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Advancing Legal Education: Integrating Space Law into Postgraduate Curricula in International Governance and Commercial Law

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Abstract:

Space law, in its current form, is still largely rooted in Cold War-era assumptions, and yet the realities of space activity today could hardly be more different. The 1967 *Outer Space Treaty* remains the primary legal scaffold, but its focus on state actors leaves considerable ambiguity where commercial and non-state activities are concerned. That gap has become increasingly problematic as private ventures, from small satellite constellations to lunar mining initiatives, have reshaped the landscape. This paper makes the case for integrating space law as a distinct and serious component of postgraduate legal curricula, particularly in courses concerned with international governance and commercial regulation. Without this shift, it is difficult to see how future legal practitioners will be prepared to respond to the growing regulatory complexities in this field. Through examining recent developments and legal trends, this paper highlights why and how legal education should adapt, while exploring the institutional and pedagogical challenges such integration might raise.

Keywords: space law; legal education; postgraduate curriculum; capacity building; commercial space activities; international governance.

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1. Introduction

When the Soviet Union launched Sputnik 1 on 4th October 1957, its effects went far beyond the technical. That seemingly simple orbiting transmitter came to represent, in a very real way, a turning point in global politics. It exposed the growing strategic asymmetry between East and West and acted, more or less, as a catalyst for the militarised dimension of the space race.[1] In the midst of Cold War tensions, the signal sent by Sputnik was not just radio, it was geopolitical.

This escalation quickly prompted discussions around the legal status of outer space. After all, if states were to operate above Earth, the old rules clearly would not do. The United Nations acted quickly,[2] establishing COPUOS in 1959 to begin the admittedly difficult task of setting legal norms for a completely new domain.[3] While that move might seem diplomatic on its face, it was also a pragmatic response to escalating rivalry. The effort culminated in the 1967 *Outer Space Treaty*, a legal instrument that remains, in some respects, foundational.[4]

The treaty's principles are now familiar: space is not subject to national appropriation; nuclear weapons are prohibited in orbit; and all space activity must be carried out for the benefit of humankind.[5] In other words, it attempted to build consensus around what should, and should not, be permissible in space.[6] Yet despite its groundbreaking nature, the treaty was framed entirely in terms of state responsibility.[7] Private actors were not, at the time, imagined to be participants of any significance.[8]

This assumption has aged poorly. The emergence of commercial entities as serious space operators has, particularly in recent decades, fundamentally altered the practical and legal dynamics at play. Arianespace set the stage in the 1980s, but newer firms such as SpaceX, Blue Origin, and others have changed the field beyond recognition. They are, in some respects, rewriting the norms through their actions, even as the law struggles to respond. The scale, frequency, and ambition of private

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[1] GG Nucera, 'International Geopolitics and Space Regulation' (2019) Oxford Research Encyclopedia of Planetary Science, pp 1 – 23.

[2] United Nations General Assembly, 'International Co-operation in the Peaceful Uses of Outer Space' (12 December 1959) UNGA Res 1472 (XIV).

[3] United Nations Office for Outer Space Affairs (UNOOSA), 'Committee on the Peaceful Uses of Outer Space' <https://www.unoosa.org/oosa/en/ourwork/copuos/index.html> accessed 12 May 2025.

[4] *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies* (adopted 27 January 1967, entered into force 10 October 1967) 610 UNTS 205 (*Outer Space Treaty*).

[5] JF Kennedy, 'Special Message to the Congress on Urgent National Needs' (25 May 1961) John F. Kennedy Presidential Library and Museum <https://www.jfklibrary.org/archives/other-resources/john-f-kennedy-speeches/urgent-national-needs-19610525> accessed 12 May 2025.

[6] *Outer Space Treaty* (n 4).

[7] Frans von der Dunk and Fabio Tronchetti (eds), *Handbook of Space Law* (Edward Elgar Publishing 2017) 717.

