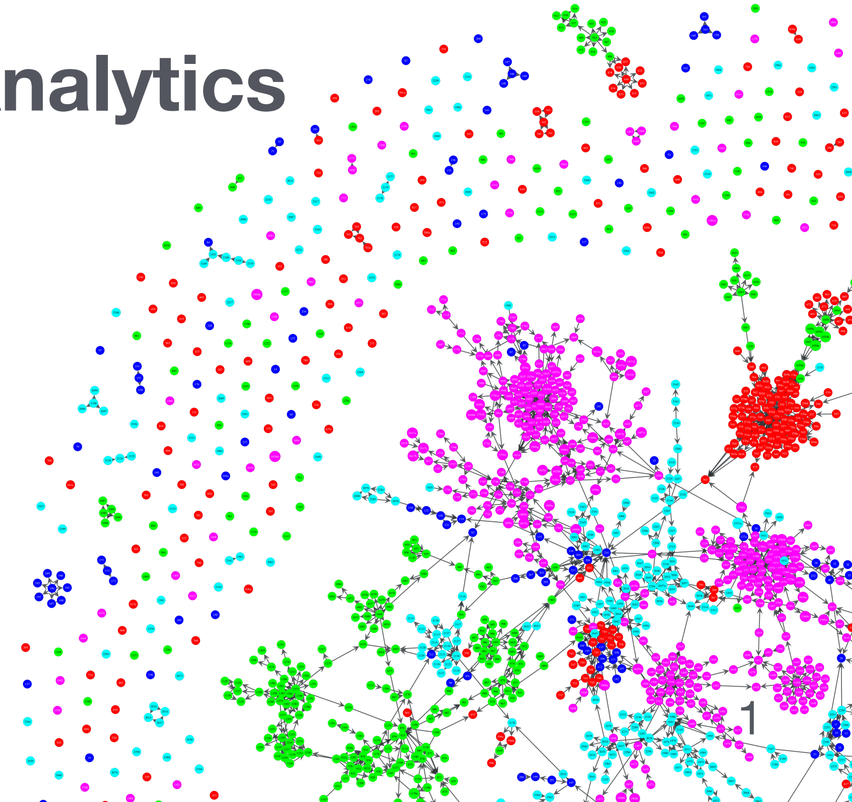
Introduction to FPSO

Master Data Engineering and Analytics

Alexander Beischl



Who? Where? What?

Academic Student Advisors
- Vivija Simić
- Dr. Sandra Kemler
- Sibylle Roden-Kinghorst
- Imme Proske




International Student Advisor
- Lena Krone

Secretary of the Examination Board
- Dr. Anna-Lisa Fuchs

Program Coordinator
- Alexander Beischl

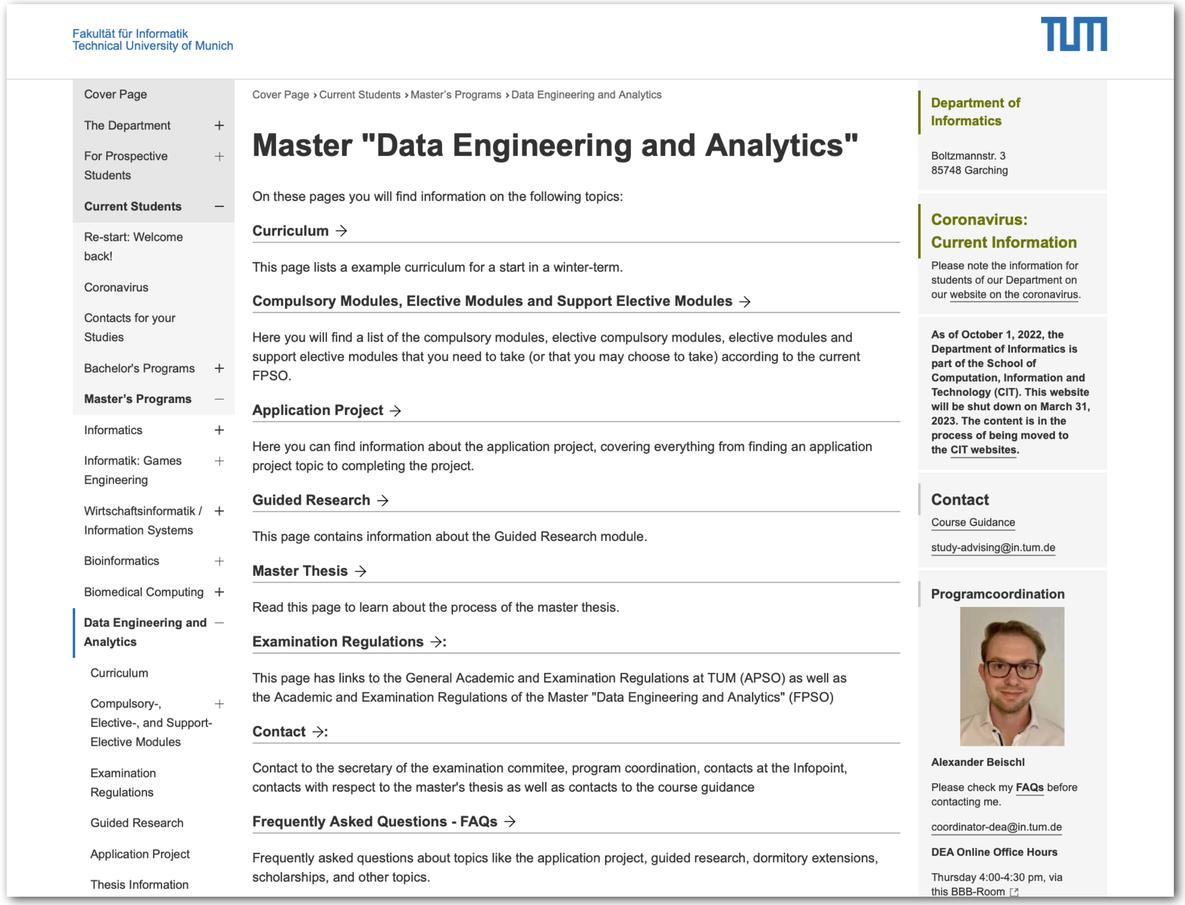


Website

Links all relevant information

- Curriculum structure
- FPSO (examination regulations)
- APSO (TUM general regulations)
- Guided research
- Application project
- Thesis information

https://www.in.tum.de/en/current-students/masters-programs/data-engineering-and-analytics.html

