(Vilniaus universiteto studijų dalyko (modulio) aprašo tipinė forma anglų kalba)

COURSE UNIT (MODULE) DESCRIPTION

Course unit (module) title	Code
The governance of new and emerging technologies	

Academic staff	Core academic unit(s)
Coordinating: Florian Rabitz **Other:**	Institute of International Relations and Political Science, Vilnius University, Vokiečių str. 10, LT-01130, Vilnius

Study cycle	Type of the course unit

Mode of delivery	Semester or period when it is delivered	Language of instruction
Face-to-face	Fall semester	English

Requisites	
Prerequisites:	**Co-requisites (if relevant):**

Number of ECTS credits allocated	Student's workload (total)	Contact hours	Individual work
5	145	32	113

Purpose of the course unit

The aim of this course is to provide an overview of *how* and *why* to govern new and emerging technologies, and how to reconcile their governance with (competing) social values. The course will adopt a socio-technical approach by understanding technology as enmeshed with institutions, norms, rules, and social practices. We will cover key conceptual and theoretical debates, starting with classic discussions in the sociology of technology and continuing up to present debates on responsible innovation. In addition, we will look at the political implications of novel technologies in four areas: biotechnology, space technology, climate technology, and artificial intelligence. The course will primarily approach the problem of technology governance from a perspective of international relations and global governance: What are the international implications of technological change; how do changes in the international system influence the modalities and effectiveness of technology governance; and what options are there for states to cooperate on technology governance for mutual benefit?

The course will be divided into a lecture and a seminar component. During the lecture, the teacher will give an overview of key conceptual and theoretical debates, and of key technological issue areas. During the seminars, course participants will engage in course work, presentations, and overall discussion.

Learning outcomes of the course unit	Teaching and learning methods	Assessment methods
Understands key theories and concepts in technology governance	Lecture	Exam

Has an overview of important recent empirical developments with new and emerging technologies	Lecture	Exam
Is able to critically reflect on the social and political implications of technological change	Seminar	Presentation; group work
Is able to apply theories and concepts in technology governance to novel issue areas	Seminar	Presentation; group work

Content	**Contact hours**							**Individual work: time and assignments**	
	Lectures	Tutorials	Seminars	Workshops	Laboratory work	Internship	**Contact hours, total**	**Individual work**	**Tasks for individual work**
1. Socio-technical systems and the dilemma of control: • Conceptualizing „technology“ • Linkages between technology and social structures • Political challenges of technology governance	2		0				**2**	**8**	Reading: Geels, F. W. (2004). From sectoral systems of innovation to socio-technical systems: Insights about dynamics and change from sociology and institutional theory. *Research policy*, *33*(6-7), 897-920; Rabitz, F. (2026). A theory of international technology regulation. *Review of International Studies*, *52*(1), 24-41.
2. Techno-fixes, solutionism, and responsible innovation: • Conceptual history of „techno-fixes“ and its linkages to social enginering • Solutionism and Silicon Valley ideology • Balancing innovation with social values	2		0				**2**	**8**	Reading: Sætra, H. S., & Selinger, E. (2024). Technological remedies for social problems: Defining and demarcating techno-fixes and techno-solutionism. *Science and engineering ethics*, *30*(6), 60. Genus, A., & Stirling, A. (2018). Collingridge and the dilemma of control: Towards responsible and accountable innovation. *Research policy*, *47*(1), 61-69.

