

Degree Program Documentation

Master's Program AI in Society

Part A

School of Social Sciences and Technology

Technical University of Munich

General Information:

- Administrative responsibility: School of Social Sciences and Technology
Political, Social and Educational Sciences and
Technology
- Name of degree program: AI in Society
- Degree: Master of Science (M.Sc.)
- Standard duration of study and credits:
4 semesters of enrollment and 120 credit points (CP)
- Form of study: full time
- Admission: Aptitude assessment (EV – Master's)
- Start: Winter semester 2024/2025
- Language of Instruction: Englisch
- Main Location: Munich
- Academic administrator (program design):
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1 Degree Program Objectives

1.1 Purpose

(1) Current Starting Point: As Artificial Intelligence continues to evolve and becomes increasingly integrated into every aspect of our lives, it brings forth a variety of challenges and problems across technological, economic, and political domains. These challenges stem from the rapid development and widespread adoption of AI technologies, as well as their potential consequences on society.

Challenges associated with the increasing adoption of AI-based solutions in society	
User-related	Bias and fairness: AI algorithms can inadvertently perpetuate existing biases in data, leading to unfair and discriminatory outcomes.
	Explainability and interpretability: Many AI models are considered "black boxes" due to their complex and hard-to-understand decision-making processes, hence user-dependent explanations and trust-building measures are needed.
	Security and privacy: The increasing reliance on AI raises concerns about privacy, security, and potential misuse (detecting fake news, protecting the end user, etc.)
Socio-economic	Job displacement: The automation of tasks by AI may lead to job displacement in various industries, potentially exacerbating unemployment and income inequality.
	Digital divide: The unequal access to AI technologies and the skills required to use them can widen the gap between advantaged and disadvantaged populations.
	Economic concentration: The dominance of a few large tech companies in AI development can lead to an unhealthy concentration of power and stifle innovation.
Socio & geo-political	Regulation and governance: The rapid development of AI calls for effective regulation and governance to ensure responsible and ethical use, but the pace of technological advancement often outstrips the ability of policymakers to respond.
	Geopolitical competition: The race for AI supremacy among nations raises concerns about national security, surveillance, and the weaponization of AI.
	Social & Ethical considerations: The deployment of AI in various sectors raises ethical questions about the appropriate boundaries and limits of AI applications.

(2) Addressing the above-mentioned and multifaceted challenges posed by AI's rapid development requires a comprehensive, *interdisciplinary* approach involving various stakeholders. For example, mitigating bias and improving explainability in AI requires a blend of technical advancements and *diversity* among development teams. Tackling socio-economic issues such as job displacement and the digital divide necessitates cooperative efforts *in reskilling, education, and improved technological access*. Creating effective AI governance involves *legal experts, ethicists, and policymakers* working together to establish international norms and regulatory frameworks. In essence, a collaborative and cross-

disciplinary approach is crucial to responsibly steer the development and implementation of AI technologies.

(3) Aim and Contribution of the MSc program “AI in Society”: The MSc program addresses the above challenges posed by the integration of AI into society by equipping the students with technical skills and interdisciplinary knowledge. The program focuses on mitigating biases in AI, enhancing user-dependent explainability and interpretability, ensuring data privacy and security. It also emphasizes the importance of equitable access to AI technologies and fostering a competitive AI ecosystem. By exposing students to legal, ethical, and policy aspects of AI, the program prepares them to shape regulations and governance frameworks, assess potential risks, and contribute to responsible, ethical, and inclusive AI applications. Especially the current developments in AI (e.g., in the realm of generative AI for generating texts, speech, images, and videos) call for an interdisciplinary oversight supported by social scientists who understand the workings, limitations, and potential impact of such AI solutions.

(4) The intended role of graduates from the MSc program “AI & Society” is to serve as AI ethicists, consultants, researchers, or product managers in various fields, as well as AI policy advisors in public administration. Their job is to ensure the responsible development and implementation of AI technologies, analyze their potential societal impacts, and promote ethical AI practices in both private and public sectors. Graduates will contribute to the design, evaluation, and governance of AI systems that prioritize fairness, transparency, and social good, while fostering innovation and inclusivity across diverse domains. In summary, the program is an interdisciplinary approach that aims to equip students with the tools and concepts they need to successfully apply AI in social contexts for the social good.

The role of the graduates from the MSc program “AI & Society” is not to primarily work in the field of AI development, as that is typically done by graduates with a pure computer science back-ground. Instead, these graduates, equipped with a profound understanding of AI, take on intermediary or interface functions between the technical and social science aspects of AI applications.

(5) The MSc program “AI in Society” is both research-oriented and application-oriented. It is research-oriented as it involves the study of complex AI-related challenges, including biases, socio-economic implications, and legal and ethical aspects. It is application-oriented as it prepares graduates for roles such as AI ethicists, consultants, researchers, and policy advisors, where they apply their knowledge to ensure responsible and ethical AI practices in real-world settings. Thus, the program integrates theoretical knowledge and practical skills to address AI's societal impact.

1.2 Strategic Significance

- **Contribution of the study program “AI in Society” to the teaching strategy of the School of Social Sciences and Technology.**

The MSc program “AI in Society” aligns with the School of Social Sciences and Technology's mission of Human-Centered Engineering. It embodies an interdisciplinary approach,

merging AI technical knowledge with social science insights. This program addresses multiple challenges arising from AI and by which our society is confronted, reflecting the school's public interest focus. By fostering AI understanding among social scientists and other non-technical disciplines, it contributes to the school's intellectual diversity and promotes international, interdisciplinary exploration. The program's emphasis on stakeholder collaboration aligns with the school's collaborative ethos, preparing graduates for roles in AI governance. Thus, the MSc program "AI in Society" enhances the school's strategic orientation, integrating AI within its human-centered, interdisciplinary framework.