[8] RJ Lee, 'Creating a Practical Legal Framework for the Commercial Exploitation of Mineral Resources in Outer Space' (PhD thesis, Murdoch University 2009).

missions now rival those of states, raising questions that international law was never quite designed to answer.[9]

2. Historical Evaluation of Space Law

Space law, as a field, developed under very particular conditions. The Cold War provided both the urgency and the context, and the earliest treaties reflect that. State-centricity was built into their very structure.[10] So, the *Outer Space Treaty* of 1967 really did set the tone: outer space was to be free, peaceful, and more or less cooperative.[11] Its framing was aspirational, but grounded in a fairly rigid understanding of sovereignty and international responsibility.[12]

What followed was a series of supplementary agreements. The 1968 *Rescue Agreement* introduced obligations to assist astronauts in distress, treating them as envoys of humankind.[13] A few years later, the 1972 *Liability Convention* addressed the problem of damages caused by space objects, creating both absolute liability regime for damage occurring on the surface of the Earth under Article II, and a fault-based liability regime for damage occurring elsewhere in space under Article III.[14] Then, the 1976 *Registration Convention* added a requirement for states to maintain and report space object registries, a move designed to increase transparency.[15]

Together, these treaties formed a coherent, if rather limited, legal system. They placed the burden of oversight on states, even when non-state entities were involved.[16] This was not accidental—it reflected a world in which space was expensive and inaccessible, and where only governments could afford to participate.[17] As early as the 1980s, the paradigm began to shift. The commercialisation of satellite services and the emergence of launch capabilities prompted legislative action, particularly in the United States and the United Kingdom. In 1984, the United States enacted the Commercial Space Launch Act, introducing a federal licensing regime for non-governmental launch activities. That legislation has since been amended on several occasions—in 1988, 2004, and through the Commercial Space Launch Competitiveness Act 2015—and is now codified under Title 51 of the United States

[9] JI Gabrynowicz and JE Serrao, 'An Introduction to Space Law for Decision Makers' (2004) 30(2) Journal of Space Law 227.
[10] *Outer Space Treaty* (n 4).
[11] ibid.
[12] *Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space* (adopted 19 December 1967, entered into force 3 December 1968) 672 UNTS 119.
[13] *Convention on International Liability for Damage Caused by Space Objects* (adopted 29 November 1971, entered into force 1 September 1972) 961 UNTS 187 (*Liability Convention*).
[14] *Convention on Registration of Objects Launched into Outer Space* (adopted 14 January 1975, entered into force 15 September 1976) 1023 UNTS 15 (*Registration Convention*).
[15] Nucera (n 1).
[16] *Outer Space Treaty* (n 4) arts VI, VII.
[17] Commercial Space Launch Act of 1984, Pub L No 98-575, 98 Stat 3055.

Code.[18] The UK's response followed with the Outer Space Act 1986,[19] which established a national licensing system for UK entities undertaking space activities. Yet while comprehensive in scope, the 1986 Act did not envisage launch operations from British territory. That limitation became more or less untenable as ambitions for UK-based spaceports gained political and industrial support.

To address this, Parliament passed the Space Industry Act 2018,[20] aimed specifically at enabling commercial spaceflight and orbital launches from UK soil. According to the UK government's own summary, the Act significantly updated the regulatory framework to support a domestic launch capability—a development not foreseen in the earlier legislation. It marks a legal and infrastructural shift, broadening the UK's role from space operator to launch state.

These national systems marked an important pivot—towards domestic implementation of international obligations and, simultaneously, a growing recognition of the private sector's permanence in space.[21]

3. The Case for Space Law as a Dedicated Module in Legal Education

The pace of commercial expansion in outer space has, quite honestly, outstripped earlier legal expectations. What was once the preserve of state-led missions is now driven increasingly by private actors—SpaceX's satellite mega-constellations,[22] Astrobotic's lunar payload deliveries,[23] and Blue Origin's space tourism prototypes[24] all attest to a sector undergoing structural transformation. With such change, legal questions abound:[25] Who owns harvested lunar ice? What liability follows from a collision caused by debris from defunct satellites? How are human rights protected aboard privately operated spaceflights?[26]

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[18] Commercial Space Launch Act of 1984, Pub L No 98–575, 98 Stat 3055 (codified as amended at 51 USC §§ 50901–50923). See also Commercial Space Launch Amendments Act of 2004, Pub L No 108–492, 118 Stat 3974.
[19] Outer Space Act 1986.
[20] Space Industry Act 2018.
[21] Nucera (n 1); Gabrynowicz and Serrao (n 9).
[22] Mike Wall, 'SpaceX's Starlink Satellite Megaconstellation Launches Explained' Space.com (23 February 2024) <https://www.space.com/spacex-starlink-satellites.html> accessed 12 May 2025.
[23] Astrobotic, 'Lunar Delivery Manifest' <https://www.astrobotic.com/lunar-delivery/manifest/> accessed 12 May 2025.
[24] Blue Origin, 'For the Benefit of Earth' <https://www.blueorigin.com/> accessed 12 May 2025.
[25] Space Generation Advisory Council, Navigating the Space Law and Policy Environment: Professional Development Guide (20 January 2025) <https://spacegeneration.org/slp-professiona-development-guide> accessed 12 May 2025.
[26] Danielle Ireland-Piper and Steven Freeland, 'Human Rights and Space: Reflections on the Implications of Human Activity in Outer Space on Human Rights Law' (2021) 9 Groningen Journal of International Law 101.

