Degree Program Documentation

Master's degree program
Responsibility in Science, Engineering and Technology (RESET)

Munich Center for Technology in Society (MCTS)

Technical University of Munich

TUM School of Governance

Name	**Responsibility in Science, Engineering and Technology (RESET)**
Administrative responsibility	**Munich Center for Technology in Society (MCTS), TUM School of Governance**
Degree	**Master of Arts (M.A.)**
Standard duration of study & credits	**4 semesters and 120 ECTS**
Form of study	**Full-time**
Admission	**Aptitude assessment (EV)**
Start	**WS 2017/2018**
Language(s) of instruction	**English**
Overall responsibility for degree program	**Prof. Dr. Sebastian Pfotenhauer**
Additional information for special degree programs	**Elite Master's Program funded by the Elite Network of Bavaria**
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Inhaltsverzeichnis

Preamble

The Munich Center for Technology in Society (MCTS) was founded in 2013 and is one of the largest hubs for Science & Technology Studies (STS) in Europe. As an integrative, interdisciplinary center at TU Munich, it is dedicated to understanding and reflexively shaping the multiple interactions between science, technology, society, and politics. To that end, the MCTS brings together experts from STS, sociology, political science, anthropology, management, policy, history, philosophy as well as engineering and the natural sciences.

The MCTS is a major player in the European and German Research landscape. It is currently coordinating the EU-H2020 flagship project "Scaling Up Co-Creation" (SCALINGS) and participating in a range of other European projects such as the "EIT Food", "Smarter Together" and "IMPROVE" projects. Nationally, the MCTS is playing a leading role in various DFG and ministry-funded projects, including the DFG research group "Practicing Evidence," the SFB 768 "Managing Cycles in Innovation Processes" or individual DFG projects such as "Regional Innovation Cultures" and "METALABS" and the BMBF-funded research projects "The Language of Biofacts", "Assessing Big Data (ABIDA)", and "TechnoCitizenScience". In the Munich region, the MCTS has research and teaching collaborations with the LMU's Department of Sociology, the Deutsches Museum as well as with the Institut für Sozialwissenschaftliche Forschung (ISF). It is also developing a course framework on science and technology communication with the Bayerische Rundfunk (BR). Moreover, collaborative research efforts exist with many leading national and international partners, including the WZB (Berlin Social Science Center), Universidad Alberto Hurtado Chile, University of Vienna, Leiden University, Harvard University, MIT, TU Eindhoven, and Arizona State University, as well as international research networks such as the SDN ("Science and Democracy Network") or CPERI ("Changing Political Economy of Research and Innovation").

The MCTS works closely with the Bavarian School of Public Policy (Hochschule für Politik München). Both institutions make up the TUM School of Governance, which was founded on January 1, 2017 as an additional department of the Technical University of Munich (TUM) and examines the interactions between politics, economy, society, and technology, thereby seeking a multi- and transdisciplinary social scientific understanding of these interactions.

In 2016, the MCTS initiated a new research group on "Engineering Responsibility" to investigate, from a comparative perspective, the conditions and effects of responsible research and innovation (RRI) in engineering that serves as a platform for projects and teaching initiatives. RRI builds on previous work on the ethical, legal, and social implications of research (ELSI) and research integrity, and has

recently gained global prominence as a key priority of the EU Horizon 2020 program. As a result, leading universities have been challenged to offer targeted education programs to equip graduates with the necessary skill sets – this is exactly what RESET at the MCTS/TUM is about.

The RESET M.A. program builds on these diverse collaborative platforms. Funded by the Bavarian State Ministry of Education and the Arts under the Elite Network of Bavaria, it enables students to understand and engage in socio-technical dynamics and effects of innovation and research, and to respond to the challenges resulting from the entanglement of science, technology, and society.

1. Degree Program Objectives

Purpose of the Degree Program

The goal of the RESET M.A. program is to help students with undergraduate backgrounds in STEM ("Science, Technology, Engineering and Mathematics") fields, social sciences and/or the humanities to become practitioners and researchers with outstanding analytical capabilities. It aims to prepare them for careers in corporations, academia, public services, or other sectors concerned with research, decision-making, and/or communication in emerging socio-technical fields such as sustainable energy solutions, industrial biotechnology, biomedical health care, the internet of things, big data, and urban infrastructure. After completion of the RESET program, graduates will be social and political scientists sensitized to technical issues on an elite level, which will make them capable of leadership in the above-mentioned fields.

