

The course **Digital logics design** begins with an introduction to the terms and concepts of digital systems. The terms information, system (behaviour, structure, interface) and automation are of central importance. Based on them, digital computers and their components are to be considered and described as a unit of hardware and software. Models, functions, and drafts of combinatorial and sequential networks are treated. An overview over the operating modes and the technical realization of integrated switching circuits is given. The qualities and the technical realization of function blocks are presented as elements of digital computers. On the basis of the von-Neumann-concept the organization and the architecture of program-controlled digital computers are treated. Furthermore an overview over microcomputers, their components and peripheral devices is given. In the course **Computer organization** the organization of digital computers and their components is treated and an overview over characteristic computer architectures and types of computers is given. The hardware description language VHDL yields a formal description; with VHDL digital computers and their components can be specified, simulated and documented. The structure and the operating mode of the central processor with the key areas control/microprogram control, arithmetic unit and computer arithmetic, I/O organization, I/O interfaces, as well as different kinds of memory organization are treated. The instruction set, the behaviour and the structure of a RISC processor are treated as well as described in VHDL and simulated. The course **Assembler programming** begins with an introduction into tools for design of machine programs (assembler, linker, debugger). Insight into the architecture of a personal computer is given. The instruction set of its processor is presented. The organization principles and operating modes of main memory, bus controller, interrupt controller, the communication between processor and periphery as well as the protected mode and its applications are taught. As exercises, programs are written for controlling and processing functions including the use of I/O functions. The **Practical hardware training** deepens the knowledge which was acquired by the analysis of the structure and the behaviour of selected digital systems in the courses of technical computer science. Different experiments are prepared, carried out and evaluated, in order to gain practical experience with the hardware and the handling of the corresponding measuring instruments.

4. Theoretical Computer Science

The course focuses on topics in the fields of analyzing correctness and running time of algorithms, and automata theory, formal languages, computability (**Theoretical Computer Science I**), complexity theory and logics (**Theoretical Computer Science II**). Numerous aspects of computer science have their roots here and are only inadequately applicable without the theoretical basics. In this case, mathematical models play an essential role. The concepts of formal languages, grammars and automata (finite automata, push-down automata, Turing machine) are introduced and examined with respect to their computing power. The variety of the different computing models, languages and grammars is manifested in the Chomsky hierarchy. During the investigation of computability it becomes clear which classes of functions (problems) can be computed (solved) or cannot be computed (solved) by computing models. However, it is also shown that there are functions and problems which are not computable and/or not decidable. In addition, Church's thesis states that all universal models of computability, for instance recursive functions and Turing machines, yield the same class of functions. While in the case of computability unrestricted resources are assumed (time and storage space) (theoretical solvability/unsolvability of a problem), these resources are central in the of considerations in complexity theory (practical solvability/unsolvability of a problem). The classes P and NP, the problems which are computable (decidable) in polynomial or nondeterministic polynomial time, are investigated here. Special attention is given to the class of NP-complete problems. In addition, a hierarchy of complexity classes is derived. By applications, such as automatic proving and logic programming, logics received a considerable significance in computer science. Areas of interest here are the propositional logics and the predicate logics, syntax and semantics of these logics as well as the corresponding resolution calculi. In addition to normal forms, knowledge representation, formalizing and provability, problems related to resolution and unification receive some attention. On the basis of the treated topics the relationship to other fields (e.g. term replacement systems, switching circuit

theory, information and coding theory, cryptology and logic of authentication) is also considered and subsequent courses are referred to.

5. Basic seminar

In every semester, basic seminars are offered on various subjects. The topics may complement former or running courses or may cover other fields.

6. Secondary Subject Field

The courses in the secondary subject field provide every Computer Science student with the opportunity to acquire knowledge in another field in order to enable him/her to integrate computer science into this field:

- Applied mechanics
- Engine construction
- Methods of production
- Factory systems
- Production measurement and quality assurance
- Operations Research
- Electronics
- Mathematics
- Business administration
- Environmental technology
- Vocational and economic education
- English in everyday life and for specialized communication
- Psychology
- Polygraphical technology

At the beginning of their studies, Computer Science students choose a secondary subject field, which they usually follow over the entire duration of studies. ECTS students are not subject to this arrangement. Depending on their knowledge, they may participate in the courses listed above.

More detailed information about the courses in the secondary subject field is dispensed with here (cf. also "IV.C.3. Secondary Subjects")

C. Stage II Studies - Courses

Subject	Semester				total SWS
	5. SWS	6. SWS	7. SWS	8. SWS	
Compulsory Subjects	20	12	-	-	32
Optionally Required Subjects	-	4	8	8	20
Practical Training	-	-	4	-	4
Advanced Seminar	-	-	2	-	2
Term Subject	-	-	-	8	8
Secondary Subject Field	-	4	6	2	12
Data Protection and Data Security	2	-	or 2	-	2
Ergonomics in Computer Science	-	2	-	or 2	2
total	22	22	20	18	82

1. Compulsory Subjects**TI1 Data Protection and Data Security (Information Security/Systems Security)****W 2-0-0****3 cr**

More and more information is stored, processed and transmitted electronically in open and local networks. A look at the demands of federal and state laws concerning data protection immediately shows how important the issue of data security is. Considering the dependence of the modern industrial society on information and communication technology, the necessity of data protection and data security for all concerned persons and especially for computer scientists becomes clear. While data protection is occupied with questions of objectives, data security deals with the realization of data protection. The following topics will be considered:

- number theory for cryptography
- public key cryptography, RSA
- Data Encryption Standard

Prerequisites: basic knowledge in computer science**Literature:** scriptum Datenschutz und Datensicherheit (Data Protection and Data Security)**Examination:** written**Lecturer:** Prof. Dr. H. Lefmann**TI1 Theoretical Computer Science III****S 3-1-0****6 cr**

This course is essentially a continuation of "Theoretical Computer Science I". We treat the design and analysis of efficient algorithms with the corresponding data structures. Topics include network flow algorithms, fast Fourier-transform, dynamic programming, heuristics and randomized algorithms. Moreover, we analyse some special dynamic data structures.

Prerequisites: basic knowledge in computer science**Literature:** to be announced**Examination:** oral**Lecturer:** Prof. Dr. H. Lefmann

PR Theory Of Programming Languages
S 2-2-0

4.5 cr

In this course different semantic concepts of imperative and functional programming languages will be presented. Topics include:

- basics
- operational semantics
- denotational semantics
- axiomatic semantics
- Hoare-logic
- recursive array equations
- nondeterminism and parallelity

Prerequisites: basic studies in computer science

Literature: J. Loeckx, K. Sieber: The Foundation of Program Verification, Teubner 1987.
 K. Slonneger, B. L. Kurtz: Formal Syntax and Semantics of Programming Languages, Addison-Wesley, 1995.
 G. Winskel: The Formal Semantics of Programming Languages - An Introduction, MIT Press, 1993.
 G. Winskel: The Formal Semantics of Programming Languages - An Introduction, MIT Press, 1993.
 More to be announced

Examination: written

Lecturer: Prof. Dr. G. Runger, Dr. K. Hering

BS Operating Systems
W 2-2-0

6 cr

The lessons and exercises deal with the architectures, models and other basics of operating systems. Furthermore, principles of the design and implementation of operating systems are discussed. Basic topics are:

- multi-level architecture of operating systems,
- processes (systems of processes, process control, deadlocks, etc.),
- resource management (scheduling, memory, devices, messages, etc.),
- I/O-Control,
- data management and communication

Prerequisites: basic studies in computer science, efficient algorithms

Literature: W. Kalfa: Betriebssysteme

Examination: oral

Lecturer: Prof. Dr. W. Kalfa

DV Data Modelling And Databases (Databases I)
W 2-2-0

6 cr

The lecture explains database design issues, including database architectures, data storage, data models (hierarchical, network, relational) and query processing. In addition, several criteria of designing data schemata are suggested which can be used to guide a concrete database implementation. Furthermore, problems concerning parallel database access, data protection and data security are discussed.

