

Space Security (JPM700)

Winter semester 2021/22

6 ECTS

Monday 14:00-15:20, 17-18:20

Lecturer

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Course requirements

The students' performance in the course will be assessed based on these criteria:

- Group presentation (30 %)
- Final paper (40%)
- Simulation (10 %)
- Attendance/Activity (20%)

Group Presentation

Students will divide into two groups with separate research topics that will be announces at the first lecture. At the last lecture, they will present their project (30 mins) followed by the debate.

Project 1) – Navigational systems as strategic assets – strategic/security/military role, comparison of existing systems, future development

Project 2) – Security aspects of the Indian space programme – history, overview of systems, global position, predictions

Final paper

Students will write 3-4.000 words long paper on a topic of their interest. Deadline will be announced on the first lecture. Papers will be uploaded into Moodle.

Simulation

Students have to actively participate on the simulation taking place throughout the semester.

Attendance/Activity

All students are required to participate on sessions. Two unexcused absences will be tolerated, more absences will be considered on an individual basis. Students are required to read literature provided for the single classes. Readings will be tested in a short online test that each student must pass (5 questions, minimum 4 correct answers to pass, 2 attempts) before each lecture (test will be opened up until the beginning of the lecture).

Evaluation

100-91% - A

90-81% - B

80-71% - C

70-61% - D

60-51% - E

50-0% - F

Course rules

The *Code of Study and Examination of Charles University in Prague* provides the general framework of study rules at the university. According to art. 6, par. 17 of this Code, "a student may not take any examination in any subject entered in his study plan more than three times, i.e. he shall have the right to two resit dates; no extraordinary resit date shall be permitted. (...) If a student fails to appear for an examination on the date for which he has enrolled without duly excusing himself, he shall not be marked; the provision of neither this nor of the first sentence shall constitute the right to arrange for a special examination date."

Any written assignment composed by the student shall be an original piece. The practices of plagiarism, defined by the Dean's Provision no. 18/2015, are seen as "a major violation of the

rules of academic ethics" and "will be penalized in accordance with Disciplinarian Regulations of the faculty."

Course description

The aim of the course is to comprehensively cover a field of space security – that is the secure access to, and operations in space, free from space-related threats. Outer space has its physical, legal, regulatory, political and economic distinctions that interact with threats to this domain. The course also offers an understanding of the geopolitics of space, including the most pressing space security challenges posed by counterspace activities by its major space-faring nations.

Students enrolled in the course will gain a thorough knowledge of major topics related to space politics, law and security. A set of lectures and seminars will provide students with a foundational understanding with regard to broad space security issues both from a theoretical and practical point of view. The main topics to be covered are counterspace activities; the dualuse nature of space systems; the indispensability of space services to terrestrial applications (both civil and military); challenges associated with space situational awareness; space debris; planetary defence; anti-satellite weapons and early warning systems in relation to the strategic stability on Earth; the geopolitics of outer space; and new risk considerations related to the "New Space" phenomenon.

The course is complemented by three lectures by the external specialists that provide the course with the input of space policy practitioners. The final evaluation is to a large degree based on students' projects related to the important issues of contemporary space security that enables them to acquire practical skills that will assist them in their future career and educational development.

Space security is connected to both the physical environment (e.g. protection of satellites against various hazards, including space weather and near-Earth objects) and human activity in the domain (e.g. space debris, ASATs, counterspace activities etc.). The course will mainly focus on activities related to the Earth's orbits and less on the longer-term issues as the exploration and settlement of deep space.

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Structure of the course

1) Introduction

The introductory lesson will explain the aims and structure of the course and specify the requirements for passing the course.

2) Space as a strategic domain - physical and theoretical perspectives on the outer space

The outer space presents a distinct strategic domain ruled by specific physical laws that need to be understood in order to tackle the issues of space security. This physical distinctiveness gives a ground to many different theoretical perspectives regarding the nature of the politics in space. Some of these perspectives will be presented as well.

Reading:

Dolman, E. (1999). Geostrategy in the space age: An astropolitical analysis. *Journal of Strategic Studies* 22 (2-3), pp. 83-106.

Mendenhall, E. (2018). Treating Outer Space Like a Place: A Case for Rejecting Other Domains Analogies. *Astropolitics.*

3) Historical and geopolitical development in outer space

Outer space has been since the beginning of its utilization a target of geopolitical competition. As such it reflected the nature of international politics throughout the time. To fully understand the current challenges, it is crucial to go through these developments.

Readings:

Tellis, A. (2007). China's Military Space Strategy. Survival 49 (3), pp. 41-72.

Zhang, Y. (2013). The eagle eyes the dragon in space – A critique. *Space Policy* 29 (2), pp. 113-120.