3. Biotechnology: • Overview and key technological changes over past ~20 years • Governance of digitalized genetic sequence data • Governance of novel genetic techniques, including biosafety	2		0				**2**	**8**	Reading: Qin, G., Yu, H., & Wu, C. (2023). Global governance for digital sequence information on genetic resources: Demand, progress and reforming paths. *Global Policy*, *14*(2), 403-415; Reynolds, J. L. (2021). Engineering biological diversity: the international governance of synthetic biology, gene drives, and de-extinction for conservation. *Current Opinion in Environmental Sustainability*, *49*, 1-6.
4. Climate technology: • Broad overview of causes and consequences of anthropogenic global warming • „Conventional“ climate technologies: biofuels, hydrogen, carbon capture and storage... • Climate engineering technology: Carbon Dioxide Removal and Solar Radiation Modification	2		0				**2**	**8**	Reading: Low, S., & Boettcher, M. (2020). Delaying decarbonization: Climate governmentalities and sociotechnical strategies from Copenhagen to Paris. *Earth system governance*, *5*, 100073; Moreno-Cruz, J., McEvoy, D. M., McGinty, M., & Cherry, T. L. (2025). The economics and governance of solar geoengineering. *Review of Environmental Economics and Policy*, *19*(1), 1-24.
5. Space technology: • Overview of political, technological, and economic changes in outer space in the last ~20 years • Governance of satellites, global telecommunications, and space debris • Emerging governance of space resource extraction, including lunar mining	2		0				**2**	**8**	Reading: Butkevičienė, E., & Rabitz, F. (2022). Sharing the benefits of asteroid mining. *Global Policy*, *13*(2), 247-258; Morin, J. F., & Richard, B. (2021). Astro-environmentalism: Towards a polycentric governance of space debris. *Global Policy*, *12*(4), 568-573.

6. Artificial intelligence: • Overview of key technological developments, opportunities and risks • Responding to AI-based online disinformation • „Bio-digital convergence“: governance of biosecurity risks of AI-based genetic engineering • Potential governance options for AGI takeover scenarios	2		0				**2**	**8**	Reading: Veale, M., Matus, K., & Gorwa, R. (2023). AI and global governance: Modalities, rationales, tensions. *Annual Review of Law and Social Science*, *19*(1), 255-275; Schroeder, D. T., Cha, M., Baronchelli, A., Bostrom, N., Christakis, N. A., Garcia, D., ... & Kunst, J. R. (2026). How malicious AI swarms can threaten democracy. *Science*, *391*(6783), 354-357.
7. Risk, uncertainty, precaution: • Risk and uncertainty: conceptual distinctions • Precaution as a legal and political strategy • Governing technology under risk and uncertainty	2		0				**2**	**8**	Reading: Perrow, C. (1981). Normal accident at three mile island. *Society*, *18*(5), 17-26; Rabitz, F., Feist, M., Honegger, M., Horton, J., Jinnah, S., & Reynolds, J. (2022). A preliminary framework for understanding the governance of novel environmental technologies: Ambiguity, indeterminateness and drift. *Earth System Governance*, *12*, 100134.
8. Technology governance in a changing multilateral order • Technology and the crisis of the liberal international order • Technology as a driver of geopolitical fragmentation • Consequences of geopolitical fragmentation for global technology governance	2		0				**2**	**8**	Reading: Weymouth, S. (2025). Digital Disintegration: Techno-Blocs and Strategic Sovereignty in the AI Era. *International Organization*, *79*(S1), S57-S70.
9. Individual presentations	0		8				**8**	**24**	Preparation and delivery of a presentation of 15 minutes max.
10. Group work	0		8				**8**	**25**	Preparation and delivery of a group project on practical problems of

									technology governance.
Total	**16**		**16**				**32**	**113**	

Assessment strategy	Weight %	Deadline	Assessment criteria
Exam	50	End of semester	Factual knowledge assessed via multiple-choice questions; critical thinking (ability to apply, synthesize, and reflect on acquired knowledge) assessed via open-ended questions. Each component counts for 50% of overall exam grade.
Group work	20	End of semester	In groups, students will discuss, develop, and present practical solutions for different political scenarios associated with the governance of novel technologies, followed by classroom discussion. Assessment is based on teamwork, group presentations, and ability of the group to respond to, and engage with, feedback and questions from the class. Each group will receive a single grade. Potential topics will be discussed at the beginning of the course.
Presentation	20	End of semester	Students will give short (10-15 minute) presentations on a topic of their choice, linked to a specific technological issue area, or to a specific political aspect of technology governance. Presentations will be followed by classroom discussions. Assessment is based on presentation content, presentation style, and ability to respond to feedback and questions from the class. All presentations will be given (and graded) individually. Potential topics will be discussed at the beginning of the course.
Active participation	10	End of semester	Active participation in the classroom. Students are expected to regularly attend lectures, to acquaint themselves with the reading material, and to engage in classroom discussions.