- **Study program as part of the teaching strategy of the School of Social Sciences and Technology**

The MSc program "AI in Society" enriches the School of Social Sciences and Technology's professional profile, "Political, Social and Educational Sciences and Technology." It integrates with the school's existing degree programs, providing a unique lens on AI's societal implications. More specifically, the program's socio-political focus on AI complements the themes in "Political Science (B.Sc.)" and "Politics & Technology (M.Sc.)," extending the discussion on AI's ethical, legal, and social issues. Its emphasis on educational strategies contributes to the discourse on education's role in responsible AI use and governance. The exploration of AI responsibility and ethics dovetails with the "Responsibility in Science, Engineering and Technology (M.A.)," deepening the conversation on ethical AI practices. Lastly, its interdisciplinary approach mirrors "Science and Technology Studies (M.A.)," enriching the dialogue on AI's societal impact.

- **The MSc program "AI in Society" aligns with TUM's mission as follows:**

Innovations for mankind, nature, and society	The program addresses AI's societal challenges, embodying TUM's commitment to responsible and sustainable innovation. Beyond just technical education, TUM has a broader societal mission. The "AI in Society" program aligns well with TUM's activities around human-centered engineering by producing graduates who are not only technically proficient but also ethically conscious and socially responsible. This holistic approach to education resonates with TUM's commitment to societal betterment, ensuring that its graduates are well-equipped for the challenges of the modern world.
Highest international standards:	AI is undeniably one of the most transformative technologies of our era. By establishing a program that delves into its societal implications, TUM is positioning itself at the forefront of future fields of study, ensuring its continued relevance and leadership in higher education. The program adheres to international standards, fostering future fields in AI research and education, and attracting global talent.

Cosmopolitanism and tolerance	The program promotes cosmopolitanism, fostering international understanding within the AI domain.
Talents with a sense of values	The program nurtures talents, fostering professional competence, cognitive flexibility, and social competence in the AI field.
Adding value through diversity and appreciation	The program values diversity, fostering a culture of mutual respect and equal opportunity.
Learning without borders	The program links top-level research with excellent teaching, offering future-oriented academic education in AI.
Continuing education and training - for a lifetime	The program contributes to lifelong learning, equipping students for continued success in the evolving AI field.
Entrepreneurial thinking and acting	The program promotes entrepreneurial spirit, encouraging students to translate research into market-oriented AI innovations.
Living intergenerational contract	The program fosters an intergenerational approach, combining the enthusiasm of students, faculty creativity, and graduate impact to shape AI research and teaching.
Dialogue with Society and the Public	The program encourages public dialogue, educating students to shape social change processes responsibly in the AI context.

2 Qualification Profile

The following qualification profile corresponds to the specifications of the Qualifications Framework for German Higher Education Qualifications (Hochschulqualifikationsrahmen - HQR) and the requirements contained therein (i) Knowledge and Understanding, (ii) Use, Application and Generation of Knowledge, (iii) Communication and Cooperation and (iv) Scientific Self-Image/Professionalism. The formal aspects according to the HQR (entry requirements, duration, degree options) are detailed in chapters 3 and 6 as well as in the corresponding subject examination and study regulations.

(I) Knowledge and Understanding

Graduates will possess an enriched comprehension of AI. This means they will not only be acquainted with the general terminologies, governance, and principles of AI but also with technical concepts like neural networks, machine learning algorithms, and deep learning. They will understand the boundaries of AI, such as its limitations in understanding human emotions or the challenges in ensuring unbiased algorithms, fairness, and transparency. They will also be well-versed in its applications, ranging from healthcare diagnostics to autonomous vehicles, and the societal implications these applications bring, like job displacement or privacy concerns.

In addition, graduates will have a comprehensive, and critical grasp of areas at the forefront of AI. For instance, they will be knowledgeable about areas like generative AI, natural language processing, or reinforcement learning. Equipped with this knowledge, they will be trained to convey and discuss pioneering ideas with technical and non-technical experts, be it for practical applications, for research or public discourse. This also encompasses an understanding of the ethical dilemmas AI poses, such as surveillance concerns or decision-making biases, the legal frameworks surrounding AI use, and the broader social implications. They will be familiar with strategies to address AI-related challenges, like implementing fairness checks or ensuring transparency and privacy in AI decision-making processes. In this way, they will be able to bridge ethical, regulatory and practical requirements in various AI application domains.

Furthermore, graduates will be adept at understanding the quality-related challenges of AI applications, taking into account both scientific and methodological factors. For example, they will be familiar with different evaluation strategies for assessing the appropriateness of a machine learning model for a given dataset or the potential pitfalls. They will possess the skills to tackle both practical and theoretical issues using these considerations. This will also involve a deep understanding of the principles of responsible AI for ensuring data privacy and security, and methods to gauge the societal repercussions of AI, like engagement with relevant stakeholders and conducting impact assessments or community consultations.

(II) Application, Use, and Generation of Knowledge

Graduates will be trained to both harness and pioneer knowledge in AI applications, undertaking meticulous research, making informed and scientifically grounded decisions, and overseeing intricate projects. These endeavors will consistently prioritize the ethical and responsible deployment of AI. Delving deeper into the unique offerings of the MSc program "AI in Society", graduates will develop the following competencies:

Utilization and Transfer

Knowledge Integration: Graduates will be trained to merge both established and emerging knowledge in intricate, multidisciplinary scenarios pertinent to AI's role in various domains of society, especially when faced with sparse, complex, or critical information.

Informed Decision Making: With a focus on the societal ramifications, graduates will learn to make decisions rooted in scientific rigor regarding AI applications, always critically weighing potential repercussions.