4) <u>NewSpace - access to space, nano-satellites, commercialization of space activities, space</u> tourism

Term "New Space" comprises of the challenges and opportunities connected to the commercialization and massive entrance into the outer space. This progress presents with distinct challenges that were not present throughout the Cold War bipolar competition or 1990s/2000s period of entrance of new state actors.

Readings:

Paikowsky, D. (2017). What Is New Space? The Changing Ecosystem of Global Space Activity. *New Space* 5 (2), pp. 84-88.

Quintana, E. (2017). The New Space Age. The RUSI Journal 162 (3), pp. 88-109.

5) Space law and orbital debris

Space legal system is currently rather vague and does not tackle some of the main challenges of space era. On the other hand, it provides some basic guiding principles that need to be understood in order to realize some soft restrictions in the domain. Orbital debris is then one of the primary space security challenges of today. Its solutions is also to be affected by some of the legal regime provisions.

Readings:

Doboš, B., Pražák, J. (2019). To Clear or to Eliminate? Active Debris Removal Systems as Antisatellite Weapons. *Space Policy* 47, pp. 217-223.

Outer Space Treaty.

https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/outerspacetreaty.html

6) Dual-use systems and space weapons

The lecture will explain the problematics of the proliferation of space weapons and issues related to the development of space dual-use technology with further implications for space weaponization.

Readings:

Pražák, J., 2021. Dual-use conundrum: Towards the weaponization of outer space?. Acta Astronautica, 187, pp.397-405.

Weeden, B. and Samson, V., 2021. Global Counterspace Capabilities: An Open Source Assessment. [ebook] Secure World Foundation, pp.1-16. Available at: https://swfound.org/media/207161/swf_global_counterspace_capabilities_es_2021_en.pdf.

7) Space strategy and warfare, space situational (domain) awareness

Space plays an important role in strategic thought. Not a primary, but crucial supportive role to terrestrial operations cannot be overcome. It is thus crucial to understand the strategic thought and limitations on warfighting in the domain. SSA then establishes a crucial capacity for solution of any space security issues from intentional and war-related, to environmental.

Readings:

Bowen, B. E. (2020). *War in Space: Strategy, Spacepower, Geopolitics*. Edinburgh: Edinburgh University Press. Chapter 3 – Continental Insights and Strategic Manoeuvring, pp. 105-157.

8) Planetary defence and lunar settlement

Planetary defence is a protection of planet Earth from space-based threats, mainly asteroid impact. Technologies for deflection and prediction of catastrophic impact are yet not mature enough and so the short-coming need to be illustrated as well. Staying on celestial bodies, it is likely that the Moon will witness renewed power competition and its nature needs to be understood.

Morrison, D. The Cosmic Impact Hazard (pp. 15-32), Overview of Active Planetary Defence Methods (pp. 113-121). In: Schmidt, N., *Planetary Defence*. Cham: Springer.

9) Guest lecture

10) <u>Guest lecture</u>

11) Simulation - seminar

12) Final presentations

Further readings

Al-Ekabi, C. (2015). European Autonomy in Space. (Cham: Springer).

Anantatmula, V. (2013). U.S. Initiative to Place Weapons in Space: The Catalyst for a Space-Based Arms Race with China and Russia. *Astropolitics* 11 (3), pp. 132-155.

Bormann, N., Sheehan, M. (2009) Securing Outer Space. (Abingdon: Routledge).

Dolman, E. C. (2005). *Astropolitik: classical geopolitics in the space age*. (London: Frank Cass Publishers).

Hays, P.L. (2011). Space and Security: A Reference Handbook. Contemporary World Issues book series.

Johnson-Freese, J. (2007). Space as a Strategic Asset. (New York: Columbia University Press).

Johnson-Freese, J. (2017). Space Warfare in the 21st Century: Arming the Heavens. (New York: Routledge).

Klein, J.J. (2006). Space Warfare: Strategy, Principles and Policy. (London: Routledge).

Lambeth, B.S. (1999). Air power, space power and geography. *Journal of Strategic Studies* 22 (2-3), pp. 63-82.

Lele, A. (2013). Asain Space Race: Rhetoric or Reality? (Springer India: Heidelberg)

Moltz, J. C. (2014). Crowded Orbits: Conflict and Cooperation in Space. New York: Columbia University Press

Norris, P. (2010). Watching Earth from Space: How Surveillance Helps Us – and Harms Us. (Praxis).

Sadeh, E. (2011). The Politics of Space: A Survey (Routledge: London)

Wang, S.-C. (2009). The Making of New "Space": Cases of transatlantic Astropolitics. *Geopolitics* 14 (3), pp. 433-461.