RESET's unique strategy is based on educational symmetry: instead of merely providing add-on training in social science and ethics to engineers and scientists (as many programs do), we seek to educate high-performing students equally in the social sciences, humanities, and STEM fields, alongside one another.

Characteristic features of RESET are:

Responsibility and responsiveness: a distinctive focus on the socio-technological dynamics and effects of innovation and research that empowers social scientists to understand and respond to the unique challenges resulting from the increasing entanglement of science, technology, society, politics, and the economy

A prominent role for STEM in the social sciences: a transdisciplinary program that combines rigorous social science training in the methods, theories, and research practices of Science and Technology Studies (STS) with training and project-based immersion in engineering, science, citizen engagement, and policy-making

Current research-oriented education: case-study-oriented teaching methodology at the cutting edge of STS research, complemented with perspectives from ethics, politics, economics, law, and media studies to train future leaders in the pursuit and governance of Responsible Research and Innovation – a key priority in the EU Horizon 2020 strategy. RESET enables students to autonomously explore, identify, and respond to emerging ethical and political challenges in science, technology, and society.

An innovative immersive curriculum with a cohort focus: a cohort-centered approach with an innovative term structure (e.g. based on a biweekly rotation of theoretical subjects and project formats in the first term) and hands-on immersive learning opportunities that fosters project-based learning and new forms of collaborative teaching across institutions and disciplines in Munich and Bavaria

Practice-oriented education: immersion projects and an internship to help students gain practical experience and give them the opportunity to apply their theoretical knowledge to practical issues

Intensive support and guidance: a personal mentoring program and individual guidance for all students throughout the program to ensure the feasibility of STEM integration

International competitiveness: an English-only curriculum to attract national and international students to a unique education program in STS with a strong STEM profile and a special focus on issues of responsibility

A long-term vision: a commitment to deepening inter-institutional relationships and embracing experimental collaboration in education and research in order to equip students with qualification profiles that are responsive and adaptive to emerging policy demands

Strategic Significance of the Program

TU Munich has recently extended its notion of excellence in the natural sciences and engineering to include a synergistic commitment to the social sciences and the humanities, especially to fields that explore issues of public policy, governance, societal well-being, organization, and management in relation to science and technology. In cooperation with other TUM institutions, such as the Munich School of Engineering (MSE) and the Hochschule für Politik (HfP), the MCTS is designed to promote research, teaching, and public dialogue that addresses the dense cross-traffic between science, technology, and society in the 21st century. RESET is one central contribution adding to this mission. As an Elite Graduate Program, RESET is funded by the Elite Network of Bavaria (ENB). Hence, the goals of the program are also closely aligned with the specific objectives of the ENB. The following list is a selection of goals which have special relevance to both the

strategic role of RESET as a degree program offered by the MCTS / TUM School of Governance as well as the objectives of the Elite Network of Bavaria:

- **Curriculum profile:** a small core faculty selected on the basis of scientific and teaching excellence, allowing for interdisciplinarity through joint appointments between the MCTS and other TUM departments; additional (elective) teaching resources from Munich, Bavaria and international partners; tight integration of social sciences and STEM with a focus on responsible interaction, which does not currently exist in Germany but which is in high demand internationally and will further strengthen TUM's position in this domain

- **Internationalization**: international faculty invited for colloquia, symposia and teaching exchange; cooperation with high-profile international researchers at high-profile international institutions for student exchange in research projects; this underlines TUM's profile as an internationally oriented university

- **Personality development:** interdisciplinary course content from the social sciences with a particular perspective on STEM; elective in-depth courses in certain STEM domains allowing for individual specialization; student groups with complementary academic and cultural backgrounds, making for mutually beneficial study groups; student-organized workshops and retreats; annual symposium to present and discuss own research amongst peers; intense scientific debating and symposia in small groups and the wider context of the MCTS; development of team-building skills and leadership qualification in small groups; all this adds up to what could be called the TUM experience in excellent interdisciplinarity

- **Scientific graduation profile:** mandatory individual research projects give students experience with independent scientific work, ideally allowing each student to (co-)author a scientific paper, which may serve as a jump-start in graduate (PhD) programs; debating and presenting trains students to understand the significance of finding, interpreting, critically evaluating, and discussing scientific results amongst peers and stakeholders; with these measures RESET sets out to attract young academic talents to join TUM

2. Qualification Profile

Working on questions of responsibility, the RESET master's program focuses on problem-based learning and instruction to apply solution-oriented perspectives. Key questions guiding the learning process across a number of empirical fields are: What does it mean to act responsibly at this specific nexus of science, technology and society? Who is responsible and in which ways? Whom do I need to involve in order to develop responsible decision-making practices? To answer these questions, RESET graduates can draw on specifically tailored training in key

principles and approaches from Science and Technology Studies (STS) and neighboring fields, as well as on immersion experiences in fields of practice.