Autonomous Learning: Recognizing the dynamic nature of AI and current limitations, graduates will learn to proactively seek and assimilate new knowledge and skills, ensuring they remain at the forefront of the field.

Project Execution: Graduates will spearhead application-centric projects with autonomy, channeling their expertise to address tangible AI challenges across diverse sectors.

Scientific Innovation

Research Formulation: Graduates will be able to formulate research questions that delve into the challenges of the interplay between AI and society.

Operationalization: They will be trained to pinpoint and defend tangible operational strategies for their research by transforming abstract questions into creative, feasible solutions and executable blueprints.

Method Selection: Graduates will learn to discern and advocate for fitting research methodologies, weighing the pros and cons of various techniques.

Result Interpretation: They will learn to interpret and critically dissect research outcomes, drawing insightful inferences about the societal footprint of AI.

(III) Communication and Cooperation

Graduates from the MSc program "AI in Society" will be uniquely equipped with competencies in the realm of "Communication and Cooperation". This training will empower them to articulate, collaborate, and adequately resolve challenges and conflicts in varied, multidisciplinary settings, especially at the intersection of AI and societal dynamics.

Interdisciplinary Dialogue: Graduates will be trained to convey intricate, scientifically grounded solutions concerning AI's societal role. They will not only be able to engage with peers from diverse academic backgrounds but will also have the competence to bridge the communication gap with non-academic stakeholders, ensuring that AI concepts are accessible and meaningful to a broader audience. Graduates will be adept at bridging the communication gap between AI specialists and professionals from other disciplines, ensuring seamless collaboration

Collaborative Synergy: Recognizing the importance of harmonious teamwork, graduates will be able to steer group dynamics by knowing how to integrate team members into tasks with a clear vision, always being attuned to the distinct nuances of an AI application and the related collaborative scenario. They will be able to ensure a conducive, inclusive, and goal-driven team environment.

Challenge and Conflict Resolution: In the multifaceted realm of AI and society, disagreements are inevitable. Graduates will be adept at pinpointing potential discord in cooperative ventures, reflecting on them contextually. They will know how to prioritize constructive dialogue and concept-driven, state-of-the-art AI solutions, ensuring that conflicts are not just resolved but also leveraged as opportunities for growth and understanding.

Public Engagement: Recognizing the importance of public discourse, graduates will be able to effectively communicate AI concepts and implications to the general public, fostering informed societal discussions and decisions.

(IV) Scientific self-conception/professionalism

Graduates of the MSc program "AI in Society" will be uniquely equipped with competencies in the realm of "Scientific Self-concept and Professionalism". This program is distinctively designed to empower them to confidently, competently, and ethically engage with the societal dimensions of AI.

Professional Self-Image: Graduates will foster a professional identity that resonates with both scientific realms and professional sectors. Given the program's emphasis on the societal implications of AI, they will be adept at bridging the gap between AI expertise and ethical, regulatory, and practical

requirements for real-world AI applications, ensuring they contribute to diverse professional settings with both confidence and competence.

Justification and Reflection of Actions: Graduates will learn to ground their professional decisions in robust theoretical and methodological foundations. They will not only act but also reflect, always considering alternative strategies for AI applications and their societal implications, thereby perpetually enhancing their professional contributions.

Self-Assessment and Autonomy: Graduates will possess a suitable self-awareness of their capabilities. They will independently harness their creativity, critical thinking, and decision-making competencies, always seeking guidance to refine and go beyond already acquired skills. Their drive will be intrinsic, with a perpetual quest for learning and self-improvement, especially in understanding the societal nuances of AI.

Ethical and Responsible Decision-Making: Recognizing the profound societal impact of AI, graduates will be trained to discern both immediate and long-term conditions for professional actions. Their decisions will be deeply rooted in ethical and regulatory considerations, ensuring they consistently maintain the pinnacle of ethical and regulatory standards in their AI-related endeavors.

Social Responsibility: Central to the program's goals, graduates will be acutely conscious of the societal expectations and consequences of AI. They will critically evaluate their professional actions, ensuring their work aligns with, and even anticipates, societal needs and expectations related to AI's integration into everyday life.

3 Target Groups

3.1 Target Audience

(1) **Educational Qualifications:** The MSc program in AI in Society is designed for applicants who have completed a bachelor's degree in social sciences, political sciences, economics, law, and psychology, or a related field. Applicants should have a solid foundation in their respective fields.

(2) **Interests:** The program is particularly attractive to applicants who have a keen interest in the intersection of AI and society. This includes, but is not limited to, interests in ethical AI practices, AI governance, AI's socio-economic impacts, and the role of AI in shaping future societies. The program offers applicants the opportunity to delve deep into these topics, equipping them with the necessary skills to navigate and contribute to the field of AI in society.

(3) **Target Audience:** The MSc program in AI in Society targets an international audience. It welcomes applicants from all over the world, fostering a diverse and international learning environment. The program's international orientation aligns with its focus on global AI challenges and its commitment to preparing graduates to work in various fields and regions.

3.2 Prerequisites

Eligibility for the 'AI in Society' master's program is determined by several criteria: (1) a Bachelor's degree of a minimum of six semesters from a recognized domestic or international university, or an

equivalent qualification; (2) proficiency in the English language, evidenced by a recognized language assessment like the TOEFL (with a minimum score of 88) or the IELTS (scoring at least 6.5), or the 'Cambridge Main Suite of English Examinations'. Alternatively, if an applicant has undertaken examinations equivalent to 15 credits in English-language modules during their undergraduate studies, this will also serve as proof of their English proficiency; (3) Successful completion of module examinations in either mathematics or statistics (minimum of 5 credits each) from their prior degree program. This foundational knowledge is crucial for thriving in the master's curriculum. (4) a practical project spanning typically 18 credits, where engineering or scientific insights are blended with political or social science perspectives to address societal issues, especially within technologically-driven contexts. (5) Successful clearance of an aptitude test. To pass the aptitude test expertise in the fundamentals of mathematics and statistics, engineering and natural sciences, political and social sciences, and economics and law is required, also with regard to their practical application at the interface of engineering and natural sciences with political and social sciences.

