



# Master in Management & Technology

(TUM-BWL)



## Master in Management & Technology - Overview

2 in 1	Specialization in Technology (major or minor) + Specialization in Management	100% in English	Individual profiles
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- **Content:** Master's program with specialization in Technology and in Management at the TUM School of Management (Combination of Master's programs M. Sc. TUM BWL and WITEC)
- **Innovative design:** Block structure consisting of technology majors and minors and the possibility to set individual profiles (international profile, sharpened management profile, sharpened technology profile)
- **Course language:** Up to 100% in Englisch
- **International partners:** 90 exchange partners at the TUM School of Management
- **Target group:** International B. Sc. graduates with degrees in management, business administration or economics with high technical affinity; B. Sc. TUM BWL graduates
- **Modus:** 4 semester, full-time
- **Starting semester:** winter semester 2017/18
- **Planned: April-May 2017:** Application period of the „Master in Management & Technology“
- **Planned: Until end of august 2017:** Selection process
- **Planned: October 2017/2018:** Start of the „Master in Management & Technology“
- **Study Fees:** approx. 118.50 €/semester (Information: <http://www.tum.de/studium/studienfinanzierung>)

# Structure of the study program

International Profile  
 Sharpened Management Profile  
 Sharpened Technology Profile

Semester 4

**Master's Thesis** **30 Credits**

Semester 1-3

**Electives in Management & Engineering/Natural Sciences (Mobility Option)** **30 Credits**

*Courses in Management or Engineering/Nat. Sciences or Abroad*

Semester 1-3

**Specialization in Technology** **30 Credits**

*Basic Level/Advanced Level (depending on first degree: Mechanical Engineering minor/ major, Electrical and Computer Engineering minor/ major, Computer Engineering minor/ major, Chemistry minor/ major, Informatics minor/ major, Industrial Engineering minor)*

Semester 1-3

**Specialization in Management** **30 Credits**

*Innovation & Entrepreneurship, Marketing, Strategy and Leadership, Operations & Supply Chain Management, Finance and Accounting, Economics & Policy, Energy Markets (NEW!), Life Science Management (NEW!)*

# Bestandteile des MMT - Masterstudiengangs

**M.Sc.  
MMT (TUM-BWL)  
(120 credits)**

**Master's thesis  
(30 credits)**

## Specialization in Management

Compulsory/  
elective modules  
(30 credits)

Select one of the  
following  
specializations:

**Innovation &  
Entrepreneurship**

**Marketing, Strategy &  
Leadership**

**Operations & Supply  
Chain Management**

**Finance & Accounting**

**Economics & Policy**

**Energy Markets**

**Life Sciences &  
Management**

## Specialization in Technology

Compulsory/ elective modules  
(30 credits)

Select one of the following  
Engineering/Nat.science  
subjects:

**Mechanical  
Engineering**

Major  
Minor

**Chemistry**

Major  
Minor

**Informatics**

Major  
Minor

**Electrical and  
Computer Engineering**

Major  
Minor

**Computer Engineering**

Major  
Minor

**Industrial Engineering**

Minor

## Electives in Management & Engineering and/or Natural Sciences

Elective modules  
(30 credits)

Courses in Management  
or  
Engineering/Nat. Sciences  
or  
Abroad

## Specialization in Management

Students must choose one of the following seven specializations in management.

Students must pass the compulsory module (6 credits) within one of the six specializations: **Innovation & Entrepreneurship, Operations & Supply Chain Management, Economics & Policy, Energy Markets, Life Sciences and Management** und **Finance & Accounting**.

In the specialization **Marketing, Strategy & Leadership** students must choose between two compulsory modules (either in Marketing or Strategy and Organization each 6 credits) and must pass one of the them.

