Welcome and Information Meeting
Master’s Program
Nanoelectronic Systems (NES)

Dresden, 08 October 2019
Welcome and general information

Get to know each other

Useful information for your studies
Welcome by dean of studies

Prof. Dr.-Ing. Thomas Mikolajick
Initiated by Cool Silicon cluster

Cool Silicon: Leading-Edge Cluster with the goal of energy efficiency in the information and communications technology (ICT) sector
Nanoelectronics in Saxony

Technology
- GLOBALFOUNDRIES
- Infineon
- X-FAB
- ...

Design
- IDT (former ZMDI)
- DMOS GmbH
- Productivity Engineering GmbH
- ...

Silicon Saxony
- 2,300 companies with about 60,000 employees
- among them more than 300 companies with about 20,000 employees active in microelectronics
- 4 billion Euros revenue
- Training/Research:
  - 4 Universities,
  - 5 Universities of Applied Sciences,
  - 9 Fraunhofer-, 3 Leibniz-, 2 Max-Planck-Institutes, and 1 Helmholtz-Center

Applications
- TechniSat
- National Instruments (former Signalion)
- ...

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Nanoelectronics in research

"Advancing Electronics"

- New perspectives for modern electronics
- Overcoming the CMOS bottlenecks with complementary technologies

Expertise:
- Physics
- Chemistry
- Biology
- Mathematics
- Engineering and natural sciences
Nanoelectronics at TU Dresden

- **Micro-, Opto- and Nanoelectronics** is one research focus of TU Dresden

- **Faculty of Electrical and Computer Engineering**
  - one of the oldest faculties for electrical engineering in Europe
  - one of the largest faculties for electrical engineering in Germany
  - Prof. Barkhausen was the founder of the first Low Power Technology Institute

- **Institute of Semiconductors and Microsystems (IHM)**
  - 411 m² Clean Room Laboratory (built 2006, extended 2013)
  - NaMLab gGmbH (2009)

- **Institute for Applied Physics** (Photo Physics, Semiconductor Physics)

- **Institute for Material Science**
Faculty of Electrical and Computer Engineering

Faculty Facts
- 28 full professors
- 4 junior professors
- 420 PhD Students
- 400 scientific employees
- 2,300 Students
- approx. 25 million Euro third party funding every year

Research Fields
- Automation, Measurement & Control
- Communications Engineering
- Electrical Power Engineering
- Electromechanical and Biomedical Systems
- Information Electronics
- Micro-Opto-Nano Electronics
Faculty of Electrical and Computer Engineering

Scientific and research oriented education

Guided study entry

High School Abitur

Diploma Programs
Dipl.-Ing. ET, MT, IST, RES
10 semesters

Bachelor

research oriented
Master's Program
M.Sc. NES
4 semesters

Diploma, Master

Structured PhD Program
Dr.-Ing.
3 years
Welcome and general information

Get to know each other

Useful information for your studies
Get to know each other

**Sort by given name**

- Short information about your person (name, age, family, hobbies...)

**Sort by distance of your home town from the TU Dresden**

- Where do you come from?
- Why did you come to Dresden?
- What did you do before (School, Studying, Work)?

**What is your interest in the master’s program?**

- What is your motivation for studying Nanoelectronic Systems?
- What is your main interest?
NES student mentoring program
Welcome and general information

Get to know each other

Useful information for your studies
Orientation on TUD main campus

- Examination office
- Academic advisor
- Student body (FSRET)

Buildings
- APB Andreas Pfitzmann-Bau
- BAR Barkhausen-Bau
- GÖR Görges-Bau
- HSZ Hörsaalzentrum
- MIE Mierdel-Bau
- SCH Georg Schuhmann-Bau

https://navigator.tu-dresden.de/
Important dates of the academic year

Winter Semester 2019/2020

01.10.2019 - 31.03.2020

  06.01.2020 - 08.02.2020

• Lecture-free periods and bank holidays:
  31.10.2019            Reformation Day
  20.11.2019            Day of Prayer and Repentance
  22.12.2019 - 05.01.2020  Turn of the year
  10.02.2020 - 31.03.2020  Lecture-free period