3.3 Target Numbers

Considering the current resources, the program can initially accommodate 40 students. In the future, with more resource capacities, the number of admissions can be increased to 200.

4 Demand Analysis

Employment possibilities: Graduates from the “AI in Society” program will find themselves at a pivotal juncture in the job market. As AI continues to weave itself into the fabric of our society, there's an escalating demand for professionals who can seamlessly merge the intricacies of technical AI with the nuances of social requirements and desired benefits. This program is meticulously designed to prime graduates for a plethora of roles across diverse industries and sectors.

In the technology sector, graduates might find roles in designing user-friendly AI interfaces and human-AI interaction processes or in ensuring that AI algorithms are transparent and ethically sound. In healthcare, they could be instrumental in integrating AI into diagnostic processes, patient care, and medical research, ensuring that the technology respects patient rights, privacy, and delivers equitable care. For instance, they might work on teams developing AI-driven diagnostic tools, ensuring that these tools are not only technically robust but also ethically designed and considerate of diverse patient populations.

In education, graduates could guide the development of AI-driven educational tools, ensuring they cater to diverse learning needs while maintaining ethical standards. In the realm of sustainability, they might work on AI solutions for environmental monitoring or sustainable resource management, ensuring that these solutions are both effective and socially responsible.

For those venturing into public administration, they could be at the forefront of crafting policies that govern AI use in public services, ensuring that they are equitable and in the individual's and public's best interest. In consulting, graduates might advise businesses on the ethical implementation of AI,

while in research, they could delve deep into the societal implications of AI, guiding future innovations.

Specific job roles that encapsulate these responsibilities include AI ethicists, who ensure that AI applications uphold moral and ethical standards; policy advisors, who guide governmental and organizational AI strategies; interdisciplinary researchers, who explore the multifaceted impacts of AI on society; and AI strategy consultants, who aid businesses in leveraging AI responsibly and effectively.

Actual demand and relevant data: The demand for professionals who possess a blend of expertise in AI and social sciences is surging. Given Germany's position as a leading global economy and its rapid digital transformation, there is a growing demand for professionals who understand both the technical and societal facets of AI. A fitting example of the high regional, but also global demand can be seen in the strong interest (in the establishment of this program) and endorsement by the companies participating in the advisory board (i.e., extended QM circle) of this program: the European Central Bank, Continental, Porsche, IBM, and Adobe. These companies see a distinct advantage – and have formally expressed their interest through letters of intent – in hiring graduates with interdisciplinary AI competence, who can bridge the gap between social and technical challenges related to AI applications. Moreover, with growing concerns about AI ethics, privacy, and governance both corporations and governmental bodies are increasingly aware of the imperative to address the societal ramifications of AI. This has amplified the need for specialists who can seamlessly navigate the social and practical intricacies of AI. Such professionals not only bring conceptual and technical AI expertise but also a nuanced understanding of how AI impacts societal structures in different domains and norms. This dual expertise ensures that AI implementations are not just practical and technically sound but also socially responsible and beneficial for the individual and the society as a whole.

The McKinsey report underscores this trend, indicating that from 2016 to 2030, the demand for social competencies will increase at double the rate of other skills, witnessing an 8 to 9 percent growth in demand per decade. [<https://www.mckinsey.com/featured-insights/future-of-work/skill-shift-automation-and-the-future-of-the-workforce>] This trajectory implies that the goal of our program is not just to produce social scientists proficient in AI concepts and principles but to cultivate professionals who can leverage AI to enhance research and applications across disciplines like psychology, sociology, economics, and political science, and law.

5 Competition Analysis

5.1 External Competition Analysis

The table below list several similar study programs across European and German Universities.

Title of Master programs	Institution	Target Group
Artificial Intelligence for Public Services (AI4GOV)	Universidad Politécnica de Madrid (Spain), Politecnico di Milano (Italy), Friedrich-Alexander-Universität Erlangen-Nürnberg (Germany) and the Tallinn University of Technology (TalTech) Gefördert von der EU	Professionals, Part-time Master

https://ai4gov-master.eu/		
AI Ethics and Society	University of Cambridge, UK https://www.ice.cam.ac.uk/course/mst-ai-ethics-and-society	Professionals, Part-time Master
AI and Digital Society	Radboud University AI and Digital Society Radboud University (ru.nl)	Students
Media and Communications (Data and Society)	The London School of Economics and Political Science LSE Home	Social Science Students
Applied Social Data Science	London School of Economics and Political Science, UK https://www.lse.ac.uk/Methodology/Study/MSc-Applied-Social-Data-Science	Social Sciences & Economics
Data Science and Society (Four Tracks: Health, Governance, Media, Business)	Tilburg University, NL	Broad backgrounds
Media, Data and Society	University of Liverpool, UK	Students
Big Data in Society Social Data Science	University of Oxford OII MSc in Social Data Science (ox.ac.uk)	Broad Backgrounds
Applied Economics and Data Science	Carl von Ossietzky Universität Oldenburg: Applied Economics and Data Science - Master // Universität Oldenburg (uol.de)	Students from Economics
Social and Economic Data Science	Universität Konstanz, DE	Students of Social Sciences
Applied Business Data Science	International School of Management, DE	Any background
Management & Data Science	Leuphana Universität, Lüneburg, DE	Economics
Management Analytics	Universität Mannheim, DE	Economics
Data Science for Public Policy	Hertie School of Governance, DE	Politics