After graduation, RESET students are able to respond to the challenges that occur at the intersection of science, technology, society, politics, and the economy. They are prepared for doctoral studies and future leadership positions in academia, industry, higher administration and science management through a strong emphasis on personal engagement through immersive projects, practice in reflecting on science and engineering, training in applied fields, scientific debating and presentation, as well as language and writing training.

In particular, RESET graduates are able to identify and discuss social, economic, political, media and legal aspects of innovation, controversies, and responsibility in science and technology, and they can design and carry out research projects in this vein. They are able to work in inter- and disciplinary ventures within which they can compare and integrate different perspectives on a problem at the intersection of responsible research and innovation. They are skilled in communicating on issues of responsibility in science, engineering and technology in different formats such as papers, blog posts, and talks. They are able to address topics such as specific innovations, their prerequisite and their effects, to a wider audience, they can produce opinion pieces on controversies in the field of technology assessment and write reviews on new publications at the intersection of science, technology, and society. They cannot only present and debate issues they are currently working on but are also able to create frameworks for doing so. RESET graduates are familiar with different qualitative, quantitative, mixed and inventive methods of STS, e.g. social scientific methods such as qualitative videography, discourse analysis or analysis of controversies and interviews. They understand methodological foundations of research in the humanities and social science, they understand the character of data and the links between methods and conceptual frameworks. They can apply different methodological approaches and have fundamental skills for developing research designs for STS projects. In general, graduates are able to conduct research from scratch, i.e. hypothesize about research questions, apply methods to analyze an empirical case from an STS perspective (e.g. media coverage on genome editing, the use of particular information technologies in governance processes, the smartification of homes, controversies on ecological agriculture etc.), and test assumptions by creating an appropriate research design. They can conceptualize and conduct research and keep records by producing a research report.

RESET equips graduates with a toolbox of theories, methods, and techniques that go beyond the inventory of a single discipline, but which instead emerge from tight interactions between the social sciences, economics, the legal sciences, and eth-

ics, combined with various fields such as engineering, mathematics, and informatics. In addition, students are able to acquire social, communication, and management skills.

Hence the qualification profile meets the requirements of the "Qualifications Framework for German Higher Education Degrees" (Hochschulqualifikationsrahmen – HQR) decided upon by the German Rectors' Conference and the Standing Conference of the Ministers of Education and Cultural Affairs (Hochschulrektorenkonferenz und Kultusministerkonferenz) on 16 February 2017. In accordance with the HQR, the qualification profile for the research-oriented Elite Master's Program RESET comprises the requirements (i) knowledge and understanding, (ii) implementation, application and production of knowledge, (iii) communication and cooperation and (iv) scientific self-understanding/professionality. The formal aspects according to the HQR (admission requirements, length, graduation stipulations) are specified in chapters 3 and 6 and in the corresponding Examination and Academic Regulations.

3. Target Groups

Target Groups

This program addresses national and international, internal and external graduates of the following bachelor's degree programs:

- all Bachelor of Arts and Bachelor of Economics
- all STEM subjects (science, technology, engineering and mathematics)
- life sciences and medicine
- law

Prospective students demonstrate analytic skills and the ability to recognize problems at the interface between engineering, the natural sciences, and social science. Furthermore, specific experiences in interdisciplinary fields and work practices (e.g. courses, research projects, internships) as well as in research-oriented work practices (e.g. specific science orientation in previous studies, participation in research projects) are desirable.

Program Prerequisites

To account for differences in background, and recognizing that RESET is a master's program in the social sciences and humanities, RESET applicants must enter the program with a minimum training requirement in social science theory and methodology. Should successful applicants not fulfil this requirement, they are able to take an intensive preparatory course at the beginning of the first semester.

Prospective students also need to demonstrate prior self-initiated knowledge and activity in the interdisciplinary area between the social sciences and STEM fields. Candidates go through a two-stage aptitude test: (1) an initial paper-based pre-selection of suitable candidates, followed by (2) a personal interview prior to admission.