These are not speculative concerns. International forums and domestic regulators alike are now grappling with the legal uncertainty posed by expanding space activity. While the 1967 *Outer Space Treaty* remains the bedrock of global space law, its broad, principle-based language leaves many modern issues unresolved. Scholars have noted that the treaty's Cold War origins and focus on inter-state conduct render it ill-equipped to manage twenty-first century dynamics such as space mining, commercial habitats, or dual-use satellite systems. The absence of clear mechanisms for enforcing private accountability or allocating orbital resources highlights tensions within the existing framework, but whether this calls for treaty reform remains contested.

Much of the practical development of space law has occurred not through treaty amendment but through domestic legislation. Around fifty States have now adopted national space laws that implement and expand upon the principles of the *Outer Space Treaty*. As Marchisio observes, 'space law' consists of both international rules and principles set out in the treaties and the domestic regulatory regimes through which States give them effect.[27] From this perspective, the existing system was designed to evolve through national implementation rather than periodic renegotiation of the treaty texts.

What this reveals is a clear mismatch: the legal regime has not kept pace with technological and commercial developments. Legal scholars such as von der Dunk and Lyall & Larsen have long argued that international space law remains underdeveloped relative to the rapidly evolving practice of space activities.[28] As new entrants, both state and commercial proliferate, the strain on outdated legal principles increases.

Despite this, legal education has been slow to adapt. Across most postgraduate law curricula, space law remains marginalised, typically reduced to a week or two within general public international law modules, or offered as an elective, if at all. This structural neglect risks producing legal professionals ill-prepared to address the growing regulatory and interpretive demands of outer space governance. Critical issues such as orbital slot allocation, liability under the 1972 *Liability Convention*, or contractual jurisdiction over cross-border satellite services often fall between doctrinal silos of international, commercial, and telecommunications law.

A further challenge lies in outdated perceptions. Space law is still wrongly considered 'niche', despite its increasing relevance. The global space economy is projected to reach over $1 trillion by 2040,[29] driven not just by national agencies but by commercial operators and infrastructure integrators. Treating it as an intellectual curiosity rather than a vital legal specialism is no longer viable.

Several institutions have already responded. Programmes at Northumbria, Edinburgh, and the Open University now offer space law as part of dedicated LL.M.

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[27] Francesco Marchisio, *Law of Outer Space Activities* (Nuova Cultura 2022) 19-20.
[28] F Lyall and PB Larsen, *Space Law: A Treatise* (2nd edn, Routledge 2020).
[29] Morgan Stanley, 'The Global Space Economy' (Morgan Stanley, 24 October 2023) <https://www.morganstanley.com/Themes/global-space-economy> accessed 12 May 2025.

pathways.[30] These models show both pedagogical viability and student interest. But such efforts remain the exception. Across most of the legal academy, space law still lacks institutional support.

This is not just an academic concern. It has national and strategic implications. Legal capacity is emerging as a critical component of national space policy. Countries such as the United States and Luxembourg have already adopted domestic laws authorising private resource extraction, triggering widespread debate over their consistency with Article II of the *Outer Space Treaty*.[31] The United Kingdom, too, has moved to create a licensing regime under the Space Industry Act 2018,[32] covering everything from spaceport operations to liability for commercial launches.

States without sufficient legal expertise risk falling behind—unable to implement, supervise, or even contest developments in international and commercial space law. As practitioners at McGill[33] and the University of Mississippi[34] have pointed out, space lawyers are not a luxury but a necessity; they will be responsible for shaping the rules of engagement in orbit, safeguarding state obligations, and facilitating the peaceful, sustainable use of space.