Given the focus of the envisioned Master's program "AI in Society," the most relevant study programs from the above list, both in Germany and abroad, that align closely with the themes of AI, society, ethics, and public policy are:

In Germany:

- Master in Artificial Intelligence for Public Services (AI4GOV) at Universidad Politécnica de Madrid (Spain), Politecnico di Milano (Italy), Friedrich-Alexander-Universität Erlangen-Nürnberg (Germany), and the Tallinn University of Technology (TalTech). This program is particularly relevant because it focuses on the application of AI in public services, bridging the gap between technology and governance.
- Data Science for Public Policy at Hertie School of Governance. This program emphasizes the intersection of data science with public policy, making it highly relevant for understanding the societal implications of AI.

- Social and Economic Data Science at Universität Konstanz. This program delves into the societal and economic implications of data, which can be closely related to the broader themes of AI in society.
- Applied Business Data Science at the International School of Management. While it has a business focus, the integration of data science can offer insights into the commercial and societal impacts of AI.

Abroad (Europe):

- AI Ethics and Society at the University of Cambridge, UK. As the name suggests, this program is directly aligned with the ethical and societal considerations of AI, making it one of the most relevant programs on the list.
- AI and Digital Society at Radboud University. This program explores the broader implications of AI in the digital realm, touching upon societal impacts.
- Media, Data and Society at the University of Liverpool, UK. This program delves into the media's role in the age of data, offering insights into how AI impacts communication and society at large.
- Social Data Science at the University of Oxford. This program's focus on understanding societal trends and behaviors through data aligns closely with the themes of AI in society.
- Data Science and Society at Tilburg University, NL. With tracks in health, governance, media, and business, this program offers a comprehensive look at the various societal domains impacted by AI.

The "AI in Society" program stands out due to its interdisciplinary approach, comprehensive curriculum, emphasis on societal implications, and flexible structure. It caters to a diverse target group and offers a unique blend of theoretical knowledge and practical application, all under the guidance of renowned experts in the field. More specifically, main USP of the MSc Programm "AI in Society" are the following:

- **Interdisciplinary Approach:** While many programs focus either on the technical aspects of AI or its societal implications, "AI in Society" seamlessly integrates both. It provides students with a holistic understanding, bridging the gap between technology and its real-world impact.
- **Comprehensive Curriculum:** The program covers a wide range of topics, from foundational AI and data science to the governance, law, and regulation of AI. This breadth ensures that graduates are well-equipped to navigate the multifaceted challenges posed by AI in various societal contexts.
- **Focus on Societal Implications:** Unlike many AI programs that prioritize commercial or industrial applications, "AI in Society" emphasizes the broader societal, ethical, and political implications of AI. This makes it particularly relevant in today's world, where the societal impact of technology is a topic of global concern.

- Diverse Target Group and a rich, interdisciplinary learning environment where different perspectives converge.
- Flexible Program Structure: With a mix of compulsory and elective modules, students have the flexibility to tailor their learning experience. They can delve deeper into areas of personal interest while still gaining a comprehensive understanding of the core themes.
- Practical Application: The inclusion of hands-on modules like "Project Week" ensures that students don't just gain theoretical knowledge but also practical skills. This balance prepares them for real-world challenges in both academic and professional settings.
- Global Perspective: While the program is rooted in the context of AI's impact on society, its curriculum draws on global examples and case studies. This international outlook prepares students to navigate the global challenges and opportunities posed by AI.

The introduction of the "AI in Society" program at TUM is not just a response to current academic and industry trends but a strategic move to reinforce TUM's position as a leading global institution, committed to excellence, innovation, and societal betterment.

5.2 Internal Competition Analysis

Distinction from the MSc programs “Computer Science” and “ Politics & Technology”

While the "Politics and Technology" program emphasizes the broader relationship between all forms of technology and political structures, "AI in Society" narrows down to the specific challenges and opportunities presented by AI. The "Computer Science" program, even with SOT electives, remains fundamentally a technical degree, preparing students for roles that primarily involve software development, algorithm design, etc. In contrast, "AI in Society" prepares students for roles that require a nuanced understanding of AI's societal implications.

In summary, the AI & Society graduates are equipped to address the complex challenges that arise at the intersection of AI and society. Their ability to evaluate AI systems' societal impacts, navigate ethical considerations, and influence policy and regulation make them valuable assets in a rapidly evolving AI landscape.

	<i>MSc “AI & Society”</i>	<i>MSc “Politics and Technology”</i>	<i>MSc “Computer Science”</i>
Target group	Students with a background in social sciences, politics, and related fields, who have an interest in understanding AI technology and its societal aspects.	Students with a background in political sciences and an interest in the intersection of political science, public policy, and technology	Students with a technical background in computer science, or engineering
Role and job perspectives of graduates	AI ethicists, consultants, researchers, or product managers in various fields; AI policy advisors in public	Policy analysts or advisors in governmental or non-governmental organizations.	Developers of AI technologies and solutions; Graduates will be prepared to

	administration. Ensure the responsible development and implementation of AI technologies, analyze their potential societal impacts, and promote ethical AI practices in both private and public sectors. Contribute to the design, evaluation, and governance of AI systems that prioritize fairness, transparency, and social good.	Consultants in technology policy and regulation. Research roles in think tanks or academic institutions focusing on technology's impact on society.	pursue rather technical paths in companies or public administration.
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6 Program Structure

(1) Formal structure

The prescribed duration of the program spans four semesters, encompassing a total of 120 credit points. Within this framework, 78 credit points are allocated to mandatory modules, 12 to elective modules, and the remaining 30 are dedicated to the final thesis. A schematic representation of the program's structure can be found in Figure 1.

