Master of Science in Communications Engineering Program (MSCE)

How to get a fair share of the brains of the world?

8 years of experience with international recruiting.

International Graduate Program at TUM:
Master of Science in Communications Engineering
1998-2005

MSCE Program –The Intention

- Two-year high-level post-graduate program leading to the academic degree

  Master of Science in Communications Engineering (M.Sc.),

  which allows to continue towards a PhD or Dr.-Ing.
- Designed for international students to make them acquainted with German culture, scientific and industrial world
- Taught 100% in English

- Started 1998 as one of the first International Master Programs
- Since expansion in 2005 MSCE offers two specializations:

  Communications Systems and Communications Electronics

Admission Requirements

- **Bachelor of Science (B.Sc.) or Bachelor of Engineering (B.E.)**
  - **Electrical Engineering**
  - **Information Technology**
  - **Computational Science …**

- **Sufficient knowledge of English Language**
  - **TOEFL ≥ 220 (computer)**
  - **IELTS ≥ 6.0**
  - **Cambridge EFL ≥ CPE (Certificate of Proficiency in English)**
  - **Or native speaker**

Application Package - Requirements

- Application Deadline March 15th

- Online application form
- 2 letters of recommendation by professors, certifying that the student is at least in the top 10% of his class
- Degree certificate (certified translation)
- Academic records - transcripts (certified translation)
- Curriculum Vitae - resumé
- TOEFL certificate (obligatory), GRE scores (optional)
- Phone interview invitation (April)
- Final decision (End of April)

Application Process (typical numbers per year)

- 500-600 electronic applications
- First electronic evaluation
- Students receive an assessment about their chances of admission
  - Good
  - Average
  - Weak
- 300 paper applications
- 120 telephone interviews
- 50 offers made
- 35 accept
- 33 graduate after 2 years (~95 % success rate)

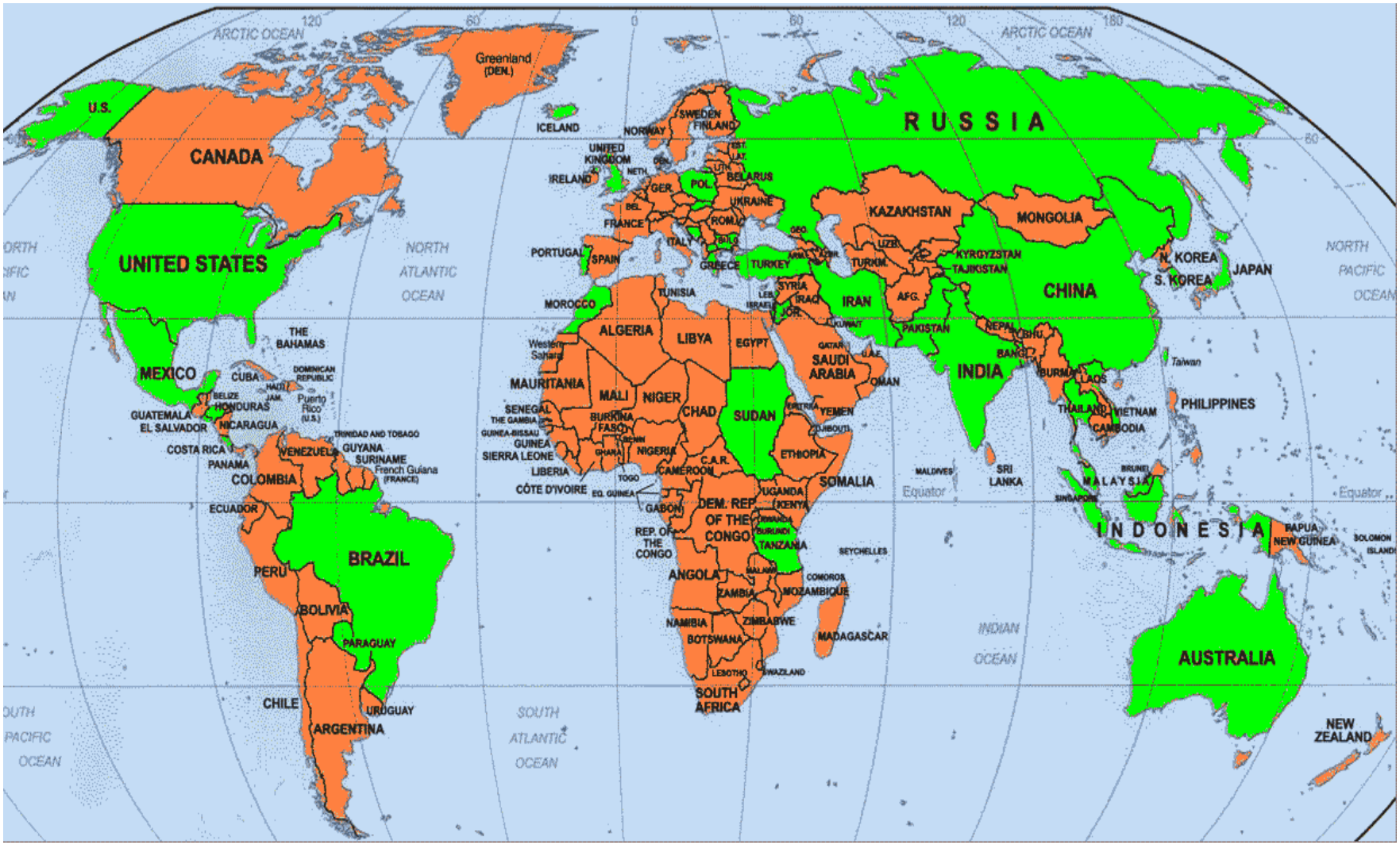
MSCE Students (1998-today)