Prerequisites: basic knowledge in computer science

Literature: C. J. Date: An Introduction to Data Base Systems

Examination: oral or written

Lecturer: Prof. Dr. W. Benn

CG Computer Graphics
W 2-2-0**6 cr**

The lectures give an introduction to computer graphics. Main topics are:

- structure of graphical systems
- characteristics and classification of graphics software
- graphics standards
- graphical user interfaces
- procedural and structural graphic representation
- presentation schemes
- methods and algorithms in computer graphics (clipping, transformations, projections, hidden surface algorithms, illumination models, visualization)

The exercises are based on the graphics standard OpenGL.

Prerequisites: basic knowledge in computer science, mathematics or engineering

Literature: J. Encarnacao, W. Straßer: Graphische Datenverarbeitung 1, Oldenbourg-Verlag 1996
M. Woo, J. Neider, T. Davis: OpenGL Programming Guide, Addison-Wesley 1996
J. D. Foley, A. van Dam, S. K. Feiner, J. F. Hughes: Computer Graphics, Addison-Wesley 1990

Examination: to be announced

Lecturer: Prof. Dr. G. Brunnett, Dipl.-Inf. M. Lorenz, Dipl.-Inform. M. Vanco

KI Artificial Intelligence
S 3-1-0**6 cr**

This course is an introduction into the methods of Artificial Intelligence and its most important applications. These methods include search and optimization (blind search, heuristic search, genetic algorithms) and knowledge representation (logics, probabilistic and fuzzy reasoning). The following application domains are presented: Planning, Machine Learning, Natural Language processing, Image Recognition, Multi-Agent-Systems and Robotics.

Prerequisites: basic knowledge in computer science

Literature: S. J. Russell, P. Norvig: Artificial Intelligence. A Modern Approach. Prentice Hall, Upper Saddle River, NJ, 1995

Examination: oral or written

Lecturer: Prof. Dr. W. Dilger

RN Computer Networks
W 2-2-0**6 cr**

- introduction
- applications: e-mail, telnet, ftp, news, www
- transmission of digital signals, modem techniques
- packet-switching and error control
- internet level and transport level
- wide area networks (modem, ISDN, DSL, ...)
- computer networks security

Prerequisites: knowledge of the programming languages C and C++

Literature:

Examination: to be announced

Lecturer: Prof. Dr. U. Hübner

RA Computer Architecture
W 3-1-0 6 cr

This lecture introduces basic computer architectures and then proceeds to enhance the acquired knowledge on the basis of programming tasks and architecture simulations, carried out in a computer-aided practical exercise. The following topics will be discussed: classes of computer architectures and computing models, system and processor architectures, memory hierarchies and management, architectural support for operating systems, CISC-, RISC, Superscalar-, VLIW- and multithreaded architecture, bus systems and I/O-structures, performance parameters and benchmarking.

Prerequisites: courses „assembler programming” and „computer organization”

Literature: J. L. Hennessy, D. A. Patterson, Rechnerarchitektur, Vieweg-Verlag, Braunschweig/Wiesbaden, 1994
K. Giloi, Rechnerarchitektur, Springer-Verlag, Berlin, 1993

Examination: to be announced

Lecturer: Prof. Dr. W. Rehm

2. Optionally Required Subjects

Optionally required subjects are divided into several fields of specialization:

- algorithms and complexity
- operating systems
- databases
- design of technical systems
- information security and communication security
- applied computer science (for engineers)
- artificial Intelligence
- modelling and simulation
- parallel and distributed systems
- computer networks
- software engineering

Students select one of these subjects. ECTS students are not restricted to this arrangement. They can choose - depending on their previous knowledge - any course from the subsequent catalogue.

TI1 Seminar Approximation Algorithms **S 0-2-0**

3 cr

Many optimization problems are known to be algorithmically hard to solve, i.e. they are NP-hard. Therefore, one tries to find strategies which find a provably good approximation to the optimal solution in polynomial time. Typical problems are scheduling, graph parameters and others. Certain problems will also be considered under on-line conditions. The corresponding problems and solutions will be investigated and discussed, where the participants of the seminar give talks on their favourite subject.

Prerequisites: basic studies in computer science

Literature: D. S. Hochbaum, Approximation Algorithms for NP-hard Problems, PWS Publishing Company, 1997.

Examination: to be announced

Lecturer: Prof. Dr. H. Lefmann

TI1 Data Security And Cryptography II **S 2-0-0**

3 cr

In this course recent cryptographic algorithms will be explained and their security aspects will be analyzed. We focus on Rijndael, IDEA (PGP) and others as well as their applications. Moreover, the following topics will be explained: key generation and key exchange, digital signatures and visual cryptography. We also look at current laws and address complexity issues of an attack from the view of an enemy.

Prerequisites: basic knowledge of computer science

knowledge from the course „Data Protection And Data Security”

Literature: to be announced

Examination: oral

Lecturer: Prof. Dr. H. Lefmann

TI1 Operations Research **W 2-0-0 3 cr**

In this course several techniques for solving optimization problems will be presented. A lot of

problems arising in practice can be described mathematically by a linear program. To solve such a linear program one can use the simplex algorithm or the ellipsoid method. Both will be presented and analyzed. We also consider some non-linear and discrete optimization problems and strategies to solve them. Further topics are game theory and decision theory (UMTS-auctions). This course is theory-oriented.

Prerequisites: basic knowledge of computer science
Literature: to be announced
Examination: oral
Lecturer: Prof. Dr. H. Lefmann

TI1 Seminar Quantum Computing
S 0-2-0

3 cr

By the laws of quantum mechanics several states - indeed complementary states in the classical sense - can exist simultaneously. Only a measurement determines the state finally. In this sense, the quantum-bits 0 and 1 exist simultaneously, which allows to handle several inputs in parallel.

Prerequisites: basic knowledge in computer science
Literature: C. Williams, S. Clearwater, Explorations in quantum computing, Springer,
 J. Gruska, Quantum Computing, McGraw-Hill
Examination: to be announced
Lecturer: Dr. U. Tamm

TI1 Seminar Chip Cards
S 0-2-0

3 cr

Cryptographic algorithms are the basic tool, if data have to be transferred or identified. First some important cryptographic systems are presented. Then we proceed to discuss design and functionality of chip cards and some applications like identification or digital signatures.

Prerequisites: basic knowledge of computer science
Literature: D. R. Stinson, Cryptography, Theory and Practice, CRC Press, 1995. W. Rankl and W. Effing, Handbuch der Chipkarten, Carl Hanser Verlag, 1999
Examination: to be announced
Lecturer: Prof. Dr. H. Lefmann

TI1 Seminar Efficient Algorithms
S 0-2-0

3 cr

Students are asked to prepare talks on topics on efficient algorithms and data structures.

Prerequisites: basic knowledge in computer science
Literature: Lawler, Lenstra. The Travelling Salesman Problem. John Wiley & Sons, 1985.
Examination: to be announced
Lecturer: Dr. U. Tamm

TI2 Cryptography
S 2-0-0

3 cr

This course is a continuation of "Data Protection and Data Security". The focus is on aspects of the security of modern cryptographic systems like RSA.