Moreover, space law offers rich intellectual challenges. It interrogates foundational legal concepts such as sovereignty, jurisdiction, and common heritage. For example, under Article II of the *Outer Space Treaty*, celestial bodies cannot be appropriated by sovereignty—an idea that destabilises the traditional Westphalian model of legal order.[35] Similarly, Article VIII introduces a form of 'portable jurisdiction', where states retain authority over objects they launch, wherever they travel in space.[36] These doctrines, while novel, offer fertile ground for exploring the adaptation of legal principles to non-territorial domains.

The relationship between space law and environmental law is more deeply rooted than is often acknowledged. Article III of the *Outer Space Treaty*, States must conduct activities "in accordance with international law". Although Article III expressly references the UN Charter, its broader effect is to import general principles of international law into the governance of outer space, including environmental obligations such as the no-harm rule and the duty of due diligence.[37] Because outer space is an area beyond national jurisdiction, these principles apply to activities that risk causing harm to the orbital environment. Contemporary initiatives, such as the

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[30] Northumbria University, 'LLM in Space Law' <https://www.northumbria.ac.uk> accessed 12 May 2025.
[31] Commercial Space Launch Competitiveness Act 2015, Pub L No 114–90, 129 Stat 704.
[32] Space Industry Act 2018.
[33] McGill Institute of Air and Space Law, 'About the Institute' <https://www.mcgill.ca/iasl/> accessed 12 May 2025.
[34] University of Mississippi, 'National Center for Remote Sensing, Air, and Space Law' <http://www.spacelaw.olemiss.edu/> accessed 12 May 2025.
[35] *Outer Space Treaty* (n 4) art II.
[36] Ibid, art VIII.
[37] ibid

UN Space Debris Mitigation Guidelines (2007)[38] and the Long-Term Sustainability Guidelines (2019) build on this foundation, even though binding environmental rules specific to space remain limited.[39] For students, the challenge of applying concepts like sustainability and stewardship in this extraterrestrial context is both timely and intellectually enriching.

Finally, space law bridges public and private domains. Issues of liability, insurance, dispute resolution, and contract enforcement are all pressing concerns in a world of multinational launch providers, satellite operators, and infrastructure consortia. Yet few students encounter these legal questions before entering practice. This gap must be addressed if legal training is to match the complexity of modern global governance.

An increasing number of major law firms are now developing specialist practice areas in space and satellite law, reflecting the commercialisation and regulatory complexity of outer space activities. Firms such as Norton Rose Fulbright, Hogan Lovells, and Bird & Bird offer cross-border legal services covering satellite operations, licensing, liability, and regulatory compliance.[40] Others, including Foot Anstey and DLA Piper, have launched space-focused teams aimed at advising both governmental clients and private operators.[41] These practices underscore the growing demand for legal expertise not only in international frameworks but also in domestic licensing regimes and commercial risk allocation. The presence of such practices in global and UK-based firms signals that space law is no longer a niche academic topic but a developing field of transactional and advisory legal work.

The case for space law as a core component of postgraduate education is clear. Normatively, the field requires new legal thinking. Strategically, states need lawyers trained in their principles. Intellectually, it deepens and challenges conventional legal categories. The integration of space law into advanced legal education is no longer optional; it is essential.

[38] United Nations, *Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space* (2007).
[39] United Nations*, Guidelines for the Long-term Sustainability of Outer Space Activities* (UN Doc A/AC.105/2019/CRP.17).
[40] Norton Rose Fulbright, 'Space and Satellite Law' <https://www.nortonrosefulbright.com/en-gb/services/485d6524/space-and-satellite-law> accessed 12 May 2025.
[41] Foot Anstey, 'Space and Satellite' <https://www.footanstey.com/sectors/energy-infrastructure/space-and-satellite/> accessed 12 May 2025.

4. Global Perspectives on Space Law Education

Different jurisdictions are, as one might expect, moving at different speeds. In Europe, institutions like the University of Vienna,[42] Leiden,[43] and the University of Cologne[44] are leading the way in terms of dedicated space law instruction. Their efforts are often supported by bodies like the European Space Agency and the European Centre for Space Law,[45] which provide institutional frameworks for research and training. A notable exception to the general trend of marginalisation is Sapienza University of Rome, where space law has been taught within the Faculty of Political Science since 1997.[46]

The UK, for its part, has made some progress. Programmes at Northumbria[47] and UCL[48], and initiatives at the London Institute of Space Policy and Law,[49] offer evidence of growing interest. However, the field remains somewhat peripheral when compared to traditional subjects.