China	61
Lebanon	34
India	29
Pakistan	17
Greece	14
Indonesia	9
Turkey	9
Brazil	7
Vietnam	7
Bangladesh	5
Mexico	5
Thailand	5
Bulgaria	3
Korea	3
Russia	3
Morocco	3
Israel	2
Malaysia	2
Portugal	2
Sudan	2
Slovakia	2

Japan	2
Australia	1
Colombia	1
Costa Rica	1
El Salvador	1
Finland	1
Honduras	1
Hong Kong	1
Iceland	1
Iran	1
Italy	1
Jordan	1
Malta	1
Poland	1
Serbia	1
Singapore	1
Taiwan	1
Tunis	1
USA	1

Total:	**244**

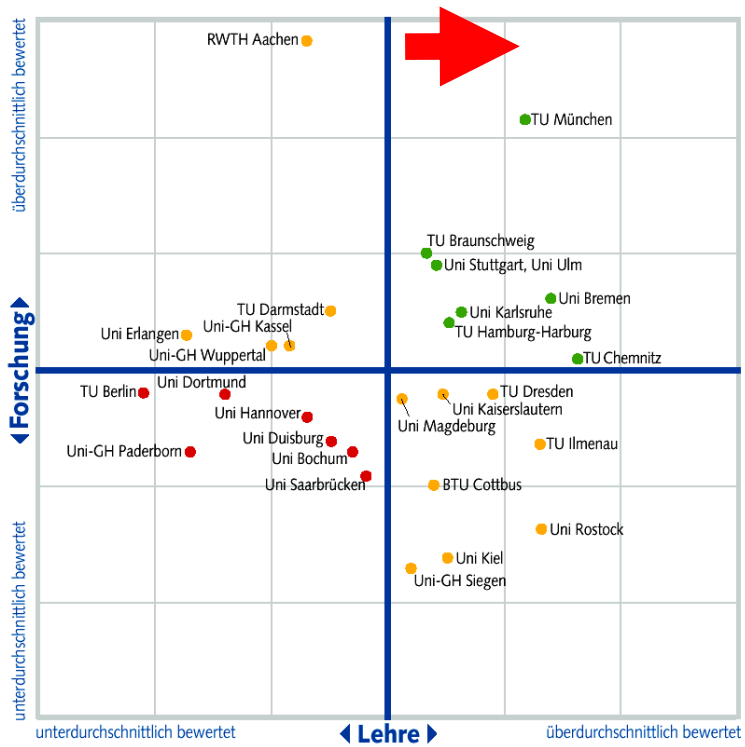
MSCE students (1998-today) 40 countries



Marketing Strategies
(in decreasing order of importance)