Prerequisites: course "Data Protection and Data Security"

Literature: to be announced
Examination: to be announced
Lecturer: Prof. Dr. A. Goerdts

TI2 Seminar Algorithmic Problems Of The World-Wide-Web
S 0-2-0

3 cr

In this seminar we read and discuss original literature on the questions: What is known about the world-wide-web, if we view it as a graph? How can we use the knowledge on the special graph structure of the www, to search efficiently for documents?

Prerequisites: basic studies in computer science
Literature: to be announced
Examination: to be announced
Lecturer: Prof. Dr. A. Goerdts

PR Compiler Design I
W 2-2-0

6 cr

The contents of this course are

- lexical analysis
- syntactic analysis
- semantic analysis
- optimizing transformations
- code generation

Prerequisites: basic studies in computer science
Literature: A. Aho, R. Sethi, and J. D. Ullman: Compilers: Principles, Techniques, and Tools, Addison-Wesley, Reading, Mass. 1986
R. Wilhelm and D. Maurer: Übersetzerbau, Springer Verlag, 1992
Other literature will be announced.
Examination: oral
Lecturer: Prof. Dr. G. Rüniger

PR Compiler Design II
S 2-2-0

6 cr

This course is a continuation of „Compiler Design I” We address the topics parsing, semantic analysis, run-time management, generation of the intermediary representation, code generation and code optimization. The corresponding exercises are both theoretical and practical.

Prerequisites: basic studies in computer science
Literature: A. Aho, R. Sethi, and J. D. Ullman: Compilers: Principles, Techniques, and Tools, Addison-Wesley, Reading, Mass. 1986
R. Wilhelm and D. Maurer: Übersetzerbau, Springer Verlag, 1992
S. Muchnik: Advanced Compiler Design and Implementation, Morgan Kaufmann, 1997
Examination: to be announced
Lecturer: Prof. Dr. G. Rüniger, Dipl.-Inf. R. Reilein-Ruß

PR Parallel Programming
W 4-2-0

9 cr

Parallelism plays an important role in computer science, for example in computer architecture, programming languages, compilers, and algorithms in practice.

In this course we focus on practical aspects of parallel programming, for parallel computers or clusters of workstations, in particular:

- models of the architecture for parallel computers
- parallel programming models and programming environments
- parallel algorithms and evaluation of their costs

The algorithms will mainly origin in the area of Scientific Computing. In the corresponding exercises theoretical and practical tasks in MPI or Pthreads will be considered.

Prerequisites: basic studies in computer science

Literature: Th. Rauber, G. Runger: Parallele und verteilte Programmierung, Springer-Verlag, 2000

G. Almasi, A. Gottlieb: Highly Parallel Computing, Benjamin/Cummings, 1994

D. Bertsekas, J. Tsitsiklis: Parallel and Distributed Computation, Prentice Hall, 1989

I. Foster: Designing and Building Parallel Programs, Addison-Wesley, 1995

V. Kumar, A. Grama, A. Gupta, G. Karypis: Introduction to Parallel Computing, Benjamin/Cummings, 1994

G. Wilson: Practical Parallel Programming, MIT Press 1995.

Examination: to be announced

Lecturer: Prof. Dr. G. Runger

PR Divide-And-Conquer Algorithms On Message-Passing-Machines

W 0-0-4

6 cr

In these practical exercises we focus on parallel implementations of Divide-And-Conquer algorithms. For these a suitable distribution of the jobs among the processes is important, where in general an arising irregular partition has to be taken into account. For several applications we will design solution strategies and implement and test these on computers with distributed memory. These practical exercises are suitable for students with some knowledge in parallel programming, in particular in message-passing programming.

Prerequisites: course „Parallel Programming“ (or simultaneous visit of this course)

Literature: to be announced

Examination: to be announced

Lecturer: Prof. Dr. G. Runger, Dipl.-Inf. R. Reilein-Ru

PR Java-Programming

W 0-0-4

6 cr

The practical exercises are suitable for beginners as well as experienced Java-programmers. The following topics will be treated:

- properties and concepts of Java
- working environment
- language elements
- object oriented programming with Java
- programming with Java foundation classes
- input and output with Java
- Java-network-programming
- Java-threads
- GUI-programming with AWT

Prerequisites: basic studies in computer science

Literature: D. Flanagan: Java in a nutshell. O'Reilly, 2000.

G. Kruger: Go To Java 2. Handbuch der Java-Programmierung, Addison-Wesley, 2000.

M. Campione, K. Walrath. The Java Tutorial. Addison-Wesley, 2001.

Examination: to be announced
Lecturer: Dr. K. Hering, S. Trautmann

PR Seminar Programming For Memory Hierarchies
S 0-2-0

3 cr

Nowadays, we observe an increasing gap between the processor speed development and the time to address the memory. However, to use the processor speed efficiently, memory hierarchies were developed. These consist of memories of different sizes and access times, to decrease the access time to the memory in average. The most simple version of a hierarchy is obtained by putting a cache between processor and memory (single level cache). The access times to register, cache and main memory differ enormously and hence using the hierarchy efficiently is important for a fast execution of the program.

Therefore for many problems, which use a lot of computing time, several techniques have been developed to use the cache efficiently, by appropriately structuring the cache. In this seminar the necessary programming techniques for doing so will be presented and will be applied for relevant situations.

Prerequisites: basic studies in computer science
Literature: to be announced
Examination: to be announced
Lecturer: Prof. Dr. G. Runger, Dipl.-Inf. R. Reilein-Ruß

PR Seminar Parallel Programming
S 0-2-0

3 cr

In this seminar we will read and discuss several papers from the area of parallel programming. Hereby we focus on some special algorithms and applications, parallelization algorithms, parallel programming models and cost models.

Prerequisites: basic studies in computer science, course „Parallel Programming“
Literature: to be announced
Examination: to be announced
Lecturer: Prof. Dr. G. Runger

BS Real-time Operating Systems
S 2-2-0

6 cr

This course is an introduction to real-time systems, which are used to handle time-critical jobs. We address the following topics: time and resource-management, process scheduling, fault-tolerance, synchronization and communication.

Moreover we consider some important aspects of existing real-time operating systems like RTLinux, VxWorks or MARS.

Prerequisites: basic studies in computer science
Literature: to be announced.
Examination: oral or written
Lecturer: Dr. R. Baumgartl

BS Distributed Operating Systems
S 2-2-0

6 cr

The lessons and exercises deal with the special aspects of modelling, design, and implementation of distributed operating systems based on loosely coupled computers. Basic topics are:

- basic models, taxonomy of parallel and distributed computer systems
- communication in distributed systems (layered protocols, routing, client-server model, RPC; transactions etc.),
- distributed resource management (distribution, caching, replication, migration, naming, etc.)
- implementation.

Prerequisites: basic knowledge in computer science and operating systems

Literature: to be announced

Examination: oral

Lecturer: Prof. Dr. W. Kalfa

BS Operating Systems II
W 2-1-0

4.5 cr

This course is a continuation of „Operating Systems“. We consider both theoretical and practical aspects and focus on the following:

- micro kernel structures
- single address room operating systems
- persistent and multimedia file systems
- security aspects of operating systems
- performance evaluation of operating system components
- case studies and current trends in the development

Prerequisites: course „Operating Systems“

Literature: to be announced

Examination: oral

Lecturer: Prof. Dr. W. Kalfa

BS Seminar Research Seminar Operating Systems
S 0-2-0

3 cr

In this research seminar staff members, students and guests will give talks on current developments for operating systems or running projects of the chair. Details on the projects can be found under www.osg.informatik.tu-chemnitz.de

Prerequisites: basic studies in computer science

Literature: to be announced

Examination: to be announced

Lecturer: Prof. Dr. W. Kalfa

BS Systems Programming
W 2-2-0

6 cr

This course introduces to system programming via Windows NT. By giving a detailed overview of the architecture of Windows NT we show and demonstrate how current operating systems services can be used and new services can be included. The main topics here are:

- short introduction to C++
- development environments
- architecture of Windows NT
- subsystems and interfaces
- single-threaded and multi-threaded applications
- multiprocessed applications
- device drivers.