During this process, the following criteria are considered:

- the ability to identify problems at the intersection of science, technology, society, politics, environment, and economy

- specific experiences with interdisciplinary questions and practices (e.g. in courses, projects, internships) and with research-oriented work (e.g. during candidates' bachelor's studies or in other research projects)

- the ability to reflect on prerequisites and consequences of science and technology by means of methodological and theoretical approaches stemming from social science and the humanities

Every applicant whose native language is not English needs to demonstrate proficiency in English (e.g. through an acknowledged language test like TOEFL or IELTS). During the aptitude interview, the candidates' motivation, communication competence and relevant extracurricular qualifications (e.g. stays abroad or internships) are evaluated. Furthermore, interviewers assess candidates' understanding of the complex relationships between science, technology and society, as well as their ability to convincingly present arguments and to appropriately respond to interview questions.

Target Numbers

RESET aims to admit no more than 30 students per cohort. This is in line with both the program's and the Elite Network of Bavaria's objective to offer intensive tutoring to all students as well as with the current lecture room and staffing conditions. Furthermore, RESET aims for a balance between students holding undergraduate degrees in STEM fields, the humanities and social sciences.

4. Analysis of Need

Responsible Research and Innovation is key to a future-oriented approach towards technology and as such the EU sees it as a "'cross-cutting issue' in Horizon

2020".[1] Along with the EU's efforts to promote socially responsible research, UNESCO has highlighted the globally growing importance of RRI principles in its 2015 science report. As science author Elisabeth Pain points out in a recent article: "A growing number of national governments, research institutions, funding bodies, and scientific fields across Europe are promoting responsible research and innovation, and similar efforts extend beyond the continent."[2]

Furthermore, it is to be expected that RRI will gain importance in funding programs and that "researchers' capacity to reflect [on] societal responsibility could—in the long run—become more important for scientific careers in academia and beyond", as stated by the spokespersons of the Research Platform for Responsible Research and Innovation in Academic Practice (a network of scholars based at the University of Vienna).[3] Yet Pain states that at the moment "[b]road institutional implementation of RRI is still in its early days". The demand for researchers with a qualification profile focusing on RRI is increasing.

RESET responds to the growing societal demand for excellent graduates who can expertly and confidently understand and confront the various political challenges emerging at the interface between science, technology, society, politics, the environment, and the economy. Furthermore, the program is driven by a mission of interaction across disciplinary boundaries and beyond. In this vein, it trains students for public and private sector careers in ways that inflect advances in science and technology with questions of governance, responsibility, responsiveness, precaution, and care in innovation processes from agenda-setting to usage.

RESET graduates are promising candidates for managerial positions in the field of science and innovation on a federal, national or EU level. In Bavaria, e.g. BAY-For (Bavarian Research Alliance) and the Bavarian Research and Innovation Agency are central actors in this domain (the former being a regional partner of RESET, see 9.1). Furthermore, they are excellently trained for the professional fields of Corporate Social Responsibility and Research & Innovation, which now play a pivotal role for companies and other kinds of organizations. RESET graduates are also prospective research analysts in think tanks preoccupied with the development and regulation of science and technology. They are well-equipped for tasks in the realm of public management with a focus on science and technology (e.g., in higher education and research-funding bodies). Last but not least,

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[1] In: https://ec.europa.eu/programmes/horizon2020/en/h2020-section/responsible-research-innovation (Jan 10, 2017).

[2] Cf. Elisabeth Pain: „To be a responsible researcher, reach out and listen" in: Science,
http://www.sciencemag.org/careers/2017/01/be-responsible-researcher-reach-out-and-listen (Jan 17, 2017).

[3] https://rri.univie.ac.at/en/about/ cited after Pain 2017.

the RESET program prepares its graduates for academic careers in teaching and research on issues of responsibility in science, engineering and technology.

5. Competition Analysis

External Competition Analysis

There is a small but growing number of STS master's programs both in Germany and abroad. Important centers for these programs are Maastricht University, University College London, University of Edinburgh, and University of Vienna. Within Germany, a small amount of more specialized and often German-speaking profiles can be found at the HU Berlin (with a focus on scientometrics), the University of Hannover (innovation studies), and Frankfurt (culture and markets, governance, and the life sciences). Compared to these STS master's programs, RESET offers a unique profile with a number of distinct selling points: First, it offers a distinct focus on questions of responsibility in research, innovations, and science policy, a topic of growing importance given a growing emphasis on responsible research and innovation in science policy and beyond. Second, it takes a distinctly problem-based and solution-oriented teaching approach, explicitly training students not only for academia but also to address these questions in practice while working in leading positions in government, industry, and administration. Thirdly, it closely integrates a strong training in the social sciences with a systematic exposure to technical sciences and cultures that only an MA program based at a leading technical university like TUM can offer.