(2) Study program concept

Semester	Modules						Credits/ number of exams	
1	Foundations of AI & Data Science (SOT86053) (required) K 9 CP		Intro. to Program. & Data Processing SOT10054 (required) ÜB 3 CP	AI in and for Society: Science, Technology and Society in the Digital Age (SOT46308) (required) K 6 CP		Law, Governance and Regulation of Artificial Intelligence (SOT46302) (required) K 6 CP	Psychology of Learning and Instructional Design of AI-based systems (SOT10057) (required) K 6 CP	30/5
2.	Introduction to Deep Learning (IN2346) (required) K 6 CP	Deep Learning Demystified : Hands-on Deep Learning for Non-CS Majors (SOT86086) (required) ÜB 3 CP	Explainable AI -- A Comprehensive Seminar on Transparent and Ethical AI (SOT86051) (required) W (inkl. P) 6 CP		Academic Competencies and Practical Skills (SOT44303) (required) W 4 CP	Methods 1 (MCTS0027) (required) ÜB 5 CP	AI in Diverse Societies (SOT46301) (required) K 6 CP	30/6
3.	Natural Language Processing (IN2361) (required) K 6 CP	Human-AI Interaction (SOT10046) (required) ÜB 6 CP	Project Week (required) PA 6 CP		Electives: AI in different domains of society 12 CP			30/5
4.	Master's thesis (required) 30 CP							30

Key: light grey = required modules, dark grey = elective modules, dark blue = final thesis

Figure 1: Structure of the study program AI in Society

The Master program “AI in Society” covers a wide range of topics from the technical aspects of AI and data science to the societal implications of AI. The curriculum includes foundational courses in AI and data science, programming and data processing, as well as specialized courses on topics such as deep learning, human-AI interaction, and natural language processing. It also includes courses that focus on the societal aspects of AI, such as governance, law and regulation of AI, AI in diverse societies, and elective modules in different societal application areas of AI. In this way the program prepares students for roles bridging technical AI and societal implications. It provides interdisciplinary knowledge and the grounding for responsible and interdisciplinary application of AI.

The significant number of mandatory courses stems from the recognition that students enter the program with diverse backgrounds outside of computer science. It is essential to first equip them with fundamental AI concepts, rudimentary programming skills, and computational aspects of social science methodologies to effectively address the challenges posed by AI applications across various societal sectors. By grounding students in these foundational topics, we ensure they possess the comprehensive skill set required to quantify, navigate and innovate within the complex landscape of AI integration into social science research, developments, and processes. This holistic approach not only bridges any pre-existing knowledge gaps but also fosters a collaborative learning environment where students from various disciplines can contribute unique perspectives.

The program culminates in a Master's thesis, allowing students to apply the knowledge and skills they have acquired throughout the program to a research project.

In summary, the curriculum is structured as follows:

1. **Foundation and Introduction:** The program begins with foundational courses in AI, Data Science, Introduction to Programming & Data Processing, AI in and for Society: Science, Technology and Society in the Digital Age, as well as courses on Law, Governance, & Regulation of AI, and an introduction to Psychology of learning and instructional design of AI-based systems. These foundation and introductory courses in the M.Sc. program "AI in Society" aim to equip students with a foundational understanding of AI, data science, programming, and the societal implications of AI. Recognizing the diverse academic backgrounds of incoming students, these compulsory courses ensure a consistent and unified knowledge base across AI concepts, programming, and the societal aspects of AI. This approach fosters a shared terminological foundation, enabling students from various disciplines to engage effectively throughout the program. These foundational courses are compulsory to guarantee that all students, regardless of their previous bachelor-level academic backgrounds, attain a consistent understanding of essential subjects and foster a unified terminological foundation in AI concepts, programming, regulation and politics of AI. The aim of each module and their contribution to the achievement of the qualification profile are provided in Table 1.
2. **Deepening Knowledge and Skills:** The next set of courses, including Deep Learning, Explainable AI, Social Science Methods for Studying AI in Society (Academic Competencies and Practical Skills and Methods 1), and AI in Diverse Societies, as described in Table 1 are designed to deepen the students' knowledge and understanding, forming the basis for the development and/or application of independent ideas. These courses also start to introduce the application of knowledge, with students expected to integrate existing and new knowledge in complex contexts, make scientifically sound decisions, and carry out application-oriented projects.
3. **Specialization and Application:** The final set of courses, including Natural Language Processing, Human-AI Interaction, and Project week (see Table 1), allow students to specialize in their areas of interest and apply their knowledge and skills to real-world scenarios. These courses are designed to further enhance the students' ability to design research questions, choose and justify concrete ways of operationalizing research, select and justify research methods, and explain and critically interpret research results.
4. **Elective Modules** (a preliminary selection is provided in Table 2) offer the opportunity to deepen knowledge in applications of AI. The list of elective modules will grow continuously with newly appointed colleagues joining the School of Social Sciences and Technology.
5. **Master's Thesis:** The program culminates in a Master's thesis, which requires students to apply all the knowledge, skills, and competencies they have acquired throughout the program to a substantial piece of independent research.