• Main exam period: 10.02.2020 – 07.03.2020
## Time system

<table>
<thead>
<tr>
<th>Day</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Double Session (Doppelstunde DS)</strong></td>
<td><strong>Semester periods per week</strong> (Semesterwochenstunden, SWS)</td>
</tr>
</tbody>
</table>
| 1. DS: 07:30 - 09:00 | **1 SWS = 45 minutes**  
| 2. DS: 09:20 - 10:50 | **1 DS = 2 SWS = 90 minutes**  
| 3. DS: 11:10 - 12:40 | **Example:**  
| 4. DS: 13:00 - 14:30 | **Memory Technology (4/0/2/0/0)**  
| 5. DS: 14:50 - 16:20 | **4 SWS** Lecture (Vorlesung, V)  
| 6. DS: 16:40 - 18:10 | **0 SWS** Tutorial (Übung, Ü)  
| 7. DS: 18:30 - 20:00 | **2 SWS** Seminar (Seminar, Se)  
| 8. DS: 20:20 - 21:50 | **0 SWS** Language course (Sprachkurs, Sp)  
| | **0 SWS** Lab Course (Praktikum, P) |
Time system

**Week**

- Odd calendar week (1\textsuperscript{st} week or 1. Kalenderwoche or 1. KW)
- Even calendar week (2\textsuperscript{nd} week or 2. Kalenderwoche or 2. KW)

  \[\rightarrow\] 42\textsuperscript{nd} calendar week = even calendar week (2\textsuperscript{nd} week)

**Example**

*NES-12 12 01-14.1 Materials for Nanoelectronics and Vacuum Technology (4 0 1 0 0)*

Materials for Nanoelectronics (2 0 1 0 0) | Vacuum Technology (2 0 0 0 0)

1 lecture every week

1 lab course every two weeks

1 lecture every week
How to get your schedule

- Schedule provided by the faculty for all study courses (German version!)
  
  www.tu-dresden.de/et → Studies → Studying at the Faculty → Courses → Timetables → EuIMN-1-01

- Schedule provided by NES study course (English version!)
  
  www.tu-dresden.de/et → Studies → Studying at the Faculty → Study Programmes → Nanoelectronic Systems → Students
<table>
<thead>
<tr>
<th>Time/Day</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 SG</td>
<td></td>
<td>E: German Language and Culture</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7:30 - 9:00</td>
<td>TUDIAS</td>
<td>Kunter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 SG</td>
<td>P: Materials for Nanoelectronics</td>
<td>L: Principles of Dependable Systems</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9:20 - 10:50</td>
<td>Kunter</td>
<td>Kunter</td>
<td>Farber</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 SG</td>
<td>L: Systems Engineering I</td>
<td>L: Materials for Nanoelectronics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 SG</td>
<td>P: Materials for Nanoelectronics</td>
<td>L: Semiconductor Technology</td>
<td>E: Stochastic Signals and Systems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15:00 - 16:30</td>
<td>Kunter</td>
<td>L: Semiconductor Technology</td>
<td>E: Principles of Dependable Systems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 SG</td>
<td>L: Stochastic Signals and Systems</td>
<td>E: Stochastic Signals and Systems</td>
<td>P: RobotLab</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14:50 - 16:20</td>
<td>Kunter</td>
<td>Kunter</td>
<td>Farber</td>
<td>NES-11 08-14.1: Stochastic Signals and Systems</td>
<td></td>
</tr>
</tbody>
</table>

The timetable is subject to change!

Date: 1st October, 2019

<table>
<thead>
<tr>
<th>Mandatory Modules</th>
</tr>
</thead>
<tbody>
<tr>
<td>NES-11 06.01 Lab Sessions</td>
</tr>
<tr>
<td>NES-11 06.02 Principles of Dependable Systems</td>
</tr>
<tr>
<td>NES-11 10.01 Fundamentals of Estimation and Detection</td>
</tr>
<tr>
<td>NES-12 12.02 Semiconductor Technology</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Elective Modules</th>
</tr>
</thead>
<tbody>
<tr>
<td>NES-10 GLC 14.1 German Language and Culture</td>
</tr>
<tr>
<td>NES-11 06.09 14.1 Distributed Systems Engineering</td>
</tr>
<tr>
<td>NES-13 06.01 14.1 Stochastic Signals and Systems</td>
</tr>
<tr>
<td>NES-12 12 01-14.1 Materials for Nanoelectronics and Vacuum Technology</td>
</tr>
<tr>
<td>NES-15 10 20 Hardware Modeling and Simulation</td>
</tr>
</tbody>
</table>
## Curriculum – compulsory modules