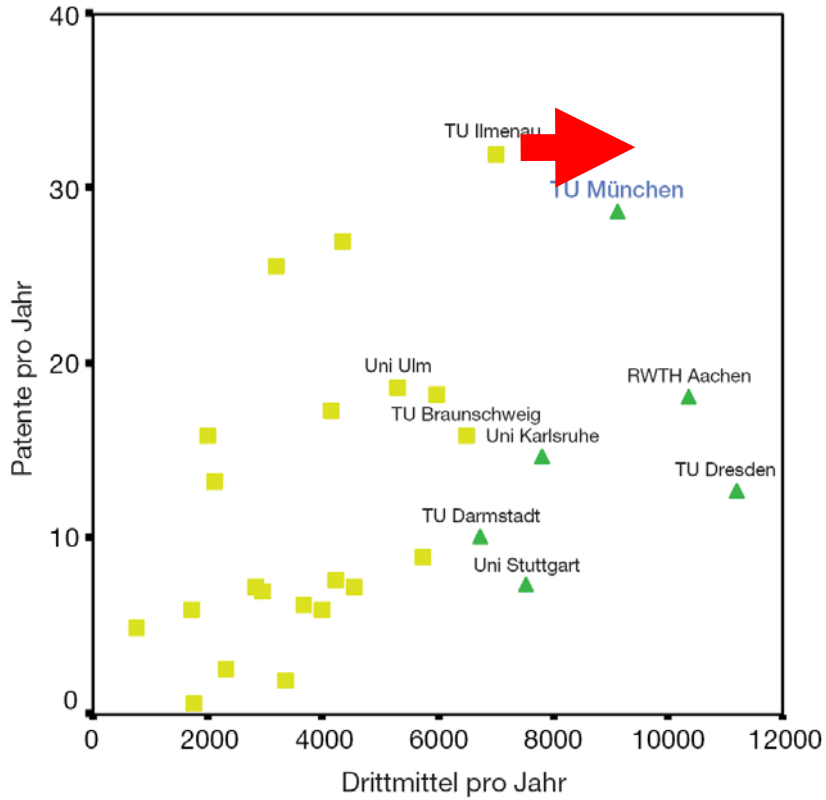
- Each year 200 personal letters with information packages (poster, flyers) sent to leading professors at leading target universities
- Alumni and students recommend MSCE at their home universities
- Visits to leading universities by program manager and assistant program manager
- DAAD booklet, German embassies
- WWW page

Marketing: Ranking of TUM - Electrical Engineering



research

teaching



patents

ext. funding

MSCE Program - Structure

1. Year

Semester 1 (Mid Oct. to Mid Feb.)
Final Exams of Semester 1 (End of Feb.)
Spring Break / **German Lang. Course** (March - Mid April)
Semester 2 (End of April through July)
Final Exams of Semester 2 (End of July)

Industry Internship - 10 weeks (Aug. to Mid Oct.)

2. Year

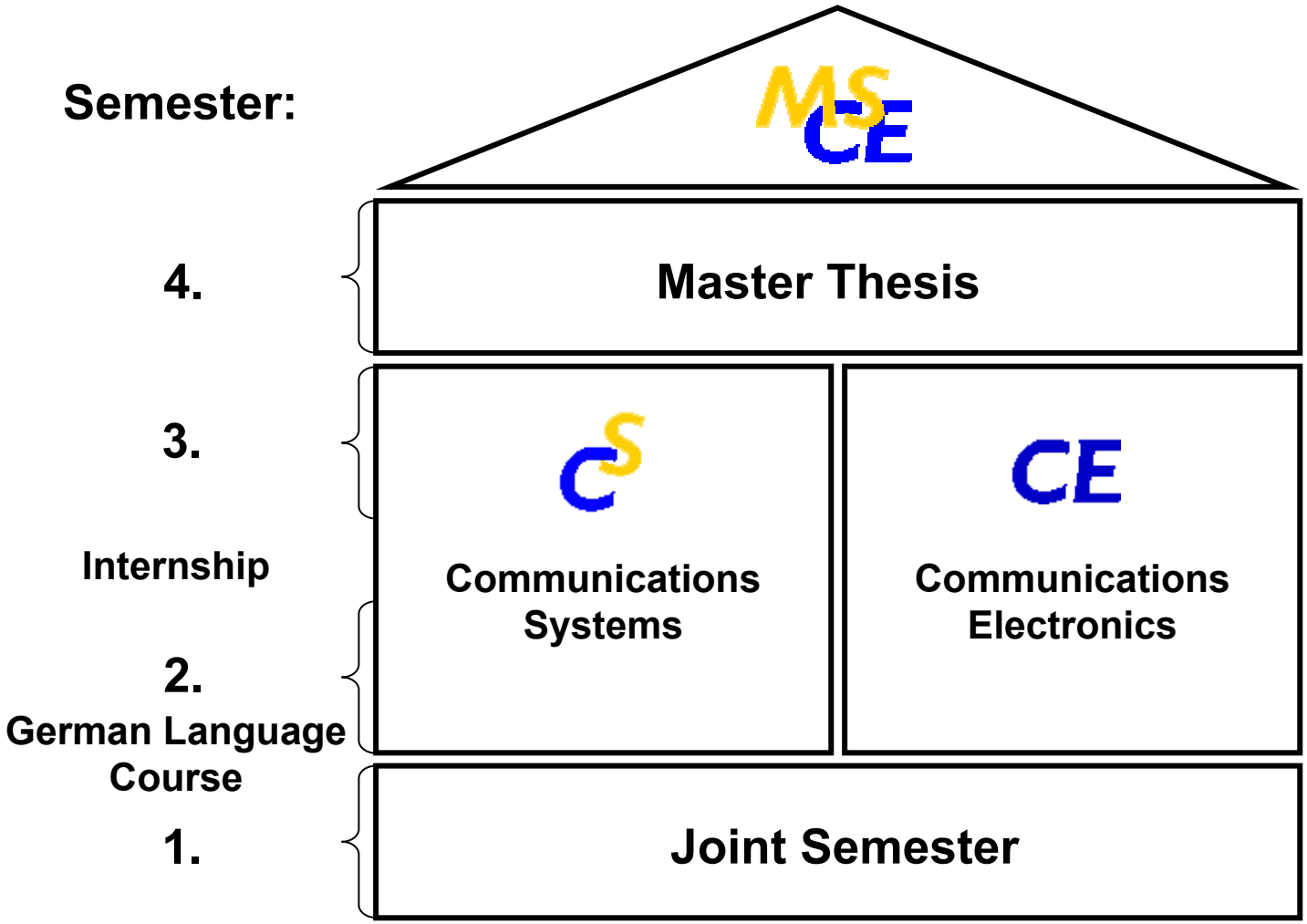
Semester 3 (Mid Oct. to Mid Feb.)
Final Exams of Semester 3 (End of Feb.)
Master's Thesis - 6 months (March thru Sept.)
Graduation (Mid Oct.)