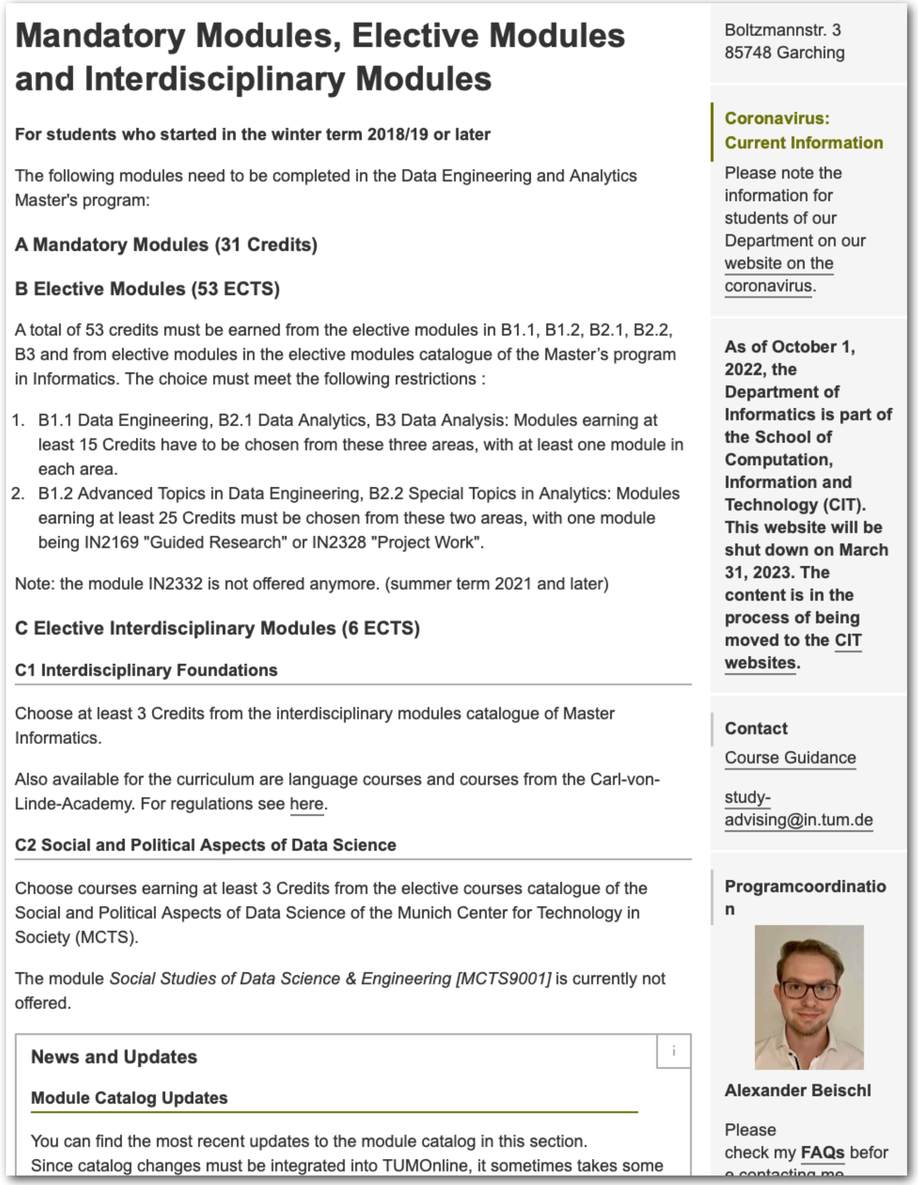


Curriculum Structure

Mandatory and Elective Modules

Listed on our website

Current Students
→Master's Programs
→Data Engineering and Analytics
→Compulsory-, Elective-, … Modules
→FPSO 2018



Mandatory Modules, Elective Modules and Interdisciplinary Modules

For students who started in the winter term 2018/19 or later

The following modules need to be completed in the Data Engineering and Analytics Master's program:

A Mandatory Modules (31 Credits)

B Elective Modules (53 ECTS)

A total of 53 credits must be earned from the elective modules in B1.1, B1.2, B2.1, B2.2, B3 and from elective modules in the elective modules catalogue of the Master's program in Informatics. The choice must meet the following restrictions :

1. B1.1 Data Engineering, B2.1 Data Analytics, B3 Data Analysis: Modules earning at least 15 Credits have to be chosen from these three areas, with at least one module in each area.
2. B1.2 Advanced Topics in Data Engineering, B2.2 Special Topics in Analytics: Modules earning at least 25 Credits must be chosen from these two areas, with one module being IN2169 "Guided Research" or IN2328 "Project Work".

Note: the module IN2332 is not offered anymore. (summer term 2021 and later)

C Elective Interdisciplinary Modules (6 ECTS)

C1 Interdisciplinary Foundations

Choose at least 3 Credits from the interdisciplinary modules catalogue of Master Informatics.

Also available for the curriculum are language courses and courses from the Carl-von-Linde-Academy. For regulations see here.

C2 Social and Political Aspects of Data Science

Choose courses earning at least 3 Credits from the elective courses catalogue of the Social and Political Aspects of Data Science of the Munich Center for Technology in Society (MCTS).

The module *Social Studies of Data Science & Engineering [MCTS9001]* is currently not offered.

News and Updates

Module Catalog Updates

You can find the most recent updates to the module catalog in this section.
Since catalog changes must be integrated into TUMOnline, it sometimes takes some

Boltzmannstr. 3
85748 Garching

Coronavirus: Current Information

Please note the information for students of our Department on our website on the coronavirus.

As of October 1, 2022, the Department of Informatics is part of the School of Computation, Information and Technology (CIT). This website will be shut down on March 31, 2023. The content is in the process of being moved to the CIT websites.