Author (-s)	Publishing year	Title	Issue of a periodical or volume of a publication	Publishing house or web link
Required reading				
Butkevičienė, E., & Rabitz, F.	2022	Sharing the benefits of asteroid mining	*Global Policy*, *13*(2), 247-258.	https://onlinelibrary.wiley.com/doi/full/10.1111/1758-5899.13035
Ding, J.	2024	The rise and fall of technological leadership: General-purpose technology diffusion and economic power transitions	*International Studies Quarterly*, *68*(2), sqae013	https://academic.oup.com/isq/article-pdf/doi/10.1093/isq/sqae013/56984912/sqae013.pdf
Drezner, D.	2019	Technological change and international relations	*International Relations*, *33*(2), 286-303	https://journals.sagepub.com/doi/full/10.1177/0047117819834629
Geels, F. W.	2004	From sectoral systems of innovation to socio-technical systems: Insights about dynamics and change from sociology and institutional theory	*Research policy*, *33*(6-7), 897-920.	https://www.sciencedirect.com/science/article/pii/S0048733304000496
Genus, A., & Stirling, A.	2018	Collingridge and the dilemma of control: Towards responsible and accountable innovation.	*Research policy*, *47*(1), 61-69.	https://www.sciencedirect.com/science/article/pii/S0048733317301622
Guston, D.H.	2014	Understanding anticipatory governance	*Social studies of science*, *44*(2), 218-242.	https://journals.sagepub.com/doi/abs/10.1177/0306312713508669

Low, S., & Boettcher, M.	2020	Delaying decarbonization: Climate governmentalities and sociotechnical strategies from Copenhagen to Paris	*Earth system governance*, *5*, 100073	https://www.sciencedirect.com/science/article/pii/S258981162030032X
Moreno-Cruz, J., McEvoy, D. M., McGinty, M., & Cherry, T. L.	2025	The economics and governance of solar geoengineering	*Review of Environmental Economics and Policy*, *19*(1), 1-24.	www.journals.uchicago.edu/doi/abs/10.1086/733652
Morin, J. F., & Richard, B.	2021	Astro-environmentalism: Towards a polycentric governance of space debris	*Global Policy*, *12*(4), 568-573.	https://onlinelibrary.wiley.com/doi/full/10.1111/1758-5899.12950
Perrow, C.	1981	Normal accident at Three Mile Island.	*Society*, *18*(5), 17-26.	https://link.springer.com/article/10.1007/bf02701322
Qin, G., Yu, H., & Wu, C.	2023	Global governance for digital sequence information on genetic resources: Demand, progress and reforming paths	*Global Policy*, *14*(2), 403-415.	https://onlinelibrary.wiley.com/doi/abs/10.1111/1758-5899.13202
Rabitz, F., Feist, M., Honegger, M., Horton, J., Jinnah, S., & Reynolds, J.	2022	A preliminary framework for understanding the governance of novel environmental technologies: Ambiguity, indeterminateness and drift.	*Earth System Governance*, *12*, 100134.	https://www.sciencedirect.com/science/article/pii/S2589811622000039
Rabitz, F.	2026	A theory of international technology regulation	*Review of International Studies*, *52*(1), 24-41.	https://www.cambridge.org/core/journals/review-of-international-studies/article/theory-of-international-technology-regulation/7F86BAC1D6B44A230C2D4E1FCA724D3C
Reynolds, J. L.	2021	Engineering biological diversity: the international governance of synthetic biology, gene drives, and de-extinction for conservation	*Current Opinion in Environmental Sustainability*, *49*, 1-6.	https://www.sciencedirect.com/science/article/pii/S1877343520300890
Sætra, H. S., & Selinger, E.	2024	Technological remedies for social problems: Defining and demarcating techno-fixes and techno-solutionism	*Science and engineering ethics*, *30*(6), 60.	https://link.springer.com/article/10.1007/s11948-024-00524-x
Schroeder, D. T., Cha, M., Baronchelli, A., Bostrom, N., Christakis, N. A., Garcia, D., ... & Kunst, J. R.	2026	How malicious AI swarms can threaten democracy.	*Science*, *391*(6783), 354-357.	https://www.science.org/doi/full/10.1126/science.adz1697
Stilgoe, J., Owen, R., & Macnaghten, P.	2013	Developing a framework for responsible innovation	*Research Policy*, *42*(9), 1568-1580.	https://www.sciencedirect.com/science/article/pii/S0048733313000930
Veale, M., Matus, K., & Gorwa, R.	2023	AI and global governance: Modalities, rationales, tensions	*Annual Review of Law and Social Science*, *19*(1), 255-275	https://www.annualreviews.org/content/journals/10.1146/annurev-lawsocsci-020223-040749