### ▪ Innovation & Entrepreneurship

- Advanced Seminar Innovation & Entrepreneurship (*english*)

additionally **24 credits** from the following module catalogue (varies each semester)

- Lead-User-Projekt
- Case Study Seminar: Strategic Management of Technology and Innovation (*english*)
- Arbeitsrecht
- Managing Innovation: From Theory to Decision Simulation
- Financial Modeling in Private Equity (*english*)
- Empirical Research in Management and Economics
- Management von Familienunternehmen
- Advanced Topics in Innovation & Entrepreneurship

## ▪ Marketing, Strategy & Leadership (in English & German)

- Advanced Seminar Marketing, Strategy & Leadership (Marketing)  
**or**
- Advanced Seminar Marketing, Strategy & Leadership (Strategy and Organization)

additionally **24 credits** from the following module catalogue (varies each semester)

- Arbeitsrecht
- Marketing Compliance
- Angewandte Personalführung
- Negotiation Strategies
- Behavioral Pricing: Insights, Methods, and Strategy (*english*)
- Management von Familienunternehmen
- Führung und Organisation (*english*)
- Strategies in MNEs (*english*)
- Luxury Marketing (*english*)

## ▪ Operations & Supply Chain Management (in English & German)

- Advanced Seminar Operations & Supply Chain Management (*english*)

additionally **24 credits** from the following module catalogue (varies each semester)

- Discrete Optimization (*english*)
- Inventory Management (*english*)
- Logistics and Operations Strategy (*english*)
- Stochastic Modeling and Optimization (*english*)
- Stochastic Optimization (*english*)
- Behavioral Operations Management (*english*)

- Planning and Scheduling of Complex Operations: Models, Methods, and Applications (*english*)
- Health Care Operations Management (*english*)
- Advanced Planning in Supply Chains – Illustrating the Concepts using an SAP APO Case Study (*english*)
- Advanced Topics in Operations & Supply Chain Management

### ▪ Finance & Accounting (in English & German)

- Advanced Seminar Finance & Accounting

additionally **24 credits** from the following module catalogue (varies each semester)

- Asset Management (*english*)
- Management Accounting
- Group Accounting and IFRS
- Derivatives (*english*)
- Steuerrecht
- Banking and Risk Management (*english*)
- Management von Familienunternehmen
- Negotiation Strategies
- Anreizsetzung und Performancemanagement
- Financial Modeling in Private Equity (*english*)
- Advanced Topics in Finance & Accounting
- Value Based Management (*english*)
- Capital Markets Law

### Economics and Policy (in English & German)

- Advanced Seminar in Economics and Policy

additionally **24 credits** from the following module catalogue (varies each semester)

- Economics III – Advanced Microeconomics
- Public Economics I – Economic Theory of the State
- Public Economics II – Theory and Politics of Taxation
- Public Economics III – Theory and Politics of Public Debt
- Public Economics IV – Theory and Politics of Income Distribution
- Advanced Seminar in Managerial Economics (*english*)
- Energy Economics (*english*)
- Industrial Organization
- Environmental Economics and Environmental Management
- Environmental Politics

## Energy Markets (in English & German)

- Advanced Seminar in Energy Markets

additionally **24 credits** from the following module catalogue (varies each semester)

- Energy Trading (*english*)
- Energy Markets I (*english*)
- Energy Markets II (*english*)
- Challenges in Energy Markets I
- Challenges in Energy Markets II
- Energy Economics (*english*)
- Stochastic Optimization (*english*)
- Advanced Topics in Energy Trading (*english*)
- Advanced Seminar in Electricity Market Economics

## Life Science Management (in English & German)

- Advanced Seminar in Life Sciences & Management

additionally **24 credits** from the following module catalogue (varies each semester)

- Advanced Planning in Supply Chains – Illustrating the Concepts Using an SAP APO Case Study (*english*)
- Advanced Topics in Operations & Supply Chain Management (*english*)
- Food Economics (*english*)
- Analysen im Agribusiness Marketing
- Consumer Behaviour (*english*)
- Sustainability Marketing and Consumption (*english*)
- Consumer History (*english*)
- Energy Markets I (*english*)
- Energy Markets II (*english*)
- International Environmental Policy and Conflict Resolution (*english*)



## Specialization in Technology

Depending on the Engineering/Nat.Science subject selected in the Bachelor's studies, students must select one specialization in Engineering/ Nat.Sciences. In total, students must pass 30 credits.