Contact

Course Guidance

study-advising@in.tum.de

Programcoordination

Alexander Beischl

Please check my **FAQs** befor
e contacting me

Curriculum Structure

Overview

A: Modules are mandatory

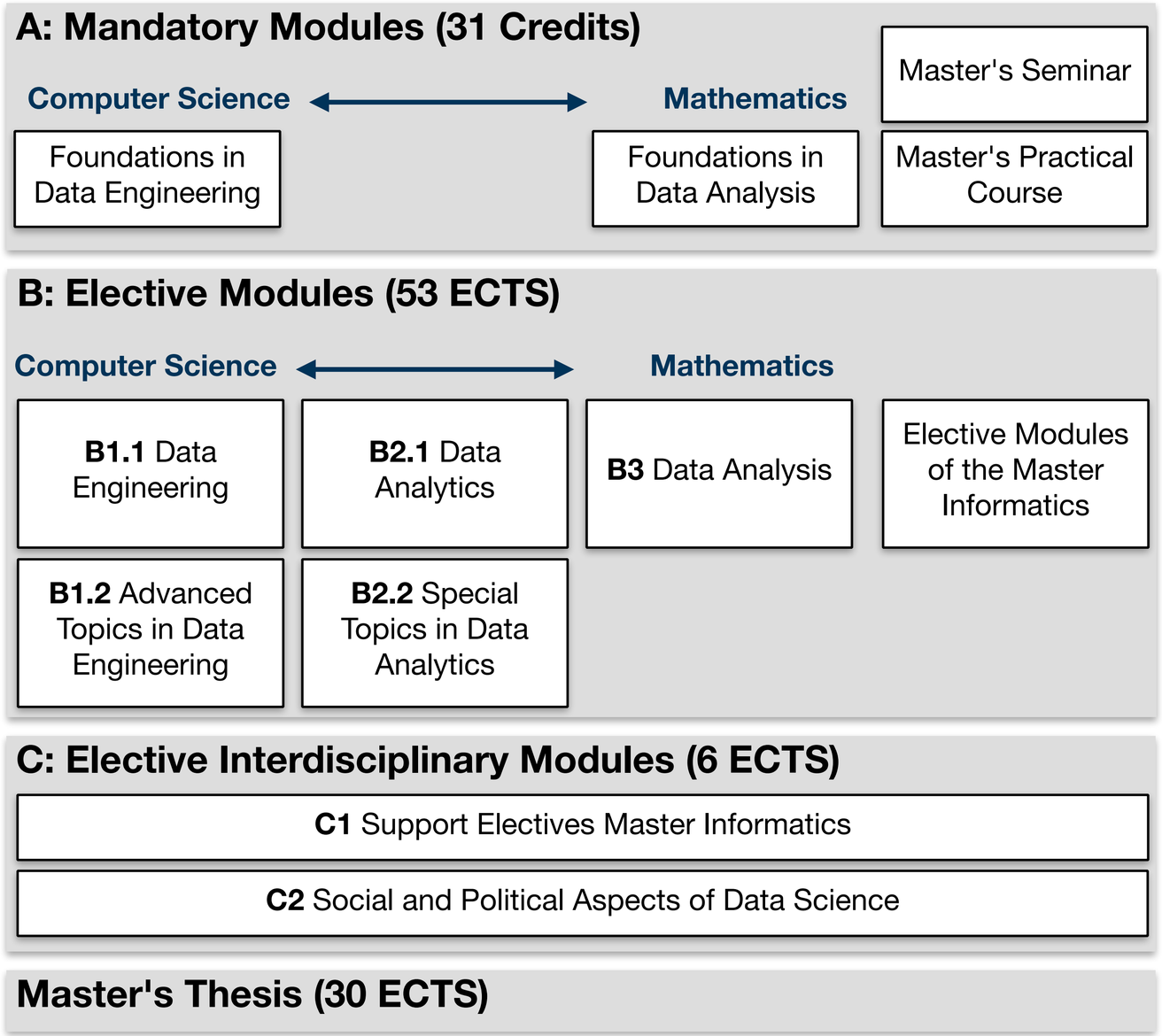
B: Catalog of elective modules from different areas

➡ Choose modules (with small constraints)