95% of the beginners graduate in the shortest possible time (24 months)

MSCE Program – Offered Specializations

- **Communications Systems (Prof. Joachim Hagenauer)**
  - **System Aspects of Communications Technology**
- **Communications Electronics (Prof. Ulf Schlichtmann)**
  - **Aspects of Hardware Implementation, IC Design**

MSCE Program – Specializations



Visiting Professors
teach in the second semester

´99	Prof. John G. Proakis	Northeastern University
	Prof. Stephen B. Wicker	Cornell University
´00 ´01	Prof. Ruey-Wen Liu	University of Notre Dame
	Prof. Jerzy Rozenblit	University of Arizona
´02	Prof. John G. Proakis	Northeastern University
	Prof. Daniel J. Costello	University of Notre Dame
´03	Prof. Thomas Kailath	Stanford University
	Prof. de Wilde	University Delft
´04	Prof. Ezio Biglieri	Torino, UCLA
	Prof. Gershman	McMaster University Canada
´05	Prof. Daniel J. Costello	University of Notre Dame
	Prof. Raymond Yeung	Chinese Univ. of Hongkong
´06	Prof. Max Costa	Campinas, Brazil
	Prof. Wayne D. Grover	Univ. of Alberta, Canada
	Prof. Paolo Ienne	EPFL, Lausanne

Industry Professors teach in the third semester

- Prof. Kaup, Siemens Research, Univ. Erlangen
- Prof. Feicht, Siemens Networks
- Prof. Yang, Infineon
- Dr. Obradovic, Siemens Research
- Dr. Seeger, European Patent Office
- Dr. Kirstaedter, Siemens Research

Social Life

- Airport pickup
- Welcome reception
- Housing service
- Day of Electrical Engineering and Information Technology
- Graduation Ceremony
- Annual Yearbook
- Alumni Association
- Student Union
- Sports Activities (Football Match)
- ...

Financial Issues

- Online Application, No Application Fee
- Tuition Fee: 3.000 €/year
  - Many partial and full grants available from our industry partners
  - Up to now all admitted students received a tuition grant from industry or department
- Living Expenses: 750 €/month
  - Grants from DAAD (German Academic Exchange Service)
  - Partial industry partner scholarships (e.g. Siemens Youth & Knowledge)
- Additional Financing Possibilities
  - Paid internship
  - Industry projects
  - Student jobs
  - Student research grants
- Income from Industry Tuition Fee Grants: 90.000 € per year
  - No state or public (DAAD, etc) subsidies used
- Program Costs: guest professors, marketing, welcome service, graduation

MSCE Sponsors from German Industry

- Siemens
- Infineon Technologies
- Comneon
- Rohde & Schwarz
- Deutsche Telekom
- Vodafone
- Texas Instruments
- Ericsson
- O2
- …

What our students value most?