In North America, McGill University continues to be a central hub,[50] while in the US, institutions like Georgetown[51] and the University of Mississippi[52] have developed specialised centres and degree programmes. These are often tied closely to aerospace industry demands, which may explain their relatively early adoption of the subject. For completeness: the University of Nebraska College of Law offers a well-

[42] University of Vienna, 'European Space Law and Policy' (Department of European, International and Comparative Law) <https://rechtswissenschaften.univie.ac.at/en/research/european-space-law-and-policy/> accessed 12 May 2025.
[43] Leiden University, 'International Institute of Air and Space Law' (IIASL, Leiden Law School) <https://www.universiteitleiden.nl/en/law/institute-of-public-law/international-institute-of-air-and-space-law> accessed 12 May 2025.
[44] University of Cologne, 'Institute of Air and Space Law' (Cologne University) <https://ilwr.jura.uni-koeln.de/en/institute-of-air-and-space-law> accessed 12 May 2025.
[45] European Space Agency (ESA), 'European Centre for Space Law (ECSL)' <https://www.esa.int/About_Us/ECSL_European_Centre_for_Space_Law> accessed 12 May 2025.
[46] Sapienza University of Rome, Outer Space Law <https://www.outerspacelawsapienza.it/> accessed 4 December 2025
[47] Northumbria University, 'Space Law and Policy' (Northumbria Law School) <https://www.northumbria.ac.uk/about-us/academic-departments/northumbria-law-school/research/space-law/> accessed 12 May 2025.
[48] University College London (UCL), 'Space Law and Policy' (UCL Faculty of Laws) <https://www.ucl.ac.uk/laws/research/space-law-and-policy> accessed 12 May 2025.
[49] London Institute of Space Policy and Law, 'About the Institute' <https://www.space-institute.org/> accessed 12 May 2025.
[50] McGill University Institute of Air and Space Law, 'Institute of Air and Space Law' (McGill University) <https://www.mcgill.ca/iasl/> accessed 12 May 2025.
[51] Georgetown University, 'Georgetown Law' <http://www.georgetown.edu/> accessed 9 October 2024.
[52] University of Mississippi, 'National Center for Remote Sensing, Air, and Space Law' <http://www.spacelaw.olemiss.edu/> accessed 9 October 2024.

known LL.M. in Space, Cyber, and Telecommunications Law,[53] and the University of Houston has developed a respected space law programme.[54] Both have been recognised in ESA sources and represent essential parts of the U.S. academic landscape in this area.[55]

Asia presents a mixed picture. China, through the China University of Political Science and Law and the Harbin Institute of Technology,[56] has developed sophisticated programmes, frequently linked to the country's broader space ambitions. In Japan, Keio University offers instruction that blends policy and legal analysis, though again, these offerings are limited in number.

This suggests that while space law education is growing, it remains uneven. A recent update from the United Nations Office for Outer Space Affairs (UNOOSA) offers, in fact, the most comprehensive snapshot to date of global educational efforts in space law. The 2024 *Directory of Education Opportunities in Space Law* catalogues over fifty institutions across all continents,[57] ranging from long-established centres such as those previously mentioned to newer or under-recognised programmes in Argentina, Malaysia, and South Africa. The Directory not only confirms the steady institutionalisation of the field in Western jurisdictions but also reveals how seriously space law is being taken as a capacity-building tool in emerging spacefaring states. It reflects a gradual shift from fragmented, localised efforts to a more internationally coordinated approach to legal education. In that sense, the document both evidences and supports the claim that space law education is now entering a more pluralistic and globally distributed phase—albeit one still lacking standardisation or equitable access. A more standardised and globally accessible framework would help ensure that legal professionals across jurisdictions are equipped to deal with the transboundary and increasingly complex nature of space governance.

5. Emerging Legal Challenges in the New Space Era

To further illustrate why traditional legal education must evolve, the following examines several emerging challenges in space law that new lawyers will confront. For all the weight carried by the treaties of the 1960s and 70s, the truth is that space activity in the 21st century has evolved in ways they barely anticipated. The move