- Columns have a different focus

C: Interdisciplinary modules

Master's Thesis

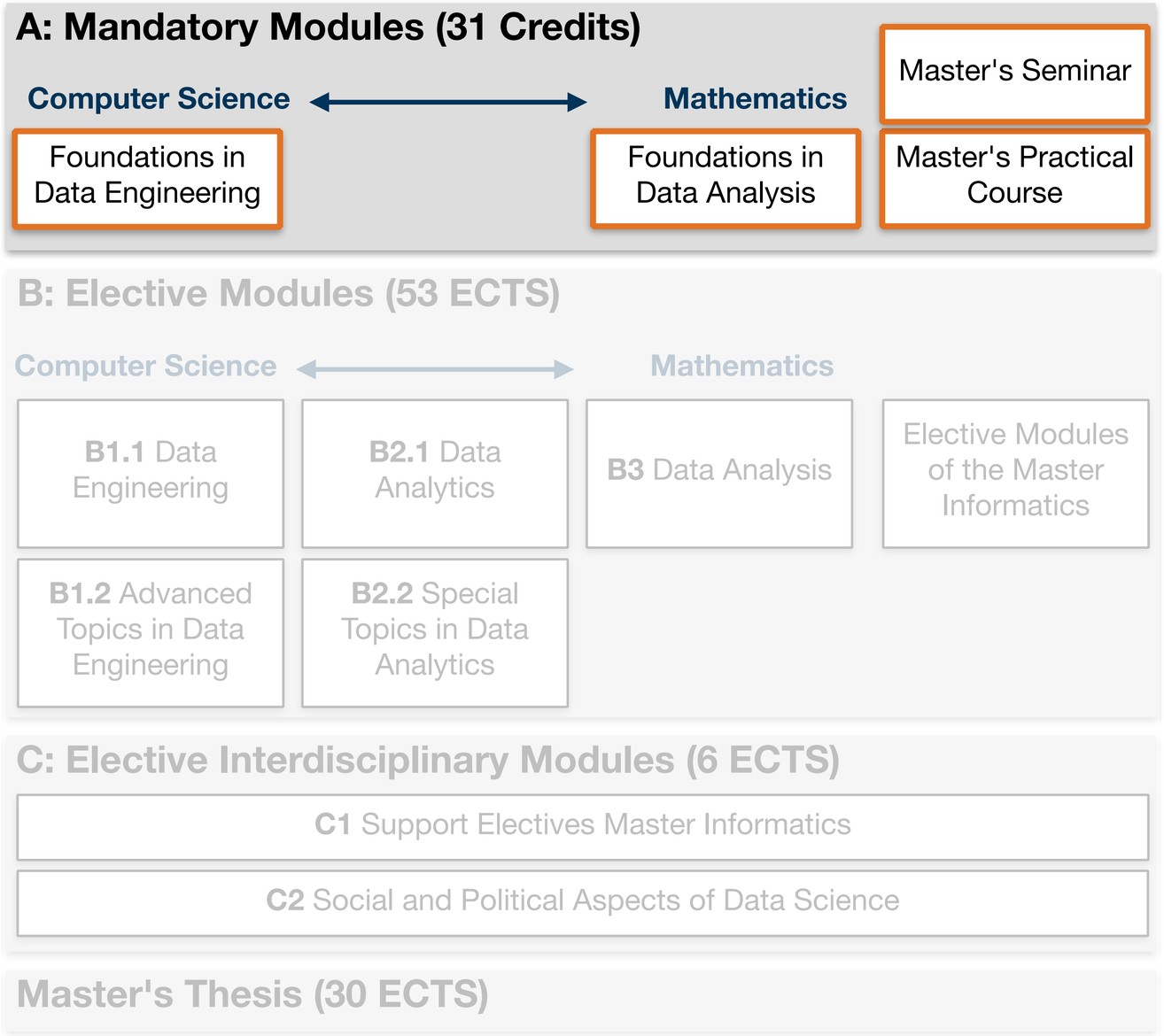


Curriculum Structure

Mandatory Modules

- Foundations in Data Engineering (IN2326, 8 ECTS)
- Foundations in Data Analysis *(MA4800, 8 ECTS)*
- Master's Seminar *(IN 2107, 5 ECTS)*
- Master's Practical Course *(IN2106, 10 ECTS)*

- Listed in the FPSO in: *A Mandatory Modules*

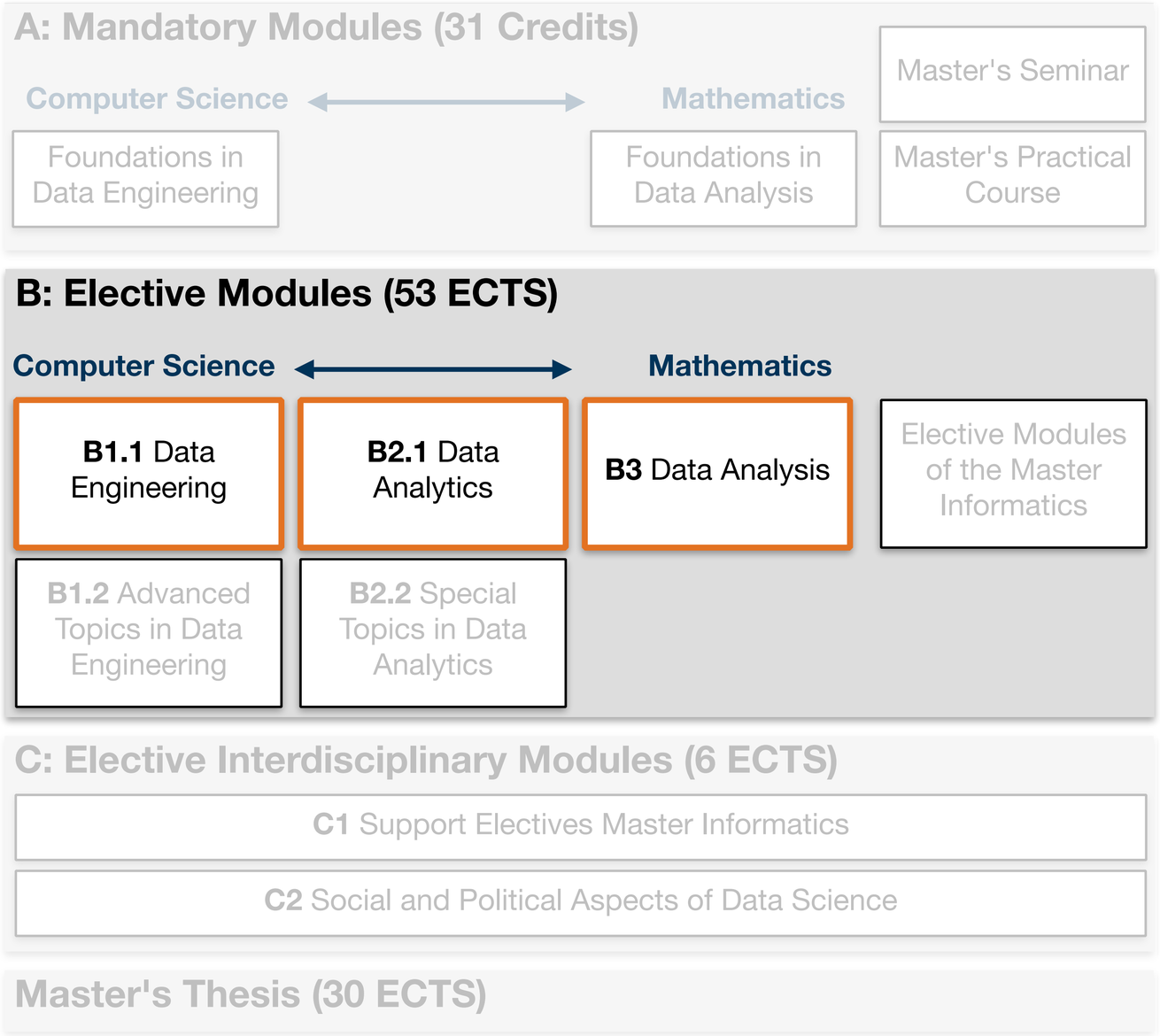


Curriculum Structure

Elective Modules - Electives 1

- Earn at least *15 ECTS* in core groups
- Complete at least one module in each group