### ▪ **Mechanical Engineering**

Depending on their previous knowledge, students are able to select basic modules (minor) or advanced modules (major) in Mechanical Engineering. In total, modules worth 30 credits from the elective module catalogue must be selected and passed. Students who already passed the Engineering/Nat.Sciences specialization Mechanical Engineering as part of their Bachelor's studies, can only select advanced modules (major) of Mechanical Engineering.

#### ▪ **Minor**

- CAD und Maschinzeichnen 1 und 2
- Technische Mechanik (for TUM-BWL separate)
- Maschinenelemente – Grundlagen, Fertigung, Anwendung
- Werkstoffe im Maschinenwesen
- Grundlagen der Fluidmechanik
- Bioverfahrenstechnik
- Industrielle Softwareentwicklung für Ingenieure
- Grundlagen der Ur- und Unformtechnik
- Grundlagen der Thermodynamik
- Spanende Fertigungsverfahren

#### ▪ **Major**

- Materialfluss und Logistik
- Automatisierungstechnik
- Montage, Handhabung, Industrieroboter
- Produktionsergonomie
- Förder- und Materialflusstechnik
- Planung technischer Logistiksysteme
- Arbeitswissenschaft/Ergonomics
- (Rechnerintegrierte Produktion) – Intelligent vernetzte Produktion – Industrie 4.0
- Fabrikplanung
- Fügetechnik
- Antriebssystemtechnik
- Grundlagen des Kraftfahrzeugbaus
- Leichtbau
- Produktergonomie

- Energiesysteme I
- Nachhaltige Energiesysteme mit Seminar
- Wärmetransportphänomene
- Energetische Nutzung von Biomasse und Reststoffen
- Solar Engineering
- Turbomaschinen

## ▪ Informatics

Depending on their previous knowledge, students are able to select basic modules (minor) or advanced modules (major) in Informatics. In total, modules worth 30 credits from the elective module catalogue must be selected and passed. Students who already passed the Engineering/Nat.Sciences specialization Informatics as part of their Bachelor's studies, can only select advanced modules (major) of Informatics.

### ▪ *Minor*

- Einführung in die Informatik 1
- Information Management for Digital Business Models
- Einführung in die Rechnerarchitektur
- Praktikum: Grundlagen der Programmierung
- Einführung in die Softwaretechnik
- Grundlagen Betriebssysteme und Systemsoftware
- Grundlagen Datenbanken
- Einführung in die Informatik 2
- Bachelor-Praktikum
- Elektronisches Publizieren / Document Engineering und das World-Wide-Web
- Dreidimensionale Nutzerschnittstellen
- Programmiersprachen
- IT Sicherheit
- Algorithmen und Datenstrukturen (für ET/IT)

### ▪ *Major*

- Grundlagen: Rechnernetze und Verteilte Systeme
- Effiziente Algorithmen und Datenstrukturen (*english*)
- Business Analytics (*english*)
- Data Mining and Knowledge Discovery (*english*)
- Einsatz und Realisierung von Datenbanksystemen
- Virtuelle Maschinen (*english*)
- Grundlagen der Künstlichen Intelligenz
- Robotik (*english*)
- Rechnerarchitektur (*english*)
- Strategisches IT-Management

- Masterkurs Rechnernetze (*english*)
- Netzsicherheit (*english*)
- Kognitive Systeme (*english*)
- Advanced Topics of Software Engineering

## ▪ **Chemistry**

Depending on their previous knowledge, students are able to select basic modules (minor) or advanced modules (major) in Chemistry. The minor requires compulsory classes worth 18 ECTS and electives at least worth 12 ECTS to be selected and passed. For the major, in total modules worth 30 ECTS from the elective module catalogue must be selected and passed.