- High Quality of Education
- Close Cooperation with German Industry
- Intensive Support from the MSCE Team
- Events and Student Activities
- Traveling and Tourism Opportunities

What our students like:

Some students' statements from the yearbook

About the program

- Attending this elite Master course has been one of the best experiences I have had. It offered lectures by German high-profile professors, international well-known professors, Siemens' experienced engineers
- The MSCE program has given me more than just an education, it has given me the experience of a lifetime
- I came to Munich to pursue a Master degree in MSCE and also to be closer to my favorite football stars
- I took complete advantage of being in this High-Tech city where I worked with Infineon the first year and Rohde & Schwarz the second year
- I liked the very friendly and warm hearted people of the South

What our students like:

Some students' statements from the yearbook

About Friendship

- Learn German!! It will surely make your stay more enjoyable.
- I think that the best point in the MSCE program is bringing these students from different cultures and putting them together in a beautiful city and a High-Tech center
- The opportunity to meet so many people from all over the world created an incredible cultural diversity.
- It was fun playing the game of Cricket on German soil, where everyone wants to play Soccer.
- a Bulgarian-Lebanese-Greek-Palestinian-Chinese-..... lifetime friendship and priceless experience and knowledge.

MSCE: Alumni Tracking

Year	Graduates Number	Industry Germany	Industry other	PhD Germany	PhD other	In transition
2000	24	11	4	5	0	4
2001	20	8	2	5	1	4
2002	33	7	13	3	6	4
2003	34	6	10	5	4	9
2004	25	4	4	4	2	11
2005	27	5	3	5	1	13
Total	163	41	36	27	14	45

The MSCE Program: Plus and Minus

- Up to 700 applications for 35 positions, 175 students in 5 years
- ~95 % success rate = successful graduates in shortest possible time
- The selection and monitoring procedures worked well
- Top guest professors from foreign universities and industry
- Dedicated staff from TUM (extra work without extra pay and without extra funding from public sources)
- International programs enhance visibility of the department
- Students are very well received by the Industry (20 graduates out of 24 stayed initially in Germany (PhD and green card employees)

- Wissenschaftsministerium did not allow tuition fees
- With less resources the department cannot handle this extra workload
- More industry tuition grants are needed

MSCE Graduates 1998-2005

China	36
India	23
Lebanon	22
Greece	11
Indonesia	9
Brazil	6
Vietnam	6
Mexico	5
Bangladesh	4
Pakistan	4
Thailand	4
Turkey	4
Bulgaria	3
Korea	3
Portugal	2
Israel	2

Australia Costa Rica Honduras Hong Kong Iceland Iran Japan Jordan Malaysia Malta Morocco Poland Serbia Singapore Slovakia Sudan Taiwan Tunisia USA	Each 1

Total:	**163**

Mandatory Lectures: 1st Semester

Information Theory and Source Coding
Digital IC Design
Broadband Communication Networks
Adaptive and Array Signal Processing
Engineering Management

Mandatory Lectures: 2nd Semester

Communications Systems

Channel Coding
Advanced Topics in Signal Processing
Advanced Topics in Communications Engineering

Communications Electronics

Electronic Design Automation
System on Chip Solutions in Networking
Advanced Topics in IC Design

Mandatory Lectures: 3rd Semester

Communications Systems
Realtime Systems
System Aspects in Signal Processing
System Aspects in Communications

Communications Electronics
Testing of Digital Circuits
Analog/Mixed Signal IC Design
Aspects in Integrated System Technology and Design

Seminar on Topics in Communications Engineering
or
Seminar on Topics in Signal Processing

Seminar on Topics in Integrated System Design
or
Seminar on Topics in Integrated System Technology

Labs (2 must be chosen)

Communications Systems

Communication Networks Lab
SDL Based System Design Lab
Software Engineering Lab
Simulation of Optical Communication Systems Lab
Digital Signal Processing Lab
Image & Video Compression Lab

Communications Electronics

VLSI Design Lab
Analog IC Design Lab
Project Lab IC Design

Common Labs

Communications Lab
HDL Design Lab

Electives (4 must be chosen)

Communications Systems

Mobile Communications
Electronic Design Automation
Image and Video Compression
Multimedia Communications
Pattern Recognition
Satellite Navigation II
Simulation of Comm. Networks
Optical Comm. Systems
Cryptography and System Security
Resource Management in Wireless Networks
Satellite Navigation
MIMO Systems

Communications Electronics

Mathematical Methods of IT
Advanced MOSFETs and Novel Devices
Hardware/Software Co-Design
Image and Video Compression
Nanoelectronics
Physical Electronics
IC Manufacturing
MIMO Systems
Realtime Systems
Mobile Communications
Nanotechnology