Listed in the FPSO in: *B Elective Modules*

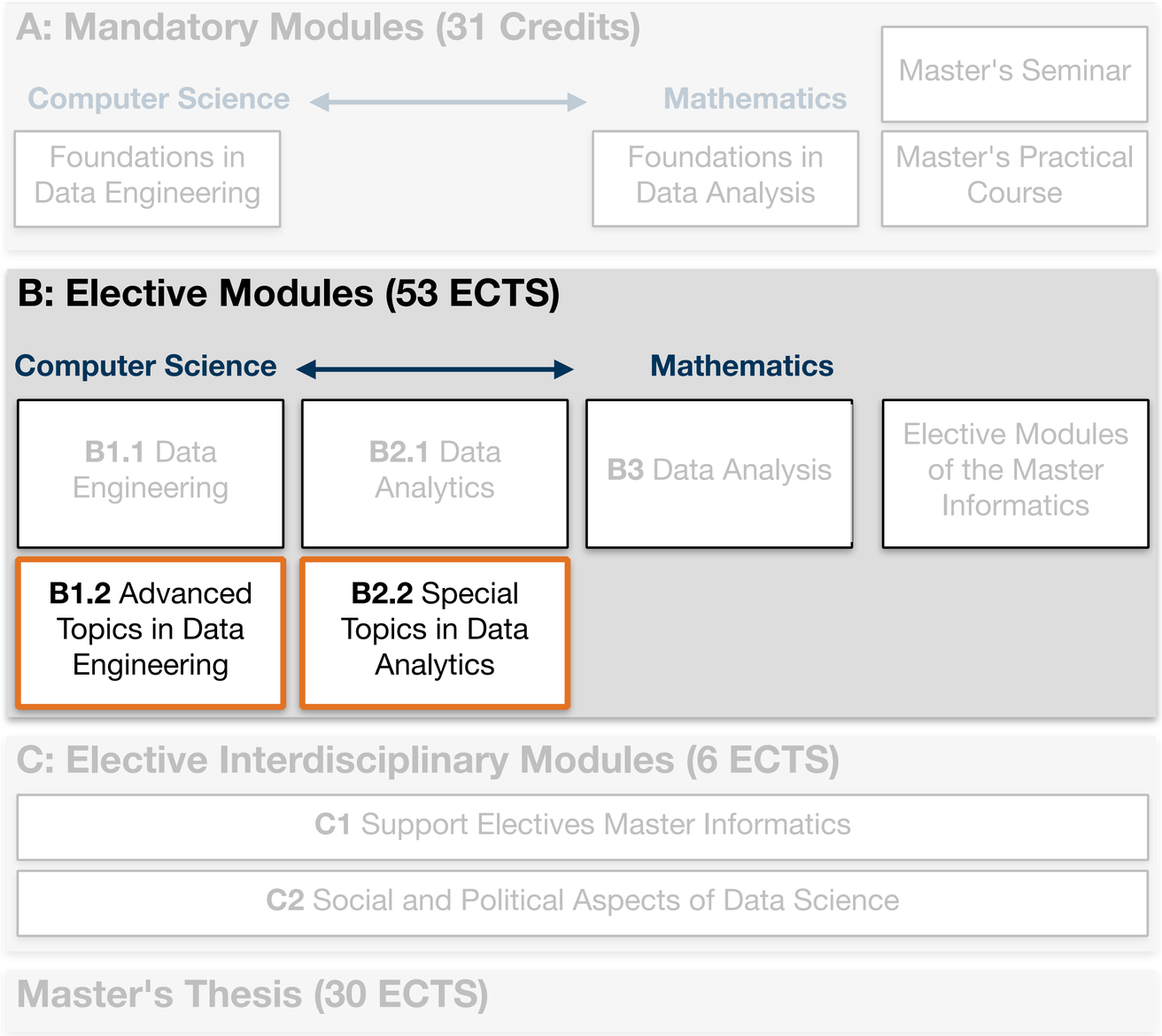


Curriculum Structure

Elective Modules - Electives 2

- Earn at least *25 ECTS* in advanced/ special groups
- Includes *Guided Research* or *Application Project*
- Complete at least *Guided Research* or *Application Project*