### ▪ **Minor**

- Allgemeine und anorganische Chemie (compulsory)
- Einführung in die organische Chemie (compulsory)
- Grundlagen der Physikalischen Chemie I (compulsory)
- Biologie für Chemiker
- Technische Chemie für TUM-BWL
- Analytische Chemie
- Chemiesoftware und Datenbanken für TUM-BWL
- Bauchemie I
- Die Chemische Industrie
- Toxikologie und spezielle Rechtskunde für Chemiker
- Anorganische Festkörperchemie und Organometalle
- Anorganische Molekülchemie
- Biochemie
- Lebensmittelchemie (für BBB)

### ▪ **Major**

- Anorganische Festkörperchemie und Organometallchemie
- Bauchemie I
- Anorganische Molekülchemie
- Praktikum Technische TUM-BWL
- Die Chemische Industrie
- Toxikologie und spezielle Rechtskunde für Chemiker
- Biochemie
- Stoffströme in Industrie und Natur
- Fortgeschrittene analytische Verfahren
- Siliciumorganische Werkstoffe im Bauwesen
- Wasserchemie I
- Lebensmittelchemie I
- Nanomaterialien

- Molekulare Medizin
- Molekulare Biotechnologie
- Lebensmittelchemie I (für BBB)
- Industrielle chemische Prozesse II – Petrochemische Prozesse
- Industrielle Chemische Prozesse – Refining
- High Performance Polymers
- Pharmazeutische Radiochemie I
- Pharmazeutische Radiochemie II
- Industrielle relevante Aktivierung kleiner Moleküle
- Reaktivität organischer Verbindungen

## ▪ **Electrical and Computer Engineering**

Depending on their previous knowledge, students are able to select basic modules (minor) or advanced modules (major) in Electrical and Computer Engineering. The minor requires modules worth 10 ECTS chosen from Electives 1 and modules worth 20 ECTS chosen from Electives 2 to be selected and passed. Students who already passed the Engineering/Nat.Sciences specialization Electrical and Computer Engineering as part of their Bachelor's studies, can only select advanced modules (major) of Electrical and Computer Engineering.

### ▪ **Minor**

#### Electives 1

- Grundlagen der Informationstechnik
- Principles in Electrotechnology (*english*)
- Elektrotechnik

#### Electives 2

- Analog Electronics (*english*)
- Nachrichtentechnik I
- Kommunikationsnetze
- Praktikum Schaltungselektronik
- Nutzung regenerativer Energien
- Grundlagen der Hochfrequenztechnik
- Nachrichtentechnik II
- Energietechnische Anlagen
- Internetkommunikation
- Photovoltaische Inselsysteme
- Audiokommunikation
- Nanoelectronics (*english*)

**▪ Major: Informationstechnik und Elektronik**

- Projektpraktikum Multimedia
- Nanotechnology for Energy Systems (*english*)
- Projektpraktikum: Wirtschaftliche Aspekte der Nanotechnologie
- Medientechnik
- Clinical Applications of Computational Medicine (*english*)
- Entwicklung von integrierten Schaltungen
- Projektpraktikum Nanoelektronik
- Nanotechnology for Energy Systems (*english*)
- Halbleitersensoren
- Physical Electronics (*english*)
- Technische Akustik und Lärmbekämpfung
- Nanosystems (*english*)
- Techno-Economic Analysis of Telecommunication Networks (*english*)

**▪ Major: Energy Engineering**

- Industrielle Energiewirtschaft
- Grundlagen elektrischer Energiespeicher
- Grundlagen elektrischer Maschinen
- Elektrische Straßenfahrzeuge
- Umweltmanagement und Ökoauditierung
- Elektrische Antriebe – Grundlagen und Anwendungen
- Leistungselektronik – Grundlagen und Standardanwendungen
- Bahnsysteme und ihr wirtschaftlicher Betrieb
- Elektromagnetische Verträglichkeit der Energietechnik
- Energieübertragungs- und Hochspannungstechnik
- Praktikum EU & HAT
- Energieanwendungstechnik
- Stromversorgung mobile Geräte
- Nanotechnology for Energy Systems (*english*)
- Elektrische Kleinmaschinen
- Projektpraktikum: Wirtschaftliche Aspekte der Nanotechnologie
- Techno-Economic Analysis of Telecommunication Networks (*english*)
- Energy Systems & Energy Economy (*english*)

## ▪ **Computer Engineering**

Depending on their previous knowledge, students are able to select basic modules (minor) or advanced modules (major) in Computer Engineering. In total, modules worth 30 credits from the elective module catalogue must be selected and passed. Students who already passed the Engineering/Nat.Sciences specialization Computer Engineering as part of their Bachelor's studies, can only select advanced modules (major) of Computer Engineering.