Weymouth, S.	2025	Digital Disintegration: Techno-Blocs and Strategic Sovereignty in the AI Era.	*International Organization*, *79*(S1), S57-S70.	https://www.cambridge.org/core/journals/international-organization/article/digital-disintegration-technoblocs-and-strategic-sovereignty-in-the-ai-era/DD86C6FD3FDD7FBBADEF100C6935D577
Recommended reading				
Gupta, A., Biermann, F., Van Driel, E., Bernaz, N., Jayaram, D., Kim, R. E., ... & Wewerinke-Singh, M.	2024	Towards a non-use regime on solar geoengineering: lessons from international law and governance.	*Transnational Environmental Law*, *13*(2), 368-399.	https://www.cambridge.org/core/journals/transnational-environmental-law/article/towards-a-nonuse-regime-on-solar-geoengineering-lessons-from-international-law-and-governance/83A71F8002DC88049D9575790743D3A1
Hartley, S., Taitingfong, R., & Fidelman, P.	2022	The principles driving gene drives for conservation	*Environmental Science & Policy*, *135*, 36-45.	https://www.sciencedirect.com/science/article/pii/S1462901122001514
Javadi, M.	2026	Infrastructural entanglement and cloud hyperscalers in contemporary warfare: Insights from Ukraine, Israel and Taiwan.	*Contemporary Security Policy*, *47*(2), 469-506.	https://www.tandfonline.com/doi/full/10.1080/13523260.2025.2593247
Maher, B., & Symons, J.	2022	The international politics of carbon dioxide removal: pathways to cooperative global governance.	*Global Environmental Politics*, *22*(1), 44-68.	https://direct.mit.edu/glep/article-abstract/22/1/44/108651
Morin, J. F., & Couette, C.	2025	The missing ingredients for a polycentric governance system of orbital debris.	*Global Environmental Politics*, *25*(2), 1-26	https://direct.mit.edu/glep/article/25/2/1/128618
Oltrogge, D. L., & Christensen, I. A.	2020	Space governance in the new space era.	*Journal of Space Safety Engineering*, *7*(3), 432-438.	https://www.sciencedirect.com/science/article/pii/S2468896720300550
Rabitz, F., Popovaitė, I., & Vilčinskas, V.	2026	Satellite infrastructures, earth-space sustainability, and the Global South.	*Earth System Governance*, *28*, 100323	https://www.sciencedirect.com/science/article/pii/S2589811626000133
Rotolo, D., Hicks, D., & Martin, B. R.	2015	What is an emerging technology?	*Research policy*, *44*(10), 1827-1843.	https://www.sciencedirect.com/science/article/pii/S0048733315001031