Listed in the FPSO in: *B Elective Modules*



Curriculum Structure

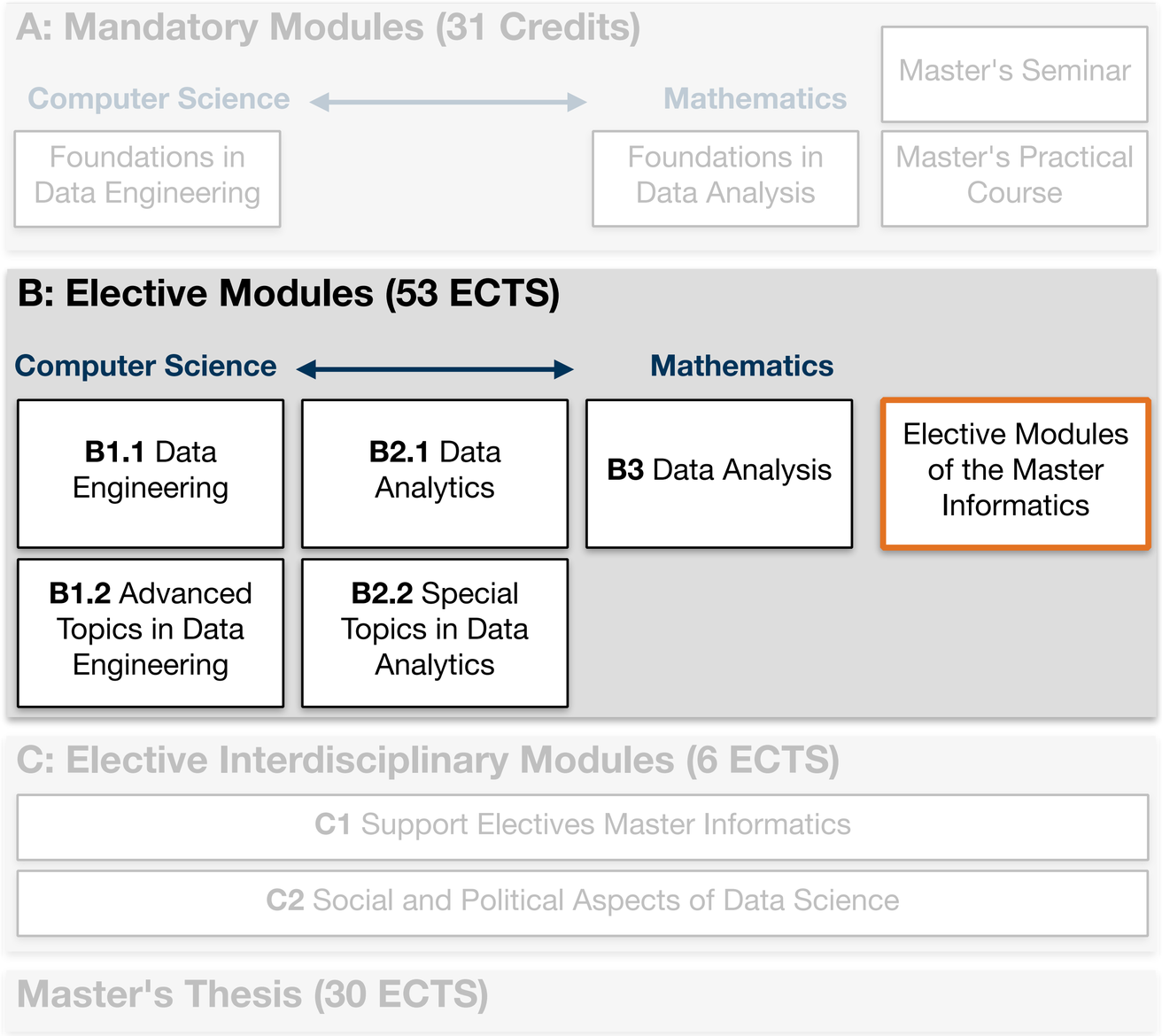
Elective Modules - Electives 3

For the remaining 13 ECTS of *B: Elective Modules*

- Additional modules from B1.1, B1.2, B2.1, B2.2, B3
- Elective modules of the Master Informatics

➡**Sum** of taken modules from:
B1.1, B1.2, B2.1, B2.2, B3, Elective modules of the Master Informatics **≥ 53 ECTS**

Listed in the FPSO in: *B Elective Modules*



Curriculum Structure

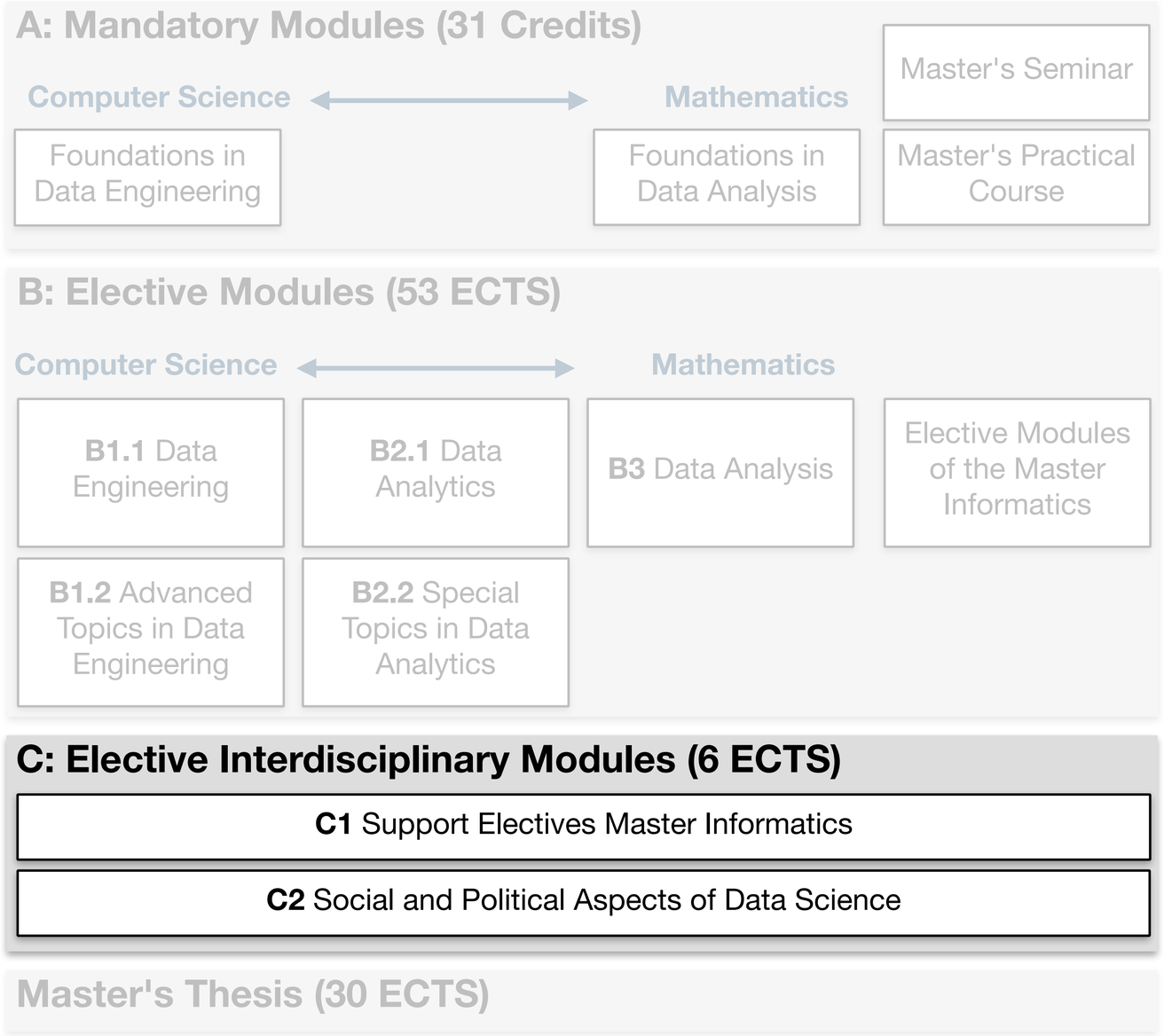
Electives Interdisciplinary Modules

Earn at least 6 Credits:

- **3 ECTS** Support Electives Master Informatics
  - Module catalogue of Master Informatics or
  - Language courses or
  - Courses from the Carl-von-Linde-Academy

- **3 ECTS** Social and Political Aspects of Data Science

Listed in the FPSO in: *C Interdisciplinary Elective Modules*



Curriculum Structure

Module Catalog - Website

B Elective Modules :

B1.1 "DATA ENGINEERING":

ID	Title	Term	Contact Hours	Credits	Language
IN2219	Query Optimization	WS	3V+2Ü	6	EN
IN2073	Cloud Computing	WS	2V+1Ü	4	EN
IN2118	Database Systems on Modern CPU Architectures	SS	3V+2Ü	6	EN
IN2140	Advanced Concepts of Distributed Databases - Programming Database Web Applications	WS	1V+2P	4	DE/EN
IN2013	High Performance Computing - Programming Paradigms and Scalability	SS	2V+1Ü	4	DE/EN
IN2209	IT Security	WS	4V+1Ü	7	DE
IN2147	Parallel Programming	SS	2V+2Ü	5	EN
IN2259	Distributed Systems	WS	3V+1Ü	5	EN