In sum, although Responsible Research and Innovation are a key priority of EU Horizon 2020, no other master's program addresses responsibility in technology and society like RESET does.

Internal Competition Analysis

The RESET master's program is part of the growing learning environment across TUM, in which questions of science, technology, and society are addressed in research and teaching. Like the master's program "Science and Technology Studies" (M.A. STS), RESET draws on insights from Science and Technology Studies as an intellectual foundation for working with a multidisciplinary group of students on issues related to the interaction of science, technology, and society. However, unlike the STS M.A. program, which addresses a broad range of topics related to science, technology, and society, RESET focuses specifically on questions of responsibility in contemporary knowledge-based and technologized societies. In this respect, the program also benefits from experiences and the demand formerly met by the discontinued MA program "Wissenschafts- und Technikphilosophie".

Synergies between the two existing master's programs are created: The STS Core Topics 1-3 in the second semester of the RESET M.A. program are shared with the STS M.A. program. RESET students can select any of the currently offered STS Core Topic modules ("Core Topics in STS") whilst students from the other programs can enroll in newly created elective RESET modules for independent specialization. The mandatory seminars and small-group tutorials, however, are reserved for RESET students.

In addition, RESET students can benefit from the encompassing expertise of the HfP (Hochschule für Politik). It is, however, important to note that RESET differs from the HfP's master's program "Politics and Technology" in that the former deals with a wide range of responsibility-related topics at the intersection of science, technology and society whereas the latter focuses primarily on the governance of new and existing technologies.

RESET builds on priorities and institutional activities at TUM. It is highly synergistic with the goals and activities at the MCTS, HfP, the School of Engineering or TUM Asia. MCTS professors and research staff are firmly established and spread across various TUM departments, thus providing strong integration and support from within the TUM community. We expect that RESET will also present a welcome opportunity for other institutions in Bavaria to strengthen their "Responsible Research and Innovation" footprint.

6. Structure of the Degree Program

Concept and Foci

RESET is a two-year, full-time interdisciplinary study program, which requires students to complete 120 ECTS to obtain the academic degree Master of Arts "Resonsibility in Science, Engineering, and Technology". The program starts every winter semester and the language of instruction is English. The RESET curriculum comprises mandatory and elective modules (90 credits) and a master's thesis (30 credits). Students are expected to achieve a score of 30 credits every semester. All mandatory classes are closely mentored. Additional "Skills" courses provide students with competences like communication, social and project management skills. The study program is designed to allow students to conduct individual, independent – yet supervised – research as early as possible in their career.

Key features of the RESET curriculum are (a) an innovative term structure, (b) current research orientation, c) practice orientation and (d) support and supervision.

a) **Innovative term structure**: In order to enable new formats of inter-institutional collaboration and to foster a cohort-centered approach, a distinct academic

calendar is adopted using a partly modular term structure. Insights from educational research are drawn upon that show how intensive, modular teaching can enhance learning outcomes. In particular, the first semester has a structure based on a biweekly rotation of subjects and project formats that gradually and synergistically build on one another and offer multiple intervention points for reflection and consolidation. Students are given the opportunity to immerse themselves in one specific topic of contemporary relevance and to view them from various theoretical perspectives in conjunction with hands-on, project-based learning experiences.

b) **Current research orientation:** Throughout the program, teaching is based on current case-study research in the interdisciplinary field of STS, addressing political, social, economic, and environmental challenges at the intersection of science, technology and society. This is crucial for training students to understand and respond to the highly specific and unique controversies and situations they will confront in their professional work.

c) **Practice orientation:** At various stages of the program, students are given the opportunity to apply theoretical approaches to practical issues and real-world problems. In both the immersion project and the internship, they work on projects with partners from the policy, non-profit and/or private sectors and are trained to reflect on how ethical, political, social, organizational and/or legal dimensions of responsibility relate to their respective tasks and the problems they are presented with.