Prerequisites: basic studies in computer science

Literature: Horton: Beginning Visual C++ 4
 Solomon: Inside Windows NT
 Baker: The Windows NT Device Driver Kit
Examination: oral
Lecturer: Prof. Dr. W. Kalfa

BS Operating Systems
S 0-0-4

6 cr

In order to understand the architecture and functioning of an operating system, in general one needs practical experience. These practical exercises will give students better insight into operating systems. A successful work might be extended to a project work or a diploma thesis.

Topics are:

- consolidation of the Cheops-project
- implementation of web-based demonstration programs

Prerequisites: basic studies in computer science
Literature: to be announced
Examination: to be announced
Lecturer: Dr. R. Baumgartl

DV Nonstandard Database Systems (Databases II)
S 2-2-0

6 cr

Enhanced concepts in database technology will be introduced in this course. These concepts will deepen the student's knowledge, the main issues are:

- integrity constraints
- non-normalized relations
- active and deductive databases
- deductive databases

During the course we will present some special database systems, which were developed on special demands, and apply the current knowledge in exercises with these systems. At the end of this course the student will have some basic knowledge in current research on databases which helps to judge further developments or improvements of existing systems and gives a better understanding of current research.

Prerequisites: basic studies in computer science, course „Databases I“
Literature: to be announced, scriptum is available
Examination: oral
Lecturer: Prof. Dr. W. Benn

DV Object-Oriented Databases (Databases III)
W 2-2-0

6 cr

Building up on the lectures on standard and nonstandard database systems, this lecture introduces semantic and object oriented concepts of database management systems. In particular, their analogies to and differences from the traditional models are discussed. The following concepts will be explained: identity of objects, classes, types and instances, polymorphism, general concepts of inheritance, completeness and extension abilities.

Prerequisites: courses „Data Modelling And Databases“ and „Nonstandard Databases“
 basics in object-oriented programming
Literature: A. Heuer: Objektorientierte Datenbanken: Konzepte, Modelle, Systeme
Examination: oral
Lecturer: Prof. Dr. W. Benn

DV Distributed Database Systems
S 2-0-0**3 cr**

In this course we deal with the basic concepts of persistent data distribution, in particular

- logical and physical data distribution
- demands and changes in the architecture to non-distributed systems
- data access methods and required time
- query-changes
- distributed transaction concepts

Rather than concentrating on a certain database system, we deal with the above mentioned topics in general. Only a few aspects of efficient data distribution are realized in existing database systems, and therefore no exercises will be available.

Interested students can test the database systems available at the chair. This course gives a first impression to help the students to better estimate the possibilities of commercial systems.

Prerequisites: basic studies in computer science, course „Databases I“

Literature: to be announced

Examination: oral

Lecturer: Prof. Dr. W. Benn

DV Database Implementation Issues
S 2-0-0**3 cr**

Using the „tier“ architecture as a reference model, a bottom-up method for implementing databases is discussed. That is, all the implementation issues concerning different layers, from the external storage management up to the user interface will be explained in detail. The main part of this lecture is concerned with relational databases. Some important aspects of network database systems and distributed systems are also considered. The aim of this course is that students understand important implementation issues for database systems and they are able to judge and apply special techniques, also on a research level.

Prerequisites: basic studies in computer science
course „Data Modelling And Databases“

Literature: to be announced

Examination: oral

Lecturer: Dipl.-Ing. H. Tischendorf

DV Seminar Music Databases
S 0-2-0**3 cr**

This interdisciplinary seminar introduces into the basics for the development of a music database system, which will yield new results and insight into music documents. Topics are:

- identification of known melodies
- classification with respect to sound characteristics
- basics of audio processing
- digital signal processing
- psycho-acoustic phenomena
- music psychology and music theory
- information retrieval

Prerequisites: none

Literature: to be announced

Examination: to be announced

Lecturer: Prof. Dr. W. Benn, Dipl.-Inf. F. Seifert

DV Seminar Multi-Agent Systems In Database Systems
W 0-2-0**3 cr**

Multi-agent systems are not only a research topic in artificial intelligence, but also have several applications in database systems. In this seminar we consider multi-agent systems in general, as well as applications of these in the area of database systems. In particular we discuss several types, their properties, possible areas of application and others. Then we discuss architectures, in which multi-agent systems and database systems, respective information systems are used. The main topics are

- multi-agent systems
- cooperative information system
- database management systems
- information systems

Prerequisites: none**Literature:** to be announced**Examination:** to be announced**Lecturer:** Prof. Dr. W. Benn, Dipl.-Inf. O. Langer**DV Seminar Web-Databases**
S 0-2-0**3 cr**

The World Wide Web can be characterized as heterogeneous, dynamic and interoperable. These properties complicate the development of database systems. Therefore much effort is spent on access methods, representation of data and services in the Web, and connected systems. In this seminar we characterize the expression „Web-Databases“ in more detail and for doing so we will focus on these topics

- models of data and language for web-data
- architectures and tools for the management of data on the web
- integration of heterogeneous sources of information
- interoperability of Web-services
- information retrieval and search engines

Prerequisites: none**Literature:** to be announced**Examination:** to be announced**Lecturer:** Prof. Dr. W. Benn, Dipl.-Inf. O. Langer**CG Geometric Modelling**
W 2-1-0**4.5 cr**

For generating computer graphics of an object, geometric models of this object are needed. Here we deal with techniques and algorithms for generation and manipulation of so called free-form geometries, which are used for the geometric modelling of complex surfaces (like car bodies or wings of a plane).

Prerequisites: basic studies in computer science, mathematics or engineering, a visit of the course „Basics Of Computer Geometry“ is of advantage**Literature:** J. Hoschek, D. Lasser: Grundlagen der geometrischen Datenverarbeitung B.G. Teubner, Stuttgart 1992**Examination:** to be announced**Lecturer:** Prof. Dr. G. Brunnert, Dipl.-Inf. M. Vanco

CG Computer Graphics II
S 2-0-0

3 cr

This course extends the course „Computer Graphics I“. Some knowledge of local illumination techniques is required here. We consider global illumination techniques like raytracing and radiosity, as well as special modelling techniques. Moreover the students will learn basic methods of virtual reality.

Prerequisites: basic studies in computer science

Literature: Encarnacao, Straßer, Klein: Graphische Datenverarbeitung II, Oldenbourg-Verlag

Examination: oral

Lecturer: Prof. Dr. G. Brunnett

CG Basics Of Computer Geometry
W 3-1-0

6 cr

In this course we consider basic techniques to handle geometric problems by a computer. In particular we address the following topics: basics of analytic geometry, coordinate-systems, coordinate-transformations, projections, curves and surfaces in the plane or in space, convex hulls, triangulations of surfaces.

Prerequisites: mathematics from stage I studies of computer science

Literature: to be announced

Examination: to be announced

Lecturer: Dr. M. Pester (faculty of mathematics)

CG Seminar Computer Graphics
S 0-2-0

3 cr

The students read and work on selected original papers in the area of processing of big polygonal nets. The participants present talks on their studies.