B1.2 "ADVANCED TOPICS IN DATA ENGINEERING":

ID	Title	Term	Contact Hours	Credits	Language
IN2328	Application Project	WS/SS		10	DE/EN
IN2018	Augmented Reality	SS	3V+2Ü	6	EN
IN2169	Guided Research	WS/SS		10	EN
IN2158	Advanced Network and Graph Algorithms	WS	4V+2Ü	8	DE/EN
IN2097	Advanced Computer Networking	WS	3V+1Ü	5	EN
IN2190	Programming of Supercomputers	WS	3P	5	EN

A: Mandatory Modules (31 Credits)

Computer Science ⟷ Mathematics

- Foundations in Data Engineering
- Foundations in Data Analysis
- Master's Practical Course
- Master's Seminar

B: Elective Modules (53 ECTS)

Computer Science ⟷ Mathematics

- **B1.1** Data Engineering
- **B2.1** Data Analytics
- **B3** Data Analysis
- Elective Modules of the Master Informatics
- **B1.2** Advanced Topics in Data Engineering
- **B2.2** Special Topics in Data Analytics

C: Elective Interdisciplinary Modules (6 ECTS)

- **C1** Support Electives Master Informatics
- **C2** Social and Political Aspects of Data Science

Master's Thesis (30 ECTS)

Curriculum Structure

Module Catalog - Website

B2.1 "DATA ANALYTICS":

ID	Title	Term	Contact Hours	Credits	Language
IN2023	Image Understanding I: Machine Vision Algorithms	SS	2V	3	DE
IN2062	Techniques in Artificial Intelligence	WS	3V+1Ü	5	DE/EN
IN2133	Principles of Computer Vision	WS	3V	4	EN
IN2124	Basic Mathematical Methods for Imaging and Visualization	WS	2V+2Ü	5	EN
IN2026	Visual Data Analytics	WS	3V+1Ü	5	EN
IN2071	Knowledge-based Systems for Industrial Applications	WS	3V	4	EN

Additionally you can elect ONE (not more) of the following modules in Data Analytics:

ID	Title	Term	Contact Hours	Credits	Language
IN2028	Business Analytics	WS	2V+2Ü	5	EN
IN2339	Data Analysis and Visualization in R	WS	2V+4Ü	6	EN
IN2030	Data Mining and Knowledge Discovery	WS	2V	3	EN

Furthermore you can elect ONE (not more) of the following modules in Data Analytics:

ID	Title	Term	Contact Hours	Credits	Language
IN2064	Machine Learning	WS	4V+2Ü	8	EN
IN2332	Statistical Modeling and Machine Learning	SS	4V+4Ü	8	EN

If you started your studies BEFORE October 2019 (but NOT afterwards) you can elect IN2323 in B2.1 too

A: Mandatory Modules (31 Credits)

Computer Science ⟷ **Mathematics**

- Foundations in Data Engineering
- Foundations in Data Analysis
- Master's Seminar
- Master's Practical Course

B: Elective Modules (53 ECTS)

Computer Science ⟷ **Mathematics**

- **B1.1** Data Engineering
- **B2.1** Data Analytics
- **B3** Data Analysis
- Elective Modules of the Master Informatics
- **B1.2** Advanced Topics in Data Engineering
- **B2.2** Special Topics in Data Analytics

C: Elective Interdisciplinary Modules (6 ECTS)

- **C1** Support Electives Master Informatics
- **C2** Social and Political Aspects of Data Science

Master's Thesis (30 ECTS)

Credit Requirements over Time

- Until the end of the 2nd semester: at least one module from section A and B
- Until the end of the 3rd semester ≥ 30 ECTS Credits
- Until the end of the 4th semester ≥ 60 ECTS Credits
- Until the end of the 5th semester ≥ 90 ECTS Credits
- Until the end of the 6th semester 120 ECTS Credits

If You are about to fail one of the requirement deadlines:

Please talk to the academic student advisors. In coordination with them, contact the chairman of the examination committee in written form and state the reasons.

If such a failure can be forseen: contact one of the academic student advisors immediately.

Bridging Courses

Non-computer-science and non-mathematics bachelors:

- Please note that the bridging courses **MUST ALL** be passed in your first year of study!

Be careful:

- Some courses and exams are only offered in either winter or summer semester.
- Please take bridge courses seriously: Plan your schedule so that you have enough time for bridge courses. Reduce load in the rest of the curriculum.

Please note, that those of you that **did not provide proof** of basic german skills:

- This obligation is automatically lifted after you complete the **first module at TUM**.