<table>
<thead>
<tr>
<th>Compulsory Modules</th>
<th>1st Sem.</th>
<th>2nd Sem.</th>
<th>3rd Sem.</th>
<th>4th Sem.</th>
</tr>
</thead>
<tbody>
<tr>
<td>NES-11 06 01 - 19.1</td>
<td>Lab Sessions</td>
<td></td>
<td>5 CP</td>
<td></td>
</tr>
<tr>
<td>NES-11 06 02 - 14.1</td>
<td>Principles of Dependable Systems</td>
<td></td>
<td>6 CP</td>
<td></td>
</tr>
<tr>
<td>NES-12 10 01 - 14.1</td>
<td>Fundamentals of Estimation and Detection</td>
<td></td>
<td>6 CP</td>
<td></td>
</tr>
<tr>
<td>NES-12 12 02 - 14.1</td>
<td>Semiconductor Technology</td>
<td></td>
<td>9 CP</td>
<td></td>
</tr>
<tr>
<td>NES-12 08 02 - 14.1</td>
<td>Radio Frequency Integrated Circuits</td>
<td></td>
<td>7 CP</td>
<td></td>
</tr>
<tr>
<td>NES-12 10 03 - 14.1</td>
<td>Hardware/Software Co-design</td>
<td></td>
<td>4 CP</td>
<td></td>
</tr>
<tr>
<td>NES-12 ASW - 14.1</td>
<td>Academic and Scientific Work</td>
<td></td>
<td>4 CP</td>
<td></td>
</tr>
<tr>
<td>NES-12 PW - 14.1</td>
<td>Project Work</td>
<td></td>
<td>10 CP</td>
<td></td>
</tr>
<tr>
<td>NES-12 PW - 14.1</td>
<td>Master Thesis and Defense</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Elective modules

| Elective modules | 6 CP | 17 CP | 16 CP | 30 CP |

### Total credits

| Total credits | 30 CP | 30 CP | 30 CP | 30 CP |
## Curriculum – compulsory modules

EMM-nano students

Nanoscience and Nanotechnology

<table>
<thead>
<tr>
<th>Compulsory Modules</th>
<th>1st Sem.</th>
<th>2nd Sem.</th>
<th>3rd Sem.</th>
<th>4th Sem.</th>
</tr>
</thead>
<tbody>
<tr>
<td>NES-12 ASW - 14.1</td>
<td></td>
<td></td>
<td></td>
<td>4 CP</td>
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<td>NES-12 PW - 14.1</td>
<td></td>
<td></td>
<td></td>
<td>10 CP</td>
</tr>
<tr>
<td>Master Thesis and Defense</td>
<td></td>
<td></td>
<td></td>
<td>30 CP</td>
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<tr>
<td>Elective Modules</td>
<td></td>
<td></td>
<td></td>
<td>16 CP</td>
</tr>
<tr>
<td>Total credits</td>
<td>30 CP</td>
<td>30 CP</td>
<td>30 CP</td>
<td>30 CP</td>
</tr>
</tbody>
</table>
Curriculum – compulsory modules

Lab Sessions – RoboLab Autumn Course

Task
Create and program your own robot using LEGO Mindstorm
Understand Hamming Codes and create a Stack Machine

Schedule
Friday every week, 4. DS
13:00 - 14:30 || 1 pm - 2:30 pm
Room: APB/E046 (and E044 if needed)

Introduction
We start on Friday, October 18th, 2019

Enrollment
HISQIS, Module „NES-11 06 01 Lab Sessions“ (140701)
until November 2nd, 2019

Details
https://se.inf.tu-dresden.de/robolab2
Curriculum – elective modules

NES students

• 30 elective modules with 185 credit points
• You have to select modules with at least 39 credit points
• You can choose modules of the catalogue by your own choice. The classification of modules (Application, Technology, Design) is a guideline for you only

EMM students

• No further action required

Current study guide with module descriptions

https://tu-dresden.de/ing/elektrotechnik/ressourcen/dateien/studium/master-nes/Modulkatalog-NES-eng
German language and culture