Prerequisites: basic studies in computer science

Literature: to be announced

Examination: to be announced

Lecturer: Prof. Dr. G. Brunnett

CG Practical Studies In Computer Graphics
S 0-0-4

6 cr

In these practical studies the students obtain a deeper knowledge in generating computer graphics and will be guided to some actual topics of research in virtual reality (VR). In particular, students can work on the following

- design and implementation of a pretentious interactive 3D-graphics program, or
- OpenGL under MS-Windows NT, SGI IRIX or Linux, or
- OpenGL / SGI Open Inventor under Windows NT/IRIX, or
- VRML.

Design and implementation of a pretentious algorithm from computer graphics by choice of the students, like visibility techniques or rendering. The students should get acquainted with the basics software World Toolkit R8 from Sense 8, which is used at this chair in the area VR. Moreover, the students should investigate how powerful the free software package Maverick is and they should implement a few reasonable programs. The practical studies are passed if one job has been done successfully.

In the first two weeks the jobs will be selected in agreement with the lecturer. The students work on their own. The following hard- and software is available

- PC-pool for OpenGL and Sense 8 World Toolkit
- PC-VR-tools in the VR-Labs, Windows NT 4.0, Visual C++, OpenGL, OpenInventor, Sense8 WTK
- graphics workstations in the VR-lab, SGI Octance/MXI graphics machine for OpenInventor, Sense 8 WTK and Maverick, HP Visualize C200 FX4 OpenGL-workstation for Maverick
- immersive VR-tools (head mounted display, data-glove, space mouse)

The lecturer offers support on a regular basis. Every two months students have to report on the progress of their work. The practical studies are finished at the end of the semester.

Prerequisites: basic studies in computer science

Literature: to be announced

Examination: to be announced

Lecturer: Dipl.-Inf. M. Lorenz

MS Stochastic Models and Applications

W 2-2-0

6 cr

In this course the students learn how to model and evaluate the operations of complex systems like computer networks, manufacturing-systems etc. In particular we will include stochastic components. Starting from the real world, we will consider several examples from different areas, and develop mathematical models for them and analyse them. Moreover, we will interpret our results of the analysis and show how to use them for the evaluation of the whole model.

Prerequisites: basic studies in computer science

Literature: Manuscripts I and II and the literature mentioned there

Examination: oral or written

Lecturer: Prof. Dr. P. Köchel

MS/KI Research Seminar Artificial Intelligence/Modelling And Simulation

W/S 0-2-0

3 cr

This seminar is jointly organized by the chairs „Artificial Intelligence” and „Modelling And Simulation”. The aims of this seminar are the following: Presentation and exchange of research results within the working areas of these two chairs:

- combining methods and the way of thinking in both areas
- regular talks by diploma as well as doctoral students

Prerequisites: basic studies in computer science

Literature: to be announced

Examination: to be announced

Lecturer: Prof. Dr. W. Dilger, Prof. Dr. P. Köchel

MS Modelling And Simulation

W 2-2-0 or 2-1-0

6 cr or 4.5 cr

This course gives an overview on theory and applications of discrete simulations. We will introduce simulation as a method of solving problems, specifically in computer science. Verbally formulated examples from different areas like manufacturing and logistic systems, computer and communication networks, traffic systems and biology will be presented, to motivate the participants to handle simulation models and develop simulation programs on their own. Typical algorithms and data structures commonly used within discrete simulation will be presented and discussed. Finally we will consider some problems with respect to the statistics concerning planning and evaluation of simulation experiments.

Prerequisites: basic studies in computer science, knowledge of a programming language

Literature: manuscripts and literature mentioned there
Examination: oral
Lecturer: Prof. Dr. P. Köchel

MS Simulation **6 cr**
W/S 0-0-4

The practical training course is an introduction to a simulation language and deepens the practical abilities for model formation and experimentation by means of reality related tasks.

Prerequisites: basic knowledge in Artificial Intelligence is recommended but not required
Literature: scriptum is available
Examination: to be announced
Lecturer: Prof. Dr. P. Köchel

KI Machine Learning **3 cr**
W 2-0-0

In this course we consider an area within artificial intelligence. We discuss the following possibility to transfer learnability to a computer

- introduction, classification, historic overview
- inductive learning / monitored learning
- inductive learning / non-monitored learning
- constructive induction
- deductive learning
- learning through analysis

Prerequisites: basic studies in computer science
Literature: to be announced
Examination: to be announced
Lecturer: Dr. J. Zeidler

KI Natural Language Understanding **3 cr**
W 2-0-0

This course introduces into language processing. We focus on understanding the written natural language and on recognizing spoken natural languages. In general, no specific prerequisites from other courses are needed.

This course is also suitable for students from other faculties. We focus on the following topics

- introduction, overview
- general notions, linguistic units
- methods of speech recognition
- methods of syntax analysis
- semantic processing of written natural languages
- speech recognition
- applications

This course is offered every two years (next time WS 2003). More information on: www.tu-chemnitz.de/~stj/lehre/sprach.htm

Prerequisites: basic studies in computer science
Literature: G. Görz et al.: Handbuch der Künstlichen Intelligenz, Oldenbourg Verlag, 2000
 E.G. Schukat-Talamazzini: Automatische Spracherkennung - Grundlagen, Statistische Modelle und Effiziente Algorithmen, Vieweg, 1995
 further literature will be announced

Examination: to be announced
Lecturer: Dr. J. Steinmüller

KI Multi Agent Systems
S 2-0-0

3 cr

Multi-agent-systems are distributed problem solving systems whose components (agents) have a high degree of autonomy. In the course the structure of agents and different ways of cooperation and communication between agents are presented. Examples are given for realization of multi-agent systems which demonstrate how problem solving is achieved through cooperation of autonomous units. Moreover, aspects of multi-agent learning and applications will be considered.

Prerequisites: basic studies in computer science

Literature: Ferber, J.: Multi-Agent Systems. An Introduction to Distributed Artificial Intelligence. Addison-Wesley, Harlow, Essex, 1999

Müller, J. (Hrsg.): Verteilte Künstliche Intelligenz. Methoden und Anwendungen. BI Wissenschaftsverlag, Mannheim, 1993.

Huhns, M. N., Singh, M. P. (eds.): Readings in Agents. Morgan Kaufmann Publ., San Francisco, 1998

Examination: to be announced

Lecturer: Dr. J. Zeidler, Dipl.-Inf. H. Langer

KI Logic Programming
S 2-0-0

3 cr

By using the programming language PROLOG, we will introduce to logic programming. The contents are

- facts, rules, queries
- data bases in PROLOG
- lists and recursive data structures
- operators
- programming techniques
- system predicates
- nontrivial examples
- definite clause grammars
- constraints in logic programming

This course is offered every two years (next time in WS 2002). A manuscript can be obtained via WWW.

Prerequisites: basic studies in computer science

Literature: Weisweber, W.: PROLOG - Logische Programmierung in der Praxis, International Thomson Publishing Company, 1997

Examination: to be announced

Lecturer: Dr. J. Steinmüller

KI Image Processing
S 2-1-0

4.5 cr

This course introduces into image processing. In particular, we will use tools and techniques from Artificial Intelligence. We will focus on understanding images. There will be exercises accompanying this course. In general, no prerequisites from other courses are needed. This course is also suitable for students from other faculties. Main topics are

- overview
- basics of digital image processing
- image preprocessing

- image segmentation
- characteristics of objects
- object recognition
- three-dimensional image interpretation

Prerequisites: basic studies in computer science

Literature: Bässmann, Kreyss: Bildverarbeitung Ad Oculos, Springer 1998
 Klette, Koschan, Schlüns: Computer Vision, Vieweg 1996
 Mallot: Sehen und die Verarbeitung visueller Informationen, Vieweg 1998
 more information can be found here:
www.tu-chemnitz.de/~stj/lehre/bildver.htm

Examination: oral or written

Lecturer: Dr. J. Steinmüller

KI Cognition **S 2-0-0**

3 cr

Cognition science considers processes which are considered as intelligent behaviour of humans. In particular, this is perception and processing of information, and thinking as well as problem solving. Results of cognition science are of increasing importance for robotics. In this course, we consider the basics and the methodology of cognition science, we present cognitive systems as information processing systems and we investigate thinking and problem solving.