	Module Code	Compulsory Module Name	Aim & contribution to the qualification profile
Foundation and Introduction	SOT86053	Foundations of AI & Data Science	Introduce foundational concepts and methodologies in AI and data science (e.g., data analysis techniques, neural networks, basics of reinforcement learning and many more foundational techniques of machine learning). Students with no prior knowledge on these topics will gain a comprehensive understanding of AI's technical landscape, ensuring they can bridge practical requirements in AI applications.
	SOT46302	Law, Governance and Regulation of Artificial Intelligence	Provide insights into the legal, governance, and regulatory aspects of AI. This module delves deep into the legal and regulatory aspects of AI. It equips students with the knowledge and skills to navigate the complex legal landscape of AI, fostering informed societal discussions and decisions, and ensuring the ethical and responsible deployment of AI technologies.
	SOT10054	Introduction to Programming and Data Processing	This module provides essential programming and data processing skills for students with non-technical backgrounds. Students will be equipped to harness and implement data-driven AI applications.
	SOT46308	AI in and for Society: Science, Technology and Society in the Digital Age	This module delves into the intricate relationship between AI, science, and society in our digital era. Students will be equipped with an understanding of the transformative role of AI in societal contexts, its implications and potential. This course sets the stage for grasping the broader societal impacts and responsibilities of AI applications.
	SOT10057	Psychology of learning and instructional design of AI-based systems	This module delves into the psychology of learning and instructional systems and focuses on the interplay between psychological principles and instructional design features. Students will explore foundational psychological learning theories, instructional design methodologies, and psychometric instruments and tools, equipping them to design AI systems that are cognizant of human behavior and can be evaluated for their psychological impact. This knowledge ensures that AI applications are not only technically sound but also psychologically aligned with human users, fostering a more holistic and human-centric approach to AI integration in society.
Deepening Knowledge and Skills	IN2346	Introduction to Deep Learning	This module offers an introduction and in-depth understanding of state-of-the-art deep learning concepts and techniques. Students will possess a comprehensive grasp of areas at the forefront of deep learning, enabling them to convey pioneering ideas and engage with technical and non-technical experts.
	SOT86086	Deep Learning Demystified: Hands-on Deep Learning for Non-CS Majors	This accompanying course "Deep Learning Demystified: Hands-on Deep Learning for Non-CS Majors" aims to prepare students that lack Computer science backgrounds from their bachelor's degree by providing a practical and intuitive understanding of deep learning. It focuses on building foundational knowledge and integrating hands-on experience, ensuring that these students are well-equipped to tackle the main course on Introduction to Deep Learning.
	SOT86051	Explainable AI -- A Comprehensive Seminar	This module delves into the concepts of AI transparency, fairness, and explainability. It ensures graduates can make

	Module Code	Compulsory Module Name	Aim & contribution to the qualification profile
		on Transparent and Ethical AI	scientifically grounded decisions regarding AI applications, always critically weighing potential repercussions and societal ramifications, and hence be empowered to engage with different stakeholders.
	MCTS0027	Methods 1	This module equips students with state-of -the-art research methods and frameworks relevant to studying AI in society and specifically implications of AI applications in different societal contexts.
	SOT44303	Academic Competencies and Practical Skills	This module equips students with essential academic and hands-on skills, from design thinking to academic writing. Through targeted sessions, students apply and reflect on these skills, ensuring they are adept at both theoretical and real-world challenges within the AI in society landscape.
	SOT46301	AI in Diverse Societies	This module investigates the challenges and opportunities of AI in diverse societal contexts (including future of work, job displacement, etc.). Students will be acutely conscious of the societal expectations and consequences of AI, ensuring their work aligns with societal needs and expectations related to AI's integration into everyday life.
Specialization and Application	IN2361	Natural Language Processing	This module introduces techniques for processing and understanding human language (NLP) using AI. Students will be equipped with a comprehensive set of technical skills to grasp of areas at the forefront of NLP, ensuring they can bridge ethical, regulatory, and practical requirements in various NLP application domains (text processing, language understanding, translation, governance-related applications, etc.).
	SOT10046	Human-AI Interaction	This module delves into the intricacies of user experience and human factors in AI systems, which are pivotal for the successful integration and adoption of AI technologies in daily applications (e.g., recommendation engines, search algorithms, decision support systems, generative AI solutions, etc). Through literature reviews and group discussions, students will collaboratively design and develop AI-integrated interactive systems. Hence, graduates will be equipped with the expertise to critically assess the performance of AI-driven interactive systems, ensuring they can bridge the gap between AI technology and its practical, user-centric applications.
	TUM Projects Week	Project week	This module offers a unique platform for students to collaboratively tackle contemporary challenges like sustainability, digitalization in health care, administration, and governance, mobility/transportation and hence apply their knowledge on various aspects of artificial intelligence in real-world scenarios. Graduates will not only deepen their domain-specific knowledge but also enhance their interdisciplinary competencies, preparing them to address complex, real-world issues with a holistic perspective.

Table 1: Aim of the mandatory modules and their contribution to the qualification profile.

Module Code	Elective Module Name	Aim & Contribution to the qualification profile
SOT10053	Learning Analytics	Dive deep into the methodologies and tools used to analyze and interpret data about learners to optimize learning experiences and the environments in which they occur.
SOT10030	Gaze-based HCI	Explore the cutting-edge interface techniques based on eye-tracking, understanding the intricacies of human-computer interaction through gaze behaviors.
SOT86052	Responsible Data Science for Safe and Socially Aligned AI Applications	Investigate the ethical, safe, and socially-aligned practices in data science, ensuring AI applications are developed responsibly.
SOT860809	Advanced Topic: Law and Digitization in Action	Engage in a deep exploration of contemporary issues at the intersection of law and digital technologies, focusing on real-world applications and implications.
SOT56307	Philosophy of Artificial Intelligence: Key Readings	Delves into the intersection of phenomenology and AI, exploring foundational philosophical questions about the nature of the mind and AI's conceptual underpinnings. Equips students with a deep understanding of AI's philosophical context and the ability to critically analyze its relationship with human cognition.
SOT10058	Advanced Analysis of Variance Procedures	This module delves into advanced ANOVA techniques, enabling students to apply intricate variance analysis to complex datasets. By mastering such procedures, students will be able to rigorously evaluate experimental results, ensuring robust data interpretation and informed decision-making in quantitative research scenarios.
SOT10059	Development of Research Instruments	This module equips students with the expertise to design theory-based questionnaires tailored for instructional measurement. They'll master the evaluation of existing instruments using psychometric quality criteria, conduct studies to assess these criteria, and refine instruments based on findings. This ensures students can (re-)use, create and critically assess research tools, enhancing the validity and reliability of their research.