German Language and Culture (Module NES-30 GLC-14.1)
Study documents

- Current study guide with module descriptions
- Examination regulations
- Study regulations
- Examination schemes

https://tu-dresden.de/ing/elektrotechnik/studium/beratung-und-service/studiendokumente-und-ordnungen/master-nes
Solving problems

- Visit the website of the program
  [https://tu-dresden.de/ing/elektrotechnik/studium/studieren-an-der-fakultaet/master-nes](https://tu-dresden.de/ing/elektrotechnik/studium/studieren-an-der-fakultaet/master-nes)
- Ask fellow students or your mentor
- Contact the academic advisor (study course, general problems, ...)
  **Manuela Tetzlaff**, BAR 161
  **Office hours:** Tuesday: 13:00 – 14:00
  Thursday: 13:00 – 14:00
  **Email:** master-nes@mailbox.tu-dresden.de

- Contact the examination office (questions about exams, (de-)registration, grades, ...)
  **Uta Strempel**, BAR 177a
  **Office hours:** Tuesday: 13:00 – 17:30
  Thursday: 13:00 – 15:30

- Contact the international office (questions about enrollment, visa, leave of absence, ...)
  **Email:** studium.international@mailbox.tu-dresden.de
Examination regulations and procedures

Additional meeting in November

➔ Manuela will send around an invitation
Studying in Germany

- 15 weeks lectures, tutorials and lab courses, 4 weeks exams afterwards
- Learning during the exam weeks only is not enough!
  → attend all classes every week, participate actively and start working on problems during the semester
  → treat your study like a 40-hour, full-time-job

Workload for each module is given in the module description

- Rule of thumb: 1 credit point is earned through 30 hours of work!
- Example: 180 hours (6 CP) for „Fundamentals of Estimation and Detection“

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
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<tbody>
<tr>
<td>Lectures (2 hours x 15 weeks)</td>
<td>30</td>
</tr>
<tr>
<td>Tutorials (2 hours x 15 weeks)</td>
<td>30</td>
</tr>
<tr>
<td>Preparation for exam (38 hours)</td>
<td>38</td>
</tr>
<tr>
<td>Exam (2 hours)</td>
<td>2</td>
</tr>
</tbody>
</table>

- Rework transcript after lecture
- Read transcript before next lecture
- Solve exercises
- Discuss issues with fellow students
- Studying related books
- etc.
German culture

• What do you consider as typical characteristics of Germans, which have you heard about?

• Which German characteristics have you encountered?

• Choose one German characteristic and explain the difference to the culture of your home country?
German culture

- Come to appointments and lectures in time (and observe deadlines!)

- Salutation with title and surname
  (especially for people that are hierarchically higher than you)

- More subject- and work-oriented than people-oriented

- Direct criticism → no loss of face

- If you have any questions: don’t be afraid to ask!
Study commission

Prof. Thomas Mikolajick  
(Dean of Studies)

Prof. Gerhard Fettweis

Prof. Kambiz Jamshidi

Student representatives

- Shaif Grover
- Eashika Gosh
- Shruthi Mudiyunur Narahari

Consulting members (without a vote)

- Prof. Christof Fetzer
- Ellen Töpfer (Examination Office)
- Manuela Tetzlaff (Study Advisor)
Miscellaneous

**TUD Email**
- xxx@tu-dresden.de

**IMPORTANT:** check this Email on a regular basis (at least once a week) → forward this to your regular mail account

- Important for OPAL (ask your mentor or corresponding professor for further details)

**Faculty PC Pool**
- BAR I/61

**Wireless LAN**
- [www.tu-dresden.de/zh](http://www.tu-dresden.de/zh) → A-Z → WiFi networks (WLAN)

**Library**
- Zellescher Weg 18, 01069 Dresden
  - [www.slub-dresden.de](http://www.slub-dresden.de)
  - www.slub-dresden.de
Student body of the faculty

www.fsret.de
Welcome to Dresden!

Offers of the Student Council (Fachschaftsrat)

- October 8th:
  - 14:10  LaborTour (registration needed; meeting point: in front of BAR)
  - 20:00  ClubTour (meeting point: Wu5)

- October 11th:
  - 18:00  ESEFETE (first semester party, BAR)
Have a good start!