[53] University of Nebraska College of Law, 'LL.M. in Space, Cyber, and Telecommunications Law' (Nebraska Law) <https://law.unl.edu/spacecyberlaw/> accessed 12 May 2025.
[54] University of Houston Law Center, 'Space Law and Policy' (University of Houston Law Center) <https://www.law.uh.edu/space/> accessed 12 May 2025.
[55] European Space Agency (ESA), 'Space Law Education Resources' (ESA) <https://www.esa.int/About_Us/ECSL_European_Centre_for_Space_Law/Education> accessed 12 May 2025.
[56] Harbin Institute of Technology, 'Harbin Institute of Technology' <http://en.hit.edu.cn/> accessed 9 October 2024.
[57] United Nations Office for Outer Space Affairs, 'Model Curriculum on Space Law' (UNOOSA, 2012) <https://www.unoosa.org/oosa/en/ourwork/spacelaw/education/model-curriculum.html> accessed 4 December 2025.

from state-led exploration to commercial exploitation, and from scientific missions to full-scale economic ventures, has created a legal terrain that is increasingly fragmented and ambiguous. The assumption that states would remain the central operators has, in a way, collapsed under the sheer scale and ambition of today's private activity. So, the legal system now finds itself in a slightly awkward position: tied to principles that still carry normative value, but poorly equipped to resolve many of the questions that now arise.

5.1 Governing Space Resources and Property Rights

Perhaps nowhere is this clearer than in the domain of space resources. While the *Outer Space Treaty* makes clear that outer space, including the Moon and other celestial bodies, is not subject to national appropriation, it is notably silent on the extraction and use of resources. That silence has become the basis for diverging interpretations. The United States, through its Commercial Space Launch Competitiveness Act 2015, has taken the view that while celestial bodies cannot be claimed as sovereign territory, resources removed from them can be privately owned.[58] Luxembourg adopted a similar position with its 2017 legislation,[59] effectively recognising commercial rights over extracted resources.

Other States have adopted comparable approaches. Japan introduced its Space Resources Act in 2021, establishing a domestic framework that enables private entities to explore for and utilise space resources.[60] The United Arab Emirates introduced Federal Law No. 43 of 2023 Regarding the Organisation of the Space Sector,[61] which provides a comprehensive regulatory regime governing activities such as the launch, operation, and disposal of space objects, as well as resource-related activities conducted by private actors. Together, these developments reflect an emerging trend in which States are increasingly relying on domestic legislation to structure resource-related activities in outer space.

These laws have more or less sidestepped the failed *Moon Agreement* of 1979, which declared such resources to be the 'common heritage of mankind'[62] and called for an international regime to govern their use. That vision, while arguably more equitable, was politically unpalatable to major spacefaring states, and remains largely dormant. In its place, non-binding initiatives like the Artemis Accords—launched by NASA and signed by over fifty nations—have begun to articulate a new normative framework,[63]

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[58] U.S. Commercial Space Launch Competitiveness Act 2015, Pub. L. No. 114–90, Title IV (codified at 51 U.S.C. § 51303).
[59] Luxembourg Space Resources Law, Law of 20 July 2017 on the exploration and use of space resources.
[60] Act on the Promotion of Business Activities for the Exploration and Development of Space Resources (Act No.83 of 2021).
[61] Federal Decree Law No. 46 of 2023 Regarding the Organisation of the Space Sector (UAE).
[62] *Agreement Governing the Activities of States on the Moon and Other Celestial Bodies* (1979), art. 11.
[63] Robert Lea, 'Artemis Accords: What Are They & Which Countries Are Involved?' Space.com (9 April 2025) <https://www.space.com/artemis-accords-explained> accessed 12 May 2025.

albeit one driven by state practice rather than multilateral agreement.[64] Many of the principles contained in the Accords can be understood as interpretative guidance on Article II of the *Outer Space Treaty*, particularly the prohibition on national appropriation, and thus amount to "subsequent practice" within the meaning of Article 31(3)(b) of the *Vienna Convention on the Law of Treaties*.[65] Other elements, such as provisions on the protection of Cultural heritage, represent more deliberate attempts at progressive development. These developments are, in some respects, legal experiments. They challenge long-standing norms and raise questions about whether a consensus-based legal order is still achievable in space.