Prerequisites: basic studies in computer science

Literature: G. Globus: The Postmodern Brain. John Benjamins Publ. Company, Amsterdam, 1995
 G. F. Luger: Cognitive Science. Academic Press, San Diego, 1994.
 P. Thagard: Kognitionswissenschaft, Klett-Cotta, Stuttgart, 1999.

Examination: oral

Lecturer: Prof. Dr. W.Dilger

KI Connectionistic Knowledge Processing **S 2-0-0**

3 cr

Connectionistic knowledge processing deals with representation and processing of knowledge in subsymbolic forms. The basic resource for this means are neural nets, which can learn certain contents from examples and reproduce them or use them to classify other examples. There is a wide range of neural nets with an equally wide range of applications. The course will present the most important types, from perceptrons to Hopfield-nets and self-organising maps, as well as different methods of training like monitored learning and their different applications.

Prerequisites: basic studies in computer science

Literature: R. Brause: Neuronale Netze. Eine Einführung in die Neuroinformatik. Teubner-Verlag, Stuttgart, 1995.
 T. Kohonen: Self-organizing maps. Springer, Berlin, 1997.
 R. Rojas: Neuronal Networks. A systematic introduction. Springer, Berlin, 1996.

Examination: oral

Lecturer: Prof. Dr. W.Dilger

KI Robotics **W 0-0-4**

6 cr

The practical training course deals with robot programming. Different types of robots are used (Rug warrior, Khepera, home-made-robots). The programming tasks concern different kinds of robot behaviour, route planning, object recognition and cooperation, among others.

Prerequisites: basic knowledge about Artificial Intelligence

Literature: Jones, Flynn: Mobile Roboter, Addison-Wesley, 1996

Further information can be found on:

www.tu-chemnitz.de/~stj/lehre/praktikum.htm

Examination: presentation

Lecturer: Prof Dr. W. Dilger, Prof. Dr. P. Protzel, Dr. J. Steinmüller, Dipl.-Ing. A. Galle

KI Data Mining
S 2-2-0

6 cr

This course gives an introduction to data mining, a young and promising discipline, placed in the centre between artificial intelligence, mathematical statistics and databases on the technical side, as well as database marketing and controlling on the economic side.

Different ways of data mining will be presented, as well as software tools, which are already in use. In addition, an overview about methods of explorative statistics and visualization of the results is given. A data-mining-process-model will be introduced in connection to practical examples.

Smaller data mining exercises will be given to the participants to be solved during the semester. All necessary tools are available as CD-ROM or via FTP.

Prerequisites: basic studies in computer science

Literature: to be announced

Examination: oral

Lecturer: Dr. M. Theß

IS Information Systems
S 2-0-0

3 cr

The course introduces methods which are needed to develop information systems. Methods of analyzing the requirements, of systems analysis and of the implementation will be discussed, based on examples. The importance of successful maintenance will be emphasized.

Prerequisites: basic studies in computer science

Literature: A. SÝ Ivberg, D. Kung: Information Systems: An Introduction; Springer, 1993

Examination: to be announced

Lecturer: Prof. Dr. P. Kroha

IS Software Engineering I
S 2-0-0

3 cr

- introduction into the problems of programming at large
- methods from engineering which turned out to be useful in the history of technologies
- product and process
- software as product
- properties of software products: correctness, reliability, robustness, etc.
- software development process and its phases
- structured analysis: data flow diagram, finite automata, synchronization, and petri nets
- object oriented analysis: cases of applications and scenaria, modelling with UML
- risk analysis
- specification
 - description and operational specification
 - formal specification: methods of logical specification, methods of algebraic specification
- design, interfaces of modules
- patterns and software architecture
- verification

- validation, testing, white-box testing, black-box testing, V-model, debugging
- testing of object-oriented applications
- testing of distributed applications

Prerequisites: basic studies in computer science

Literature: to be announced

Examination: to be announced

Lecturer: Prof. Dr. P. Kroha

IS Software Engineering II
W 2-0-0

3 cr

- design of a user interface
- process of software inspection
- process of software production, waterfall model, evolutionary model, incremental model, prototyping, transformation model, spiral model, software methodology
- configuration management, version management
- CASE management
- project management, methods of complexity estimation, methods and tools for time planning, economic efficiency of projects
- software metrics, function points, feature points
- software quality, ISO 9003, McCabe metric, design metric
- software evolution, problems of old software systems, reengineering
- advanced concepts in programming, generic programming, templates, generative programming, patterns, frameworks, meta programming, adaptive programming

Prerequisites: course Software Engineering I

Literature: to be announced

Examination: to be announced

Lecturer: Prof. Dr. P. Kroha

IS Information-Retrieval-Systems
W 2-0-0

3 cr

- introduction into processing of nonstructured data
- problems of libraries, problems of IRS
- relevance, descriptors and indexing, measurement in IRS, precision, recall, questions
- functionality of an IRS
- normalization, zoning, Ziph law, stemming, document and index database
- search possibilities of IRS, proximity, fuzzy search, thesaurus, concept representation of documents, representation of questions
- browsing, ranking
- standards ANSI/NISO
- manual and automatic indexing, lexicon, weighted indexing, vector system, concept indexing
- data structures for IRS, inverted file, stemming algorithm, hypertext, N-gram structure, PAT structure, signature file
- search algorithms, string search, Knuth-Morris-Pratt algorithm, Boyer-Moore algorithm, finite automata in IRS, Ahe-Carasick algorithm
- document clustering, KWOC, KWIC, KWAC, vector model of similarity, centroid
- data compression, Huffman coding, Ziv-Lempel coding, arithmetic coding
- evaluation of IRS

Prerequisites: none

Literature: to be announced

Examination: to be announced
Lecturer: Prof. Dr. P. Kroha

IS Seminar CASE-Tools
S 0-2-0

3 cr

In this seminar we investigate how the very first steps in the collection and specification of requirements during the software development process can be supported. The topics refer to three problems:

- properties of necessary methods and data structures
- programming of such a tool (in Java)
- application and experiments

CASE-tools, which are on the market nowadays, support the software development process only from the place on when diagrams (UML diagrams, data flow diagrams etc.) can be drawn. The very first phase, in which the requirements are collected during discussions with clients and experts, is not supported. However, it is known that just mistakes arising in this phase are the most expensive mistakes. Everything overlooked or misinterpreted in this phase must be expensively corrected later on. In most cases the analyst of the software company does not completely understand the client's desires, since he does not have profound knowledge in the special area of applications. The process is such that the client does not tell all his wishes and what he says is often inaccurate. The analyst does not fully understand the client and the things he understands are often interpreted in a way different from the client's intentions. Because of such misunderstanding, requirements are analyzed, which in fact were no requirements, and systems are implemented, which are of no use for the client.

Our solution of the problem, which is supported by the CASE-tool TESSI, forces the analyst to prepare from the beginning on a textual description of the requirements and to derive from these requirements an object oriented model (an UML base). When the analyst assumes that his interpretation of the model is correctly represented, he lets TESSI generate a text, which is automatically derived from the model. This text represents the analyst's interpretation. In addition, for the client he is understandable, something that diagrams and CASE-tools cannot guarantee. The client validates the text, i. e. he decides if the analyst's interpretation coincide with his own intentions. During this process, TESSI also generates metrics, which are able to help the analyst in order to estimate when the system will be finished and how much it will cost.

