



Master of Science Programs  
Research in Computer and Systems Engineering





**4**

semester of education

**1**

semester in Germany

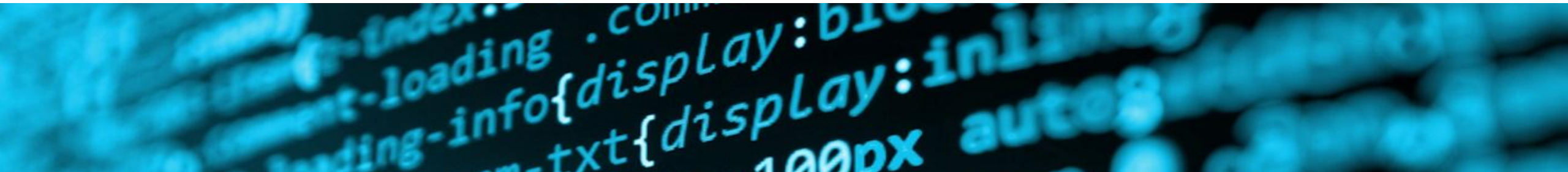
**15**

places

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# Basic studied courses



## Basis – 1 semester

Control engineering  
Theoretical computer sciences  
Neural networks  
Computer systems  
Advanced communication networks  
Research skills seminar

## Advanced – 2-3 semester

Intelligent systems  
Software and systems engineering  
Information systems  
Parallel computing  
Statistical data analysis  
Systems optimization  
Software architecture  
Distributed Data Management  
Deep learning  
Advanced Mobile Communication Networks

Each semester students do research work in one of the courses  
(Research work I, II, Group studies)

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Upon returning from Germany in 4th semester students work on a Master Thesis

# Program Coordinators



Igor Anikin  
DSc, Professor, head of  
Information security department



Andreas Mitschele-Thiel  
prof. Dr.-Ing. habil., head of  
Integrated Communication Systems Group

Flying Faculty: two German professors from TU Ilmenau hold lectures at GRIAT 10-14 days per year

Courses: Network security, Software and systems engineering, Information systems



Prof. Guenter Schaefer



Prof. Armin Zimmermann



Dr. Rita Schindler





# Research fields



**Intellectual Big Data analysis**  
Data mining techniques, neuron networks, statistics, distributed processing systems (Apache Spark, Flink, Storm, Samza)

**Parallel Computing**  
CUDA-computing on NVIDIA, development of algorithms and software for various devices

**Communication networks**  
Voice over IP (VoIP), development of algorithms for security in networks



Program's university-partner –  
Technical University of Ilmenau

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TECHNISCHE UNIVERSITÄT  
ILMENAU













# Selection criteria



Motivation

Knowledge  
Background

English  
language



# Requirements for applicants to the GRIAT master program “Research in Computer and Systems Engineering”



- **English language**

The English language skills should be at sufficient level for an interview with a German professor. The availability of the IELTS, TOEFL certificate is welcomed. For a study in Germany it is necessary within six months after admission to pass IELTS for mark at least 6.0.

- **Data Structures and Algorithms course**

Arrays, linked lists, trees, graphs, weighted graphs, stacks and queues. Recursive algorithms. Algorithms of sorting. Simple sorting, efficient sorting. Complexity of sorting algorithms. Examples. Balanced trees, B-trees, tree search. Effective algorithms for searching, complexity of algorithms. Hash tables.

- **Databases course**

Operations of relational algebra and DB. Designing a Database. ER-diagrams. Data models. Relationships, attributes of relations and their domains, a scheme of relations, tuples. Normal forms, types of normal forms, their purpose. The SQL language. A simple sample. Sampling using relationship relationships, subqueries. Operators JOIN, UNION. External and internal associations. Keys, indexes, their types, purpose. Organization of indexes in the form of hashing and B-trees. Distributed databases.

- **Networks course**

The OSI model and its levels. Basic protocols, the difference between them. Examples of protocols that works at different levels. TCP/IP stack. The main functions and purpose of the protocols are ARP, IP, UDP, TCP. Routing.

- **Programming skills**

Knowledge of modern programming languages, basic ideas, and experience in developing/usage. UML and its purpose. Object-oriented programming. Classes, types of inheritance, usage of public, private, protected. The software development process and its models: waterfall, iterative model, spiral model etc.

- **Operating Systems**

Organization of software and hardware interface. Interrupts, interrupt functions. Synchronous and asynchronous operation of I/O devices. Buffers. Caching. Multitasking. Systems with time sharing, systems with preemptive multitasking, real-time systems. Processes and threads. Processes management. Planning and dispatching processes. Deadlocks, methods of preventing and detecting deadlocks. Semaphores, mutexes. Memory management. Virtual address space.

- **Past Experience**

Experience of any projects – which methods, languages and databases were used. Models and methods, mathematical background from the previously discussed issues. Characteristics of the project, your role, complexity, which difficulties were solved and how.

- **Bachelor thesis**

Motivation for your bachelor thesis, the problem that was solved. The tasks. Algorithms, models and methods that were used, mathematical background. Characteristics of the project, complexity, which difficulties were solved and how.

- **Motivation**

A short story about **why** you need this master's program. What is your expectations? Why is the partnership between KNRTY-KAI-Ilmenau was chosen? How do you see yourself in the future? Personal achievements and awards, including academic. Personal interests, priorities and plans, if they are related to computer science and computer technology or related fields.

# Admission steps

Application applying on <https://application.griat.org/> and exam preparation

Exams and Skype-interview with representatives of TU Ilmenau

Result: admission to skype interview with the German side

Result: after checking the application, you will receive an email or call for pre-selection

Consultations, pre-selection from the Russian side

Result: information about whether you are accepted or not

**Добро пожаловать в ГРИНТ! Welcome to GRIAT! Willkommen in GRIAT!**