d) **Support and supervision:** Right from the start, RESET M.A. students benefit from different measures that encourage and support them when it comes to choosing their personal focus. This is achieved by continuous close interaction with assigned mentors from the teaching staff, especially with regard to the students' study progress, their research projects and internship.
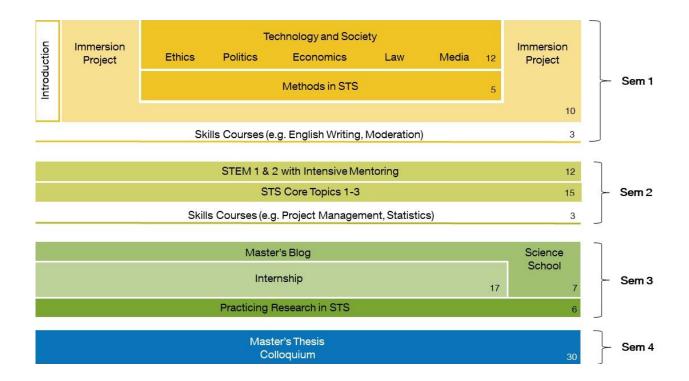
Regular meetings between mentors and teachers allow for discussions about the cohort's overall academic progress. Furthermore, the program provides formats through which junior and senior students can establish peer-mentoring routines.

The curriculum comprises four semesters, each with a specific focus: (1) a project-based introduction to STS and issues of responsibility as well as to social science methods; (2) introductions to STEM fields and seminars in key fields of STS; (3) training in presenting STS topics to different audiences and in organizing a science workshop; internship; practicing research in STS in preparation for the master's thesis; (4) independent research for the master's thesis. Whereas the first semester is characterized by mandatory courses to create a common knowledge foundation, the subsequent semesters increasingly offer possibilities to elect individual foci.

In more detail:

1. The first semester is dedicated to introducing students to social, economic, political, media, and legal aspects of innovation, controversies, and responsibility in science and technology, facilitated by an innovative term structure and immersive projects as well as by hands-on training in STS research methods, including the mapping of technoscientific controversies with digital methods.

2. The second semester provides in-depth introductions to two STEM fields. This is complemented by three elective specialization seminars in key STS fields.

3. The third semester primarily gives students the opportunity to gain practical experience through an internship as well as a research project. Furthermore, students learn to present STS topics to a wider audience in the form of a blog and to experts at a science workshop, which they themselves organize.

4. In the fourth semester students write their master's thesis, which helps them learn to carry out research work with high relevance for a range of stakeholders in academia, industry, governmental and non-governmental organizations.

Throughout the RESET program, students are required to reflect upon current research and practice from an STS and responsibility perspective: The immersion project in the first semester immediately gives students hands-on experience with academic research in STS. Their research horizons are expanded in the second semester by the tutored attendance of STEM lectures. Recommended STEM modules include introductory courses that already exist at partner faculties and are intensively mentored by tutors. In the third semester, students develop their own research project and organize a science workshop ("Science School"). The Master's Blog provides a digital platform, where students publish a blog post about a topic related to their chosen field of practice with a specific view on issues of responsibility.

			Technology and Society						Immersion Project		Sem 1
Introduction	Immersion Project	Ethics	Politics	Economics	Law	Media	12				
			Methods in STS				5				
										10	
Skills Courses (e.g. English Writing, Moderation)										3	

STEM 1 & 2 with Intensive Mentoring	12	Sem 2
STS Core Topics 1-3	15	
Skills Courses (e.g. Project Management, Statistics)	3	

Master's Blog		Science School	Sem 3
Internship	17	7	
Practicing Research in STS	6		

Master's Thesis Colloquium	30	Sem 4

Modules in Program Structure

To account for differences in undergraduate degree backgrounds, and recognizing that RESET is a master's program in the social sciences, RESET applicants must enter the program with a minimum training requirement in this field (min. 8 credits). These requirements can be met either through prior course work in the social sciences at a BA/BSc level or preparatory courses offered by the MCTS at the beginning of the first semester (the "STS0" courses "Basic Methods in Science and Technology Studies" and "Basic Ideas and Concepts of Science and Technology Studies").

Semester 1

Immersion Project (Mandatory Module, 10 ECTS)
Technology and Society (Mandatory Module, 12 ECTS)

The first semester is entirely dedicated to introducing students to social, economic, political, media, and legal aspects of innovation, controversies, and responsibility in science and technology, facilitated by an innovative term structure and immersive projects.

Week 1:   Immersion Project – Introduction to RESET

Students are familiarized with the requirements, expectations, and logistics of RESET. At the end of the week, students form small teams to prepare for their immersion project in weeks 2 and 3.

Weeks 2&3:   Immersion Project – Part 1

Students work in small teams with partners from the policy, non-profit, or private sector on a limited-scope problem at the intersection of responsible research and innovation. This initial hands-on immersive experience combines a first exposure to social science research practice with a project-based approach.