Table 2: Elective modules and their contribution to the qualification profile.

The program uses a variety of teaching and learning methods to cater to different learning styles and ensure a comprehensive understanding of the material. More specifically, traditional lectures form the backbone of the curriculum, providing students with foundational knowledge in areas like AI, deep learning, and natural language processing. Interactive seminars in courses such as "Explainable AI -- A Comprehensive Seminar on Transparent and Ethical AI" employ seminar-style teaching, fostering discussions and debates on the explainable and ethical AI. Through hands-on workshops in courses like "Deep Learning Demystified: Hands-on Deep Learning for Non-CS Majors" a practical, workshop-based approach is envisioned, where students can actively engage with the material and gain hands-on experience. On the other hand, research projects, such as the Project Weeks, where students come together to address real-world problems through AI in an interdisciplinary team, offers students an opportunity to undertake hands-on interdisciplinary research projects, allowing them to apply theoretical knowledge and creative AI solutions to practical challenges (see also: <https://www.tum.de/en/studies/degree-programs/key-skill-programs/project-weeks>).

In courses such as the "Academic Competencies and Practical Skills" student will learn academic and hands-on skills, from design thinking to academic writing through targeted sessions. Students will apply and reflect on these skills considering the latest developments in AI and its societal integration. Collaborative courses and projects ensure furthermore throughout the accompanying exercises of the curriculum that students develop teamwork skills and learn to collaborate on complex AI challenges.

In summary, this blend of traditional lectures, interactive sessions, hands-on workshops, group work, and research projects ensures a comprehensive and immersive learning experience for students, preparing them for both academic and industry challenges in the realm of AI.

Interdisciplinary competencies, such as a sense of social responsibility and personality development, are integrated throughout the program. For example, the course on AI in Diverse Societies encourages students to consider the social implications of AI and the importance of ethical decision-making in this field. The project work also provides opportunities for students to develop their teamwork and communication skills, as well as their ability to work independently and take responsibility for their own learning.

(3) Mobility window: During the third semester, students have the opportunity for a mobility window, allowing for a typical one-semester study period at another university either within Germany or internationally, without any time delay in their academic progression. The respective modules (Human-AI Interaction, Natural Language Processing, Project week and two elective modules) can be substituted with comparable courses from other universities. Periods of study will be recognized unless there are substantial differences in the competences acquired.

7 Organization and Coordination

The master's program is administratively located at TUM School of Social Sciences and Technology (SOT), Professional Profile Political, Social and Educational Sciences and Technology. Most modules as well as the master's thesis are offered by the teaching staff of TUM SOT. In particular, the TUM School of Computation, Information and Technology (CIT) provides additional modules for this program.

For administrative aspects of study organization, some responsibilities lie with the central units of the TUM Center for Study and Teaching (TUM CST), while others are handled by the facilities of TUM SOT (see the following overview):

- Student Advising: Student Advising and Information Services
(TUM CST)
Email: studium@tum.de
Phone: +49 (0)89 289 22245
Provides information and advising for
prospective and current students
(via hotline/service desk)
- Departmental Student Advising: TUM SOT, Alina Fastowski, ais@sot.tum.de

- Academic Programs Office (within department/school), Infopoint, etc.:
TUM SOT, Studien- und Qualitätsmanagement
Hedi Schmid, Tel.-Nr.: +49 89 907793075
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- Study Abroad Advising/Internationalization:
TUM-wide: TUM Global & Alumni Office
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- Advising – Barrier-Free Education: TUM-wide: Service Office for Disabled and Chronically Ill Students (TUM CST),
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Phone: +49 (0)89 289 22737
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Phone: +49 (0)89 289 22245
Admissions, enrollment, Student Card, leaves of absence, student fees payment, withdrawal
- Aptitude Assessment (EV): TUM-wide: Admissions and Enrollment (TUM CST)
Departmental: Alina Fastowski (ais@sot.tum.de)
- Semester Fees and Scholarships: Fees and Scholarships (TUM CST),
Email: beitragsmanagement@zv.tum.de
- Examination Office: Graduation Office & Academic Records (TUM CST)
Campus Munich
Graduation documents, notifications of examination results, preliminary degree certificates
- Departmental Examination Office: TUM SOT STM
Alina Fastowski (ais@sot.tum.de)
- Examination Board:
Prof. Dr. Gjergji Kasneci (Chair)
Prof. Dr. Oleksandra Poquet (Vice Chair)

Prof. Dr. Christian Djefal
Prof. Dr. Stefania Centrone

Prof. Dr. Enkelejda Kasneci

Secretary (Alina Fastowski, ais@sot.tum.de)

- Quality Management:

TUM-wide: Quality Management (TUM CST),
<https://www.tum.de/studium/tumcst/teams-cst/>

Departmental: TUM SOT

Vice Dean of Student and Academic Affairs:

Prof. Dr. Claudia Nerdel

vd.study_teaching@sot.tum.de

QM Representative Head, QM Circle,

Evaluations Representative Head,

Module Management:

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Dr. Fred Slanitz slanitz@tum.de