Student Code of Conduct

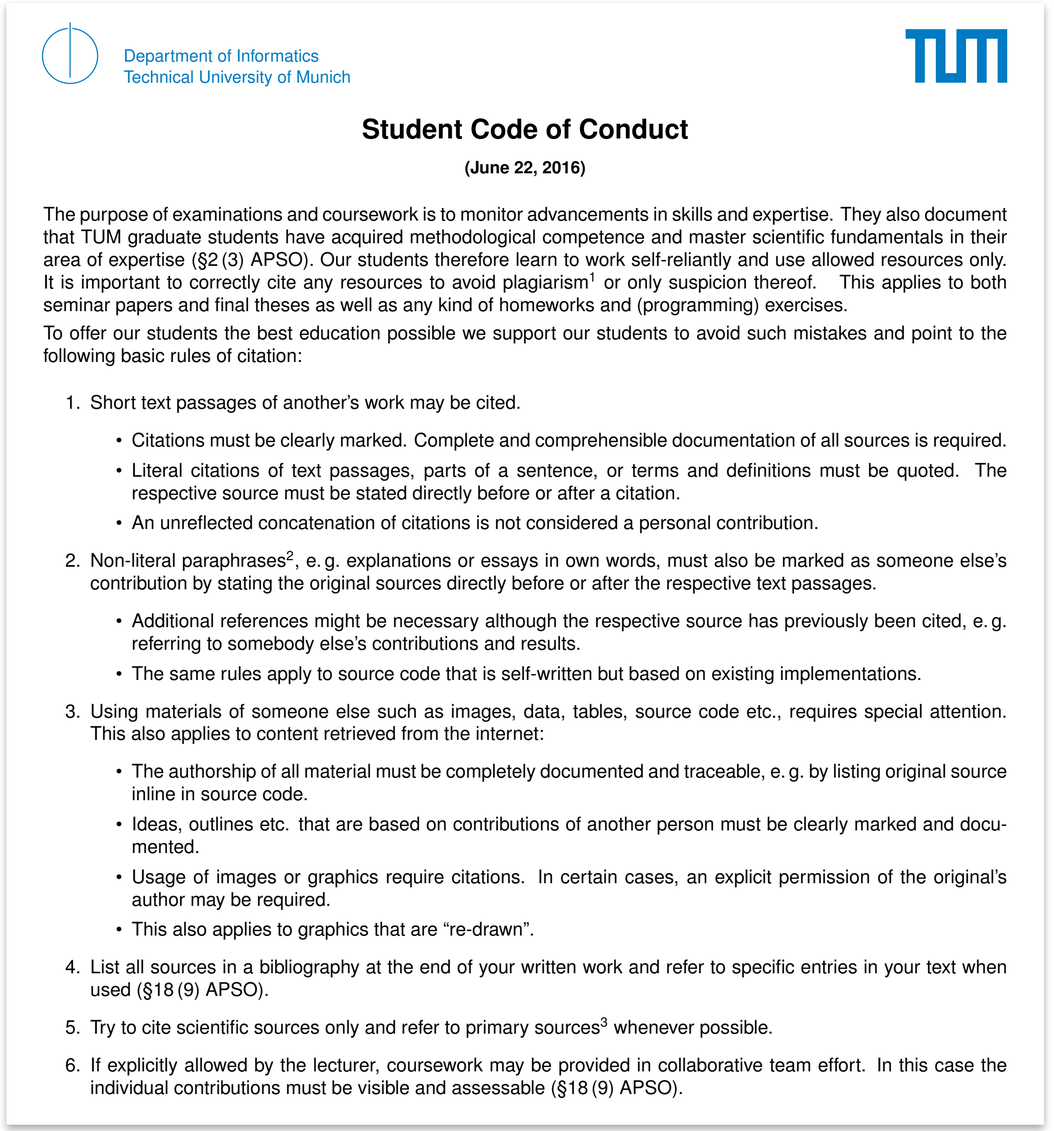
Compilation of TUM rules on

- **Plagiarism** and
- **Cheating**

Meant as

- good advice and
- help to avoid mistakes

Please read the full document on your own on our website: http://www.in.tum.de/en/current-students/administrative-matters/student-code-of-conduct.html



Department of Informatics
Technical University of Munich

Student Code of Conduct

(June 22, 2016)

The purpose of examinations and coursework is to monitor advancements in skills and expertise. They also document that TUM graduate students have acquired methodological competence and master scientific fundamentals in their area of expertise (§2 (3) APSO). Our students therefore learn to work self-reliantly and use allowed resources only. It is important to correctly cite any resources to avoid plagiarism[1] or only suspicion thereof. This applies to both seminar papers and final theses as well as any kind of homeworks and (programming) exercises.

To offer our students the best education possible we support our students to avoid such mistakes and point to the following basic rules of citation:

1. Short text passages of another's work may be cited.
   - Citations must be clearly marked. Complete and comprehensible documentation of all sources is required.
   - Literal citations of text passages, parts of a sentence, or terms and definitions must be quoted. The respective source must be stated directly before or after a citation.
   - An unreflected concatenation of citations is not considered a personal contribution.
2. Non-literal paraphrases[2], e. g. explanations or essays in own words, must also be marked as someone else's contribution by stating the original sources directly before or after the respective text passages.
   - Additional references might be necessary although the respective source has previously been cited, e. g. referring to somebody else's contributions and results.
   - The same rules apply to source code that is self-written but based on existing implementations.
3. Using materials of someone else such as images, data, tables, source code etc., requires special attention. This also applies to content retrieved from the internet:
   - The authorship of all material must be completely documented and traceable, e. g. by listing original source inline in source code.
   - Ideas, outlines etc. that are based on contributions of another person must be clearly marked and documented.
   - Usage of images or graphics require citations. In certain cases, an explicit permission of the original's author may be required.
   - This also applies to graphics that are "re-drawn".
4. List all sources in a bibliography at the end of your written work and refer to specific entries in your text when used (§18 (9) APSO).
5. Try to cite scientific sources only and refer to primary sources[3] whenever possible.
6. If explicitly allowed by the lecturer, coursework may be provided in collaborative team effort. In this case the individual contributions must be visible and assessable (§18 (9) APSO).

Student Code of Conduct

Quick Overview

Course achievements and examinations have to be performed self-reliantly and on the basis of allowed resources only.

Short text passages may be cited, but
- clearly marked
- literal citations must be quoted

Non-literal paraphrases must be quoted clearly, immediately, and reproducibly.

Use a full bibliography and primary sources.

Cheating leads to failing with only one possibility of retake.

Department of Informatics
Technical University of Munich

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(June 22, 2016)

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   - Additional references might be necessary although the respective source has previously been cited, e. g. referring to somebody else's contributions and results.
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   - Usage of images or graphics require citations. In certain cases, an explicit permission of the original's author may be required.
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6. If explicitly allowed by the lecturer, coursework may be provided in collaborative team effort. In this case the individual contributions must be visible and assessable (§18 (9) APSO).

Examination

You can pass each module **only once**, no retake for grade improvement.

Most modules are only offered in summer or winter term

- Regular exam period
- Retake exam period

If you are caught cheating:

- Exam is graded "5.0 U"
- Only one attempt to pass the exam remaining

Staying Abroad

Please read all about it on http://www.in.tum.de/goabroad
Then, talk to Martina v. Imhoff for guidance.

For each module from abroad that you want to use towards your degree:

- For modules that have sufficient similarities with an existing module from TUM: contact the respective TUM Professor.
- Or, if it is in the spirit of the catalogue, try a free recognition.

For non-TUM Bachelors:

- You need to complete one full semester before going abroad.

Tips from Guidance Counselors

www.in.tum.de/en/tips

Please talk to the academic advisors for

- Advice on your study plan
- Internships or thesis abroad
- Examination Regulations
- Learning Methods
- Any issues you may have here at TUM

Contact: advising@in.tum.de

COVID-19 Specific Topics

- Pending enrollment

- Masks not mandatory, but recommended
- If you feel sick, stay home and test yourself

- Lectures and Exams planned on-site

Welcome at TUM and Successful Studies!