Weeks 4-13: Technology and Society

Intensive introductions (two-week courses) to Ethics, Politics, Economics, Law and Media with continual reference to the immersion projects.

Week 14:   Immersion Project – Part 2

Students return to their immersion projects and synthesize their problem analysis and empirical findings with the theoretical knowledge acquired in the five Technology and Society block sessions.

The main feature of the first semester is its innovative term structure, in which the theoretical module "Techology and Society" and the research-practice-oriented module "Immersion Project" are strongly interlinked, giving students the continual opportunity of combining theory and research practice. The Immersion Project brackets an array of intensive Technology and Society block courses, which introduce students to the 1) ethical, 2) political, 3) economic, 4) legal and 5) media aspects of innovation, controversies, and responsibility in science and technology. The timetable structure allows for continual reference of these intensive courses to the individual immersion projects.

Methods in STS (Mandatory Module, 5 ECTS)

In order to give students firm foundational knowledge in the social-scientific methods particularly relevant to STS right at the beginning of their studies, the first semester also includes a "Methods in STS" module. Students are familiarized with different qualitative research methods, such as qualitative videography, discourse analysis, mapping of controversies or interviews, as well as hermeneutic, phenomenological and dialectical methods of philosophy, and historical-critical methods. In addition to acquiring hands-on knowledge of different methods, students develop a reflexive understanding of their theory, practices and politics.

Skills Modules (Elective Modules, 2 x 3 ECTS)

The RESET program aims to foster students' social, communication, management and research skills by offering a range of elective "Skills" courses such as

"**Writing for Social Scientists**" which conveys the principles of academic writing, text formats and citation styles, as well as writing strategies for a social science context

"**International Project Management**" which familiarizes students with project management tools and strategies with a special focus on the challenges of international collaboration and issues of responsibility

"**Intercultural Communication**" which provides students with insights into how people with different personalities and cultural backgrounds interact with one other and what influences their communication. Students learn to analyze these factors, to develop greater awareness for their own and other communication styles and acquire strategies to improve their communication skills.

"**Statistics**" which teaches students the basics of statistics and also how to critically reflect on and discuss statistical findings.

During the course of their studies, students elect a total of two "Skills" courses.

Semester 2

STEM 1 & 2 with intensive mentoring (Mandatory Module, 12 ECTS)

Students visit self-chosen STEM lectures as well as accompanying tutorial sessions (mentorship) in which they reflect on and critically discuss the paradigms and practices they encounter in the lectures from an STS and responsibility perspective. Students with undergraduate backgrounds in the social sciences, psychology and the humanities visit introductory STEM courses while students with a STEM background choose advanced STEM courses.

The aim of this module is a theoretically informed and methodologically controlled analysis of specific disciplinary practices.

STS Core Topics 1-3 (Elective Modules, 3 x 5 ECTS)

In the second semester at least four seminars (more if possible) from the following key STS subjects are on offer for students to choose from:

Biomedicine & Health, NatureCultures & Sustainability, Knowledge Cultures & Institutions, Media & Digital Cultures, Politics & Governance, Publics & Participation, Infrastructures & Design, Co-construction of Technology & Users, Risk & Security, Gender & Diversity, Industries & Innovation, Responsibility & Ethics, Epistemology & Ontology, Responsible Research & Innovation

Example 1: Biomedicine & Health

This subject is about how new life-scientific knowledge changes the concepts of body, disease, health, environment, and self, thereby initializing new biomedical spaces of action. Genetics, stem cell research, neurobiology, epigenetics, etc. provide new perspectives on the processes of vivid bodies. How can these changes be conceived and explored? Various theoretical and empirical approaches to exploring the relation between biomedicine and society are demonstrated, and students discuss questions that are central in this context.

The aim is to enable students to identify, describe and further develop questions about fundamental social, political, and ethical areas of tension and spaces of possibility in the context of new biomedical knowledge and technologies.

Example 2: Media & Digital Cultures

This module provides an overview of and introduction to media- and socio-theoretical debates, states of research and current controversies about processes of the generic socio-technical transformation of digital societies and cultures. The central question is: Which concepts, models and rating regimes affect the construction of digital technologies (e.g. data formats, software architectures, algorithms)? And what kind of effects does the implementation of these digital technologies have for different areas (e.g. financial markets, health systems, smart homes)? The aim is to enable students to understand the cultural, political and normative dimensions of digital transformation processes and to develop suitable research questions and designs.

The "Core Topic" courses are taught in collaboration with the master's program "Science and Technology Studies" (STS). Students elect three "Core Topic" courses in total.