### ▪ **Minor**

- Introduction into Computer Science (for non Informatics students)
- Information Management for Digital Business Models
- Bachelor Practical Course
- 3D User Interfaces (*english*)
- Programming Languages
- Principles of Information Engineering (*english*)
- Principles in Electrotechnology (*english*)
- Analog Electronics (*english*)

### ▪ **Major**

- Data Mining and Knowledge Discovery (*english*)
- Grundlagen der Künstlichen Intelligenz
- Robotik (*english*)
- Kognitive Systeme
- Advanced Topics of Software Engineering
- Mobile Communications (*english*)
- Nanoelectronics (*english*)
- Programming in C++ for Socio Technical Systems (*english*)
- Real-Time and Embedded Systems (*english*)
- Statistical Signal Processing (*english*)
- Real-Time Programming Languages (*english*)
- Brain, Mind and Cognition (Seminar) (*english*)
- Data-Driven Innovation (*english*)
- Inside my iPhone – Technology Analysis of a Smart Phone (*english*)
- Multimedia Communications (*english*)
- Techno-Economic Analysis of Telecommunication Networks (*english*)
- Topics in Multimedia Signal Processing (*english*)

## ▪ **Industrial Engineering**

In total, modules worth at least 30 ECTS must be chosen from the electives and passed. Modules in the Industrial Engineering minor cannot be taken if a specialization in OSCM is chosen.

### ▪ **Minor**

- Stochastic Modeling and Optimization (*english*)
- Inventory Management (*english*)
- Discrete Optimization (*english*)
- Designing and Scheduling Lean Manufacturing Systems (*english*)
- Planning and Scheduling of Complex Operations: Models, Methods and Applications (*english*)
- Advanced Topics in Operations & Supply Chain Management
- Business Analytics (*english*)
- Auktionstheorie und Marktdesign (*english*)
- Foundations of Data Analysis (*english*)

## Electives in Management and Technology

Students must pass electives in management and technology worth 30 credits. There are **three different ways** to do so.

- You may earn these credits during an **exchange abroad**. Students, therefore, choose classes worth in total 30 ECTS at the exchange University that suit their curriculum. The classes are to be chosen from the list of classes offered by the exchange university and no corresponding equivalents need to be offered in the Master's of Management and Technology. The purpose of the international profile is to enlarge the offer of classes by complementary classes offered at exchange universities.
- Instead of taking and passing classes during an exchange abroad, you may also earn these credits by choosing **classes of the management and technology electives**. This allows you to explore another technical or management subject or broaden and deepen your specializations.
- Students can also earn the necessary credits in their electives through **project studies**.

Students that already passed the basics in one of the technology subjects during their bachelor's, cannot take and pass these basic classes again. They must take the classes from the major modules offered in this subject or choose another technology subject.



## Master's thesis

The Master's thesis is a six month independent academic research project that proves the students' knowledge and skills in their respective field of expertise. The master's thesis may be written as a pure theoretical work or it can be complemented with empirical research as well. During the master's thesis students are individually supported and supervised by the academic staff (Phd candidates, professors) of the responsible chair. A successfully completed master's thesis is rewarded with 30 ECTS.

## Selection Procedure

Detailed information on the current selection procedure to the program can be found on our website ([www.wi.tum.de](http://www.wi.tum.de)).

# Regelungen der APSO/FPSO

## Modules

- **Compulsory** cannot be chosen freely and must be completed successfully
- **Compulsory Electives** can be chosen freely but must then be completed successfully
- **Electives** can be chosen freely and in case of failure they can be substituted through another elective module
- The time frame of a module is usually one semester.

## Resits

- For each exam usually at least one resit is offered.
- A failed module can be retaken indefinitely as long as the overall study progress is sufficient.