Prerequisites: course Software Engineering I
Literature: to be announced
Examination: to be announced
Lecturer: Prof. Dr. P. Kroha

IS Seminar Parallel Concepts Of Software-Engineering
S 0-2-0

3 cr

In this seminar we investigate how parallel and distributed processing can be used in order to support projects in software engineering. The topics refer to two subproblems:

- properties of an object oriented server in a parallel or distributed surrounding
- programming of such a server (with Beowulf-Linux, CORBA, AspectJ)

Prerequisites: basic studies in computer science
Literature: to be announced
Examination: to be announced
Lecturer: Prof. Dr. P. Kroha

IS CASE-Systems
W 0-0-4 6 cr

Participants will work with some selected tools in the area of CASE (Computer Aided Software

Engineering). The following systems are available:

- case/4/0 4.2
- objectiF 4.0
- Rational Rose 98i
- OTW 2.4 (object oriented)
- Microsoft Project 98 - project-management-tool

All participants have to give talks on the system they worked with.

Prerequisites: basic studies in computer science

Literature: to be announced

Examination: to be announced

Lecturer: L. Rosenhainer, MA.

RN Protocols And Management S 4-0-0

6 cr

Aim:

- knowledge of relevant protocol stacks and computer net solutions
- design of complex net solutions by combination of different technologies
- knowledge and evaluation of management aspects of computer nets

Contents:- subnet technologies: fast-/gigabit-ethernet, switching, ATM, SONET/SDH

- network levels: IP, routing, multicast, mobile IP, AoS/CoS, IPv6
- transport: TCP/UDP/RTP
- applications and their infrastructure
 - socket interface, DNS
 - FTP, SMTP/POP/IMAP, HTTP (WeSDAV)
 - network file systems (NFS, AFS, SMB)
 - folder systems (X.500, LDAP)
- network management (concepts, MIBs, SNMP, RMON)
- practical scenario

Prerequisites: course „Computer Networks“

Literature: nvs.informatik.tu-chemnitz.de/Vorlesungen/pm.html

Examination: to be announced

Lecturer: Prof. Dr. U. Hübner

RN Design Of Distributed Systems W 2-2-0

6 cr

- basics and concepts
- socket mechanisms (datagram/stream-communication)
- remote procedure call (RPC)
- design of clients, servers, gateways
- WWW enhancements (classification, applications server...)
- Java/TCL in distributed systems
- design and description techniques

Prerequisites: course „Computer Networks“ and „Protocols And Management“
Knowledge of C/C++, Java, TCL and systems functions

Literature:

Examination: oral

Lecturer: Prof. Dr. U. Hübner

**RN Multimedia-Networking-Practice
W 1-1-0****3 cr**

Aim:

- knowledge of processing and transfer of image and voice data
- introduction of components, architectures and algorithms in connection with the usage of time-dependent media
- consideration of technical aspects of networks for transferring multimedia data, especially in IP-networks

Contents:

- digital audio / coding
- digital video / coding
- streaming technologies, session management
- voice over IP
- specialties of packet-based digital speech transfer in IP-networks
- technical solutions used in industry
- multicast applications

Prerequisites: courses Computer Networks, Protocols and Management**Literature:** to be announced**Examination:** to be announced**Lecturer:** Dr. L. Wolf / Dipl.-Ing. Heik (computer center)**RN Computing Network Security
S 2-0-0****3 cr**

Aim:

- overview over typical threats of internet security
- knowledge of the functioning of relevant mechanisms to defend attacks
- experience in using publicly available security tools

Content:

- basics
- firewalls
- communications security
 - IP-security (IPSec)
 - virtual private networks (VPNs)
 - security of ppp-connections
 - security techniques of the transport level
 - security techniques of the application level
- WWW-security

Prerequisites: courses Computer Networks, Protocols and Management, Data protection & Data security**Literature:** rnvs.informatik.tu-chemnitz.de/Vorlesungen/rs.html**Examination:** to be announced**Lecturer:** Prof. Dr. U. Hübner / Dipl.-Inf. H. Trapp**RN Computer Networks In Practice
W 0-0-4****6 cr**

Students will gain experience with different network technologies

- TCP/IP via ethernet
- modems

- routers and repeaters
- protocol analysis
- DNS
- network file systems (NFS, SMB)
- NIS/YP
- e-mail
- point-to-point protocol (PPP)
- GIGABIT-Ethernet

Prerequisites: UNIX, courses „computer networks” and „Protocols and Management”

Literature: mvs.informatik.tu-chemnitz.de/Praktikum/Rechnernetze/Prakueber.html

Examination: to be announced

Lecturer: Dr. J. Anders

RN Principles Of Systems Administration **S 2-2-0**

6 cr

Usage of computers is strongly connected with tasks in systems and networks administration. Knowledge on installations and configuration of single hard and software components is absolutely necessary to fulfill administrative tasks, but not sufficient for the management of installations. The approach to solving arising problems in systems and networks management is usually independent of the applied hard and software. Important criteria are efficiency, systematics, scalability and sustainability.

This class gives some knowledge of techniques, principles and strategies to solve problems arising in administration tasks. In particular, we will consider principles of systems administration and the application of these techniques.

Prerequisites: courses Computer Networks, Protocols and Management
knowledge of Unix- and Windows-installations

Literature: to be announced

Examination: to be announced

Lecturer: Dipl.-Math. M. Clauß, Dipl.-Inf. T. Müller, Dipl.-Ing. C. Ziegler, Prof. Dr. U. Hübner

RN Programming In C/C++ **S 2-2-0**

6 cr

Aim:

- introduction to concepts and techniques of object-oriented programming
- introduction to procedural programming using C
- introduction to object-oriented programming using C++
- introduction to contents and usage of constructs and extensions of programming languages
- good knowledge of C and C++

Contents:

- basics on compilers
- introduction to procedural programming using C
 - basics
 - sequential control
 - data types, type conversion
 - operators, functions
 - standard I/O library
- introduction to object-oriented programming using C++
 - data types
 - polymorphism
 - programming constructs (templates, namespaces)

- error handling
- I/O using streams
- Standard Template Library (STL) - introduction

Prerequisites: basic studies in computer science

Literature: to be announced

Examination: oral or written

Lecturer: Prof. Dr. U. Hübner, Dipl.-Inf. M. Becher

RS Modelling And Design Methodology Of Embedded Systems
S 2-2-0

6 cr

The design of embedded systems takes place according to a homogeneous methodology. This methodology is fundamentally different from the methods which are used for the design of hardware and/or software. This course presents a general systematics of specification and the computer-aided design of embedded systems and related tools. Emphases are the implementation independent specification, the refinement of the demands on the system, the transformation of the specification into a simulatable model, the decomposition into components, and the transformation of the specification into an algorithmic behavioural description which is used as implementation basis. The treated languages are mainly graphically oriented and include higher design languages. Already acquired VHDL knowledge is deepened.

Prerequisites: basic studies in computer science

Literature: D. D. Gajski et al.: Specification and Design of Embedded Systems. Prentice Hall. 1994.

Teich: Digitale Hardware/Software-Systeme. Synthese u. Optimierung. Springer Verlag, 1997.

Examination: oral

Lecturer: Prof. Dr. D. Monjau

RS Implementation, Verification And Evaluation Of Embedded Systems
W 2-2-0

6 cr

The lecture continues the lecture "Modelling And Design Methodology Of Embedded Systems". Methods for the design of embedded systems, their verification and the evaluation of design variants are treated. Among the design methods, the emphasis is on high-level design techniques. The correct functioning of a system presupposes its fault-free design. Therefore, formal verification is introduced.