Semester 3

Master's Blog & Science School (Mandatory Module, 7 ECTS)

In this module, students are introduced to scientific blogging and organize an interdisciplinary workshop (Science School), at which they give a presentation. They write and publish a blog post about a topic related to their chosen field of practice with a specific view on issues of responsibility. In the process, students improve their writing skills for the general public and work on finding their "own voice". Furthermore, they learn how to give and receive constructive peer feedback. The Science School part of the module allows students to present their work to an audience of experts and to gain experience in organizing a scientific event.

Internship (Mandatory Module, 17 ECTS)

The aim of this module is to familiarize students with potential fields of practice for Science and Technology Studies. Students complete an eight-week internship at a company, research institute, governmental or non-governmental organization, where they are assigned STS-relevant tasks. They are prepared for the internship and receive support in virtual meetings with their peers and mentor. After the internship, students write a report and reflect on their experience from an STS perspective, particularly with regard to questions of responsibility.

Practicing Research in STS (Mandatory Module, 6 ECTS)

This seminar trains students to design and implement a research project leading to a written research report. The project is closely mentored by teaching staff and continually discussed in the seminar. The aim is to enable students to hypothesize about research questions, apply analytical methods to empirical cases from an STS perspective, to test assumptions by creating an appropriate research design and to finally present the results.

Semester 4

Master's Thesis (Mandatory Module, 30 ECTS)

In the fourth semester, students write a master's thesis. The Master's Thesis module represents the pinnacle of the RESET program by bringing together the knowledge and skills gained during the program in a project aimed at testing the students' ability to independently conduct (empirical) scientific research in a pre-defined setting. Students develop a research concept around a research question they themselves have identified under the guidance of a supervisor. The module includes a Master's Colloquium, which supports students by allowing for peer feedback.

Mobility

There are several opportunities for stays abroad, which students can pursue on their own initiative. The most feasible option is for students to do their mandatory internship abroad during the third semester. The strong international network of the MCTS is a particular advantage for students seeking international experience (see appendix for details concerning partner institutions). Students also have the opportunity to study abroad via ERASMUS and other international TUM partnerships. The most feasible courses to take abroad are the elective Core Topic and Skills courses. Qualifications gained abroad are recognized, provided there is no substantial difference in the acquired competencies (learning outcomes) (cf. BayHSchG, Art. 63, Lisbon Convention, Art. VI 1).

7. Organization and Coordination

The RESET M.A. program is offered by the TUM School of Governance (GOV).

Speaker of the RESET M.A. program

Prof. Dr. Sebastian Pfotenhauer
Associate Professor for Innovation Research
TUM School of Management / MCTS Co-Director

Associated Faculty

Prof. Dr. Ruth Müller, Science and Technology Policy,
TUM School of Management / MCTS Co-Director

Prof. Dr. Karin Zachmann, History of Technology,
TUM School of Education/ MCTS

Prof. Dr. Christian Djeffal, Law, Science and Technology
TUM School of Governance/MCTS

The Associated Faculty is complemented by an **Advisory Board** with confirmed members from the following institutions:

Prof. Dr. Kean Birch (York University Toronto), Prof. Dr. Sarah De Rijcke (University of Leiden), Prof. Dr. Rachel Douglas Jones (IT University of Copenhagen), Prof. Dr. Jörg Eberspächer (Technical University of Munich), Prof. Dr. Iris Eisenberger (BOKU Vienna), Prof. Dr. Ulrike Felt (University of Vienna), Prof. Dr. Stefan Kuhlmann (University of Twente), Prof. Dr. Clark Miller (Arizona State University), Prof. Dr. Michael Molls (Technical University of Munich), Prof. Dr. Alfred Nordmann (Technical University of Darmstadt), and Prof. Dr. Judith Simon (University of Hamburg)

Administrative responsibilities are determined as follows:

Student Advisory Services: MCTS (program-specific student advice) and Student Service Center/Student Advising and Prospective Student Programs (general student advice for master's studies)

Application Management: Student Service Center (SSZ) / Student Admission

Aptitude Assessment Management: MCTS

Enrolment: SSZ/Student Admission

Student Management: MCTS and the Student Service Center (SSZ) Student Admission and Semester Fees and Scholarships

Lecture Room Management: MCTS

Examination Management: MCTS, TUM School of Governance, SSZ/Central Examinations Office

Examination Board: Examination Board of the TUM School of Governance

Quality Management and Quality Assurance: MCTS