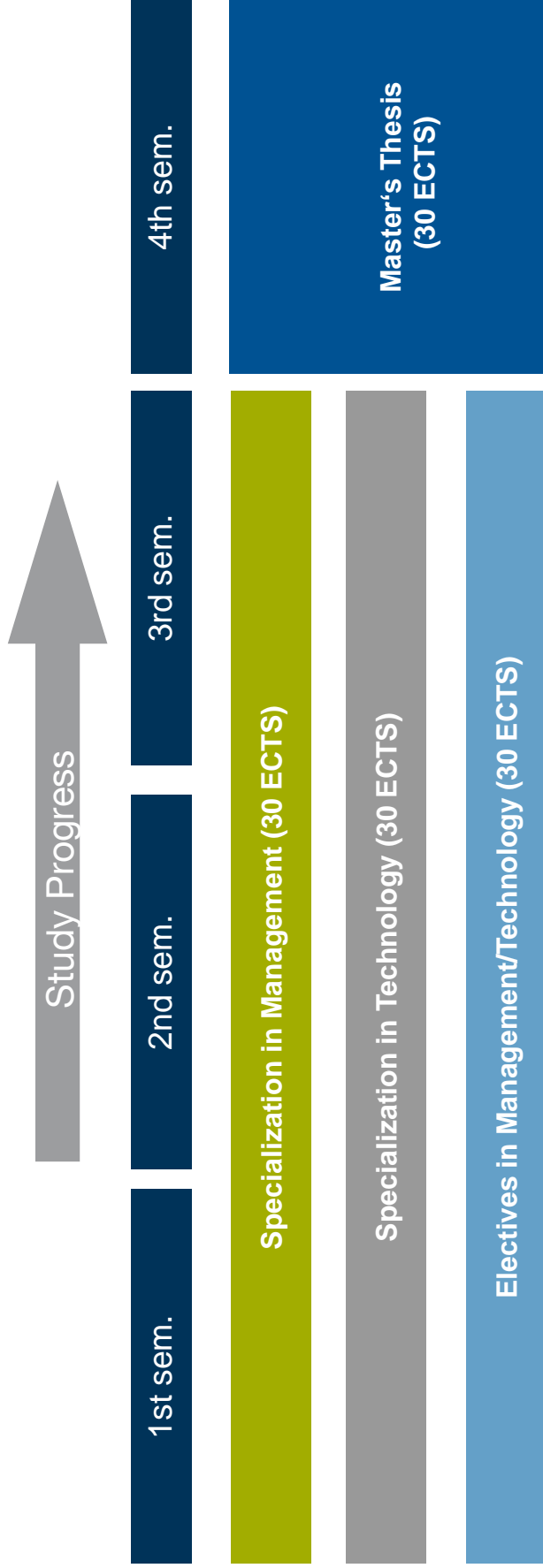
## Study Progress

- Students must pass at least
  - 30 ECTS at the end of their 3. semester
  - 60 ECTS at the end of their 4. semester
  - 90 ECTS at the end of their 5. semester
  - 120 ECTS at the end of their 6. semester

If students fail to meet the required study progress, they are immediately ex-matriculated.

- To complete the programme in due time (intended time of study for the program) 30 ECTS should be selected and passed each semester.
- The study progress will be checked once per semester
- A warning will be issued if only half or less than half of 30 ECTS are selected and passed per semester.