Prerequisites: basic studies in computer science, course „Modelling and Design Methodology of Embedded Systems“

Literature: J. Teich: Digitale Hardware/Software-Systeme. Springer Verlag 1997.

D. Gajski et al.: Specification and Design of Embedded Systems. PTR Prentice Hall.

R. Niemann: Hardware/Software Co-Design for Data Flow Dominated Embedded Systems, Kluwer Academic Publishers 1998.

M Keating, P. Bricaud: Reuse Methodology Manual for System-on-a-Chip Design. Second Edition. Kluwer Academic Publishers 1999

J. O. Hamblen, M. D. Furman: Rapid Prototyping of Digital Systems. Kluwer Academic Publishers 2000

Examination: oral

Lecturer: Prof. Dr. D. Monjau

RS Reliability And Diagnosis Of Digital Logic Systems
S 2-0-0

3 cr

This lecture treats procedures for the ensurance of the reliability of digital logic systems. As an

introduction, the quantitative definition of reliability as well as structural measures for its improvement (redundancy) are discussed. Subsequently, test methods are considered in detail. Starting from real fault mechanisms, mathematical and algorithmic basics of test generation are introduced and deepened by means of examples. Principles of the design for testability and alternative test methods are demonstrated. Finally, methods for the design of fault-tolerant systems are presented.

Prerequisites: basic studies in computer science, course „System Design Tools“

Literature: to be announced

Examination: oral

Lecturer: Dr. B. Naumann

RS System-Design-Tools
W 2-2-0

6 cr

The lecture is an introduction into modern methods and tools for design and analysis of highly integrated microelectronic circuits (VLSI). An overview over the design process and the design methods as well as the tools and methods for CAD of integrated circuits is provided. Schematic entry, simulation and fault simulation are treated with the aid of a real CAD system. An introduction is given to the practical use of the CAD system.

Prerequisites: basic studies in computer science

Literature: scriptum

Examination: oral

Lecturer: Dr. B. Naumann

RA Cluster- And Gridcomputing
S 2-2-0

6 cr

Introduction to cluster- and gridcomputing as modern forms of parallel processing

- clustercomputing: terms, concepts, environments
- cluster architectures: Uni/SMP-Cluster, message-pass./distr.shared-memory-systems
- system area networks (SANs): examples Myrinet, SCI
- introduction to message-passing programming with MPI
- introduction to (distributed)shared-memory (DSM)-programming with OpenMP (Threads)
- GRID computing (example GLOBUS-system)

Prerequisites: course Computer architecture

Literature: R. Buyya: High-Performance Cluster-Computing Vol. 1,2, Prentice Hall PTR, 1999.

David HM Spector: Building Linux Clusters, O'REILLY & Associates Inc., 2000.

K. Hwang, Z. Xu: Scalable Parallel Computing, McGraw Hill, Boston, 1998.

C. J. Northropp: Programming with UNIX Threads, J. Wiley&Sons, New York 1996.

I. Foster: The GRID: Blueprint for a new Computing Infrastructure, Morgan Kaufmann P., 1988

Examination: oral

Lecturer: Prof. Dr. W. Rehm

RA Practical Course Cluster- And Gridcomputing
S 0-0-4

6 cr

This practical course deals with programming and configuration of clusters as well as the introduction to relevant tools.

There will be different experiments to be carried out by the students.

Aim:

- good knowledge of configuration and programming basics of clusters

- knowledge of relevant tools

Prerequisites: course Cluster- And Gridcomputing

Literature: instructions to each experiment

Examination: to be announced

Lecturer: Prof. Dr. W. Rehm, Dipl.-Inf. D. Balkanski, Dipl.-Inf. M. Trams

RA Seminar Cluster- And Gridcomputing
S 0-2-0

3 cr

In this course different areas of cluster computing are introduced. Students select one and have to prepare a presentation about their topic. An essay of about ten pages has to be handed in as a supplement.

Aim:

Introduction to different problems concerning cluster/grid/P2P-computing and being able to give a compact and precise summary in oral and written form.

Prerequisites: course Cluster- And Gridcomputing

Literature: R. Buyya: High-Performance Cluster Computing Vol.1, 2, Prentice Hall PTR, 1999.

I. Foster: The GRID: Blueprint for a new Computing Infrastructure, Morgan Kaufmann P., 1988.

D. Moore, J. Hebel: Peer to Peer: A Beginners Guide. MacGraw Hill, 2001

Examination: to be announced

Lecturer: Prof. Dr. W. Rehm

3. Secondary Subjects

At the beginning of their studies, students of computer science choose a secondary subject, which they normally retain over the entire duration of studies. ECTS students are not restricted to this arrangement. Depending on their prior knowledge, they may participate in the courses listed below.

- Applied mechanics
 - courses of the main subject „solid state mechanics”
 - courses of the main subject „Engine dynamics”
- Methods of production
 - courses of the main subject „Production process organization”
- Factory systems
 - Technical management and ergonomics
 - courses of the main subject „Factory planning/factory management” and „Human factors of work”
- Production measurement techniques and quality assurance
 - courses of the main subject „Production measurement techniques and quality protection”
- Electronics
 - System design tools
 - Electrical design automation
 - Electrical design
 - ASIC design
- Mathematics
 - Analysis
 - Ordinary differential equations
 - Complex analysis
 - Introduction to partial differential equations
 - Algebraic and discrete structures
 - Logics and set theory
 - Applied algebra
 - Geometry
 - Differential geometry
 - Algorithmic geometry
 - Stochastics
 - Stochastics
 - Mathematical statistics
 - Random functions
 - Statistical information theory
 - Practical mathematics
 - Computer algebra
 - Numerical methods of linear algebra
 - Parallel algorithms of numerical mathematics
 - Mathematical basics of computer geometry
 - Optimization
 - Optimization I
 - Optimization on nets
 - Game theory
 - Optimization II (nonlinear Optimization)
- Business administration
 - Distribution and marketing
 - Personal management
 - Financing
 - Investment planning
 - Cost and efficiency accounting
 - Production economy
 - Basics of organization and personal management

- Basics of civil law
- Commercial and company law
- Vocational and economic education
 - Teaching and learning in professional education
 - Legal basics
 - Media education
 - Diagnostics of professional education, evaluation and consulting
 - Organization of personnel management, education marketing, company culture and qualification in medium and small enterprises
- Operations Research
 - Linear optimization and supplements
 - Multi-goal optimization
 - Logistics/transport problems
 - Integer optimization
 - Sequence problems
 - Stochastic models and evaluation of complex systems
 - Optimization on nets
 - Dynamic optimization/inventory accounting
 - Multi-level optimization
 - Game theory
 - Discrete simulation
 - Markov's decision models
 - Mathematical models for discrete production processes
- Environmental technology
 - Basics of meteorology and spreading of harmful substances
 - Environmental protection technology
 - Regenerative (alternative) sources of energy
 - Environmental protection apparatus
 - Environmental technology (measurement procedures)
 - Environmental law
- English in everyday life and for specialized communication
 - Lectures in cultural studies
 - British/American cultural studies
 - Academic discourse
 - Individual projects
- Psychology
 - Industrial psychology
 - Organization psychology
 - Seminar „General or educational psychology“
 - Seminar „Social psychology“
 - Seminar „Industrial psychology“
 - Optional lecture from the lecture list of psychology
- Polygraphical technology
 - Methods of printing preliminary stage II
 - Methods and engines for processing of printing materials
 - Process organization
 - Planning and operation of printing plants
 - Typography and operation of printing plants
 - Typography and organization
 - Medium engineering
 - Process measurement in polygraphy