## Ideal Study Plan (varies depending on individual profile)



120 credits

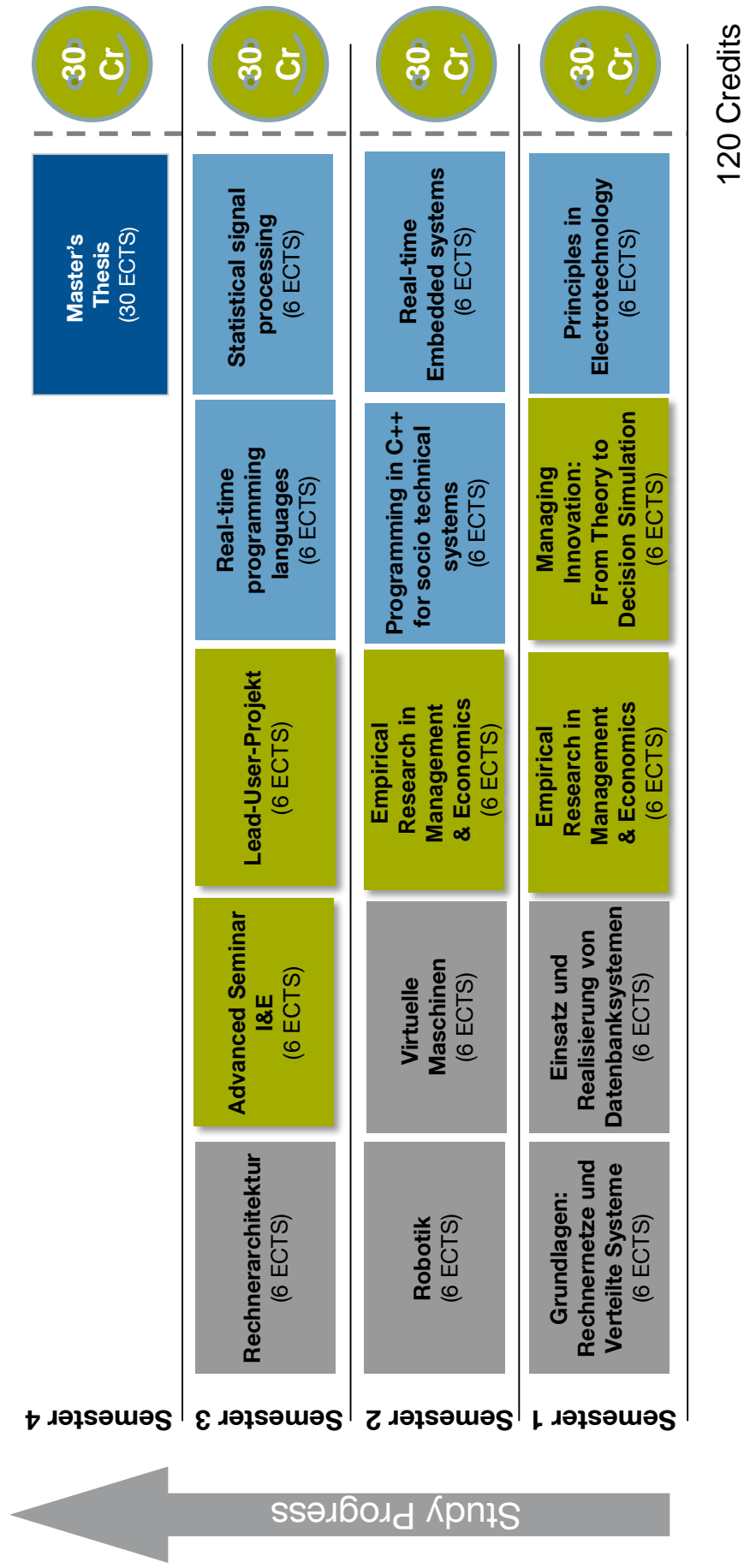
### Semester 1-3:

Mix according to your own interests and needs

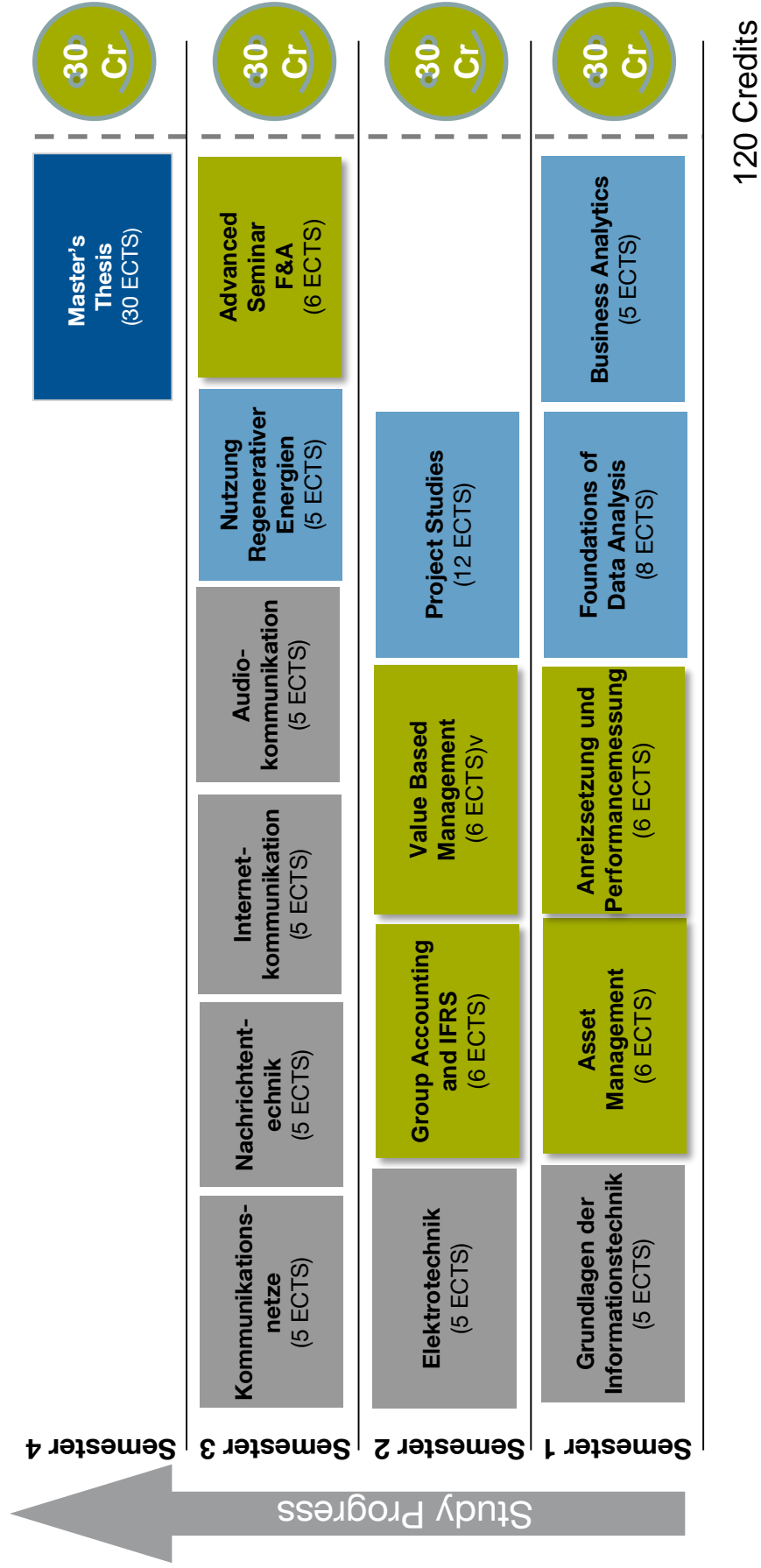
### Semester 4:

Master's thesis

## Exemplary Study Plan: Innovation & Entrepreneurship/ Major Informatics (Technology profile)



## Exemplary Study Plan: Finance & Accounting/ Minor Elektro- und Informationstechnik (Mix Management / Technology profile)



## Entry and Graduate Profile

### Minimum entry profile:

- Graduates of a Bachelor's program or alike in Management, Business Administration or Economics with a strong affinity to technology
- → reflects in the admission requirements:
  - 25 ECTS Management/Business Administration
  - 5 ECTS Economics
  - 12 ECTS foundations of Engineering/Natural Science (e.g. maths, statistics, informatics)
- → aptitude procedure according to most recent TUM-BWL M.Sc. procedure

### Minimum graduate profile:

- Overall M.Sc. qualification profile
- Advanced knowledge in Management
- Basic knowledge in at least one Engineering / Nat. Science discipline
- Individual profile: international | specialized in Management | specialized in Technology

## Contact

You find further information on our website. We gladly advise and help you personally.

**Homepage:**

[www.wi.tum.de](http://www.wi.tum.de) →  
Academic Programs

**Student Advisor  
TUM School of Management**

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**Selection Procedure  
TUM School of Management**

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Eingang Luisenstraße

**General study advice  
Technische Universität München**

**Informationsbüro Studenten  
Service Zentrum**  
[studienberatung@tum.de](mailto:studienberatung@tum.de)  
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## Kontakt

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