5.2 Orbital Debris and the Limits of Liability

Another area where current law appears to be under strain is space debris. The number of active satellites has exploded in recent years, driven in large part by mega-constellations such as Starlink. As low-Earth orbit becomes more crowded, the risk of collisions—and cascading debris events—has become significantly more pronounced. Yet, the legal response remains, at best, tentative. The *Liability Convention* 1972 does establish a basic framework,[66] imposing absolute liability for surface damage and fault-based liability for damage in space. But it has rarely been tested, and to date, no claim has ever been brought under it for debris-related damage.[67]

In practice, liability is hard to prove, fault even harder, and international cooperation often slow. Guidelines issued by the United Nations and the Inter-Agency Space Debris Coordination Committee (IADC) promote responsible behaviour, but they are voluntary and lack enforcement mechanisms.[68] This legal uncertainty matters. It affects how insurance is priced, how risk is managed, and how states interpret their own oversight obligations. In a way, it exposes the limits of a treaty system built for an earlier technological moment.

5.3 Militarisation and the Ambiguity of 'Peaceful Purposes'

Space has never been fully demilitarised. Even at the height of Cold War diplomacy, the *Outer Space Treaty*'s prohibition on nuclear weapons in orbit was more about arms control than full pacification. What is new, though, is the explicit institutionalisation of military space forces—such as the U.S. Space Force—and the testing of anti-satellite weapons by states including the United States, China, Russia,

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[64] NASA, Artemis Accords: Principles for Cooperation in the Civil Exploration and Use of the Moon, Mars, Comets, and Asteroids (2020) <https://www.nasa.gov/specials/artemis-accords/> accessed 12 May 2025.

[65] *Vienna Convention on the Law of Treaties* (adopted 23 May 1969, entered into force 27 January 1980) 1155 UNTS 331, art 31(3)(b).

[66] *Liability Convention* (n 13) arts II–III.

[67] Yannick Radi, 'Clearing up the Space Junk – On the Flaws and Potential of International Space Law to Tackle the Space Debris Problem' (2022) 12(2) ESIL Reflections.

[68] United Nations Office for Outer Space Affairs, 'Guidelines for the Long-term Sustainability of Outer Space Activities' (2019), UN Doc. A/AC.105/2019.

and India.[69] These developments suggest that space is once again becoming an arena for geopolitical competition.

The legal instruments in place offer limited guidance. There is no binding ban on conventional weapons in space,[70] and the meaning of 'peaceful purposes' remains open to interpretation. Attempts at the UN to negotiate new rules have largely stalled, with disagreements over whether to prioritise behaviour-based norms or weapons-specific prohibitions.[71] In the meantime, the risks of miscalculation are growing. This is not just a matter for diplomats—it is a pressing concern for lawyers as well. Issues of space-based targeting, command responsibility, and dual-use technologies are increasingly relevant, and yet they are rarely covered in standard legal education.

5.4 Commercial Spaceflight and Space Tourism

A further legal grey area is commercial human spaceflight. Companies like Blue Origin and Virgin Galactic have already launched private individuals into suborbital space.[72] More ambitious projects—such as private space stations or lunar tourism—are already on the horizon. And yet, the legal status of these passengers is unclear. The *Rescue Agreement* 1968 treats astronauts as 'envoys of humankind,'[73] but it is not obvious that this language extends to paying tourists. Similarly, national laws offer only partial guidance. In the U.S., a regulatory moratorium—referred to as the 'learning period'—has effectively suspended the imposition of safety regulations for commercial human spaceflight, though this was extended to January 1st 2028.[74]

The liability framework is even murkier. To what extent can passengers waive claims? How does tort law interact with international space law?[75] What role should insurers play in managing the risks? These are questions that do not yet have satisfactory answers, but which will soon demand them. For postgraduate students of law, they represent a live and increasingly urgent frontier.

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[69] M. Gruss, 'India's ASAT Test Was a Wake-Up Call for the World', SpaceNews (2019)<https://spacenews.com/indias-asat-test/> accessed 9 October 2024.
[70] *Outer Space Treaty* (n 4), art IV (interpreted as prohibiting WMD, not all military uses).
[71] United Nations General Assembly, *Group of Governmental Experts on Further Practical Measures for the Prevention of an Arms Race in Outer Space*, UN Doc. A/74/77 (2019).
[72] FAA, 'Human Spaceflight: Regulation Moratorium', U.S. Federal Aviation Administration (updated 2023)<https://www.faa.gov/space/licenses/human_spaceflight/> accessed 12 May 2025.
[73] *Rescue Agreement* (n 12) art V.
[74] Rachel Lindbergh, Regulation of Commercial Human Spaceflight Safety: Overview and Issues for Congress (Congressional Research Service, In Focus IF12508,4 February 2025) <https://www.congress.gov/crs-product/IF12508> accessed 4 December 2025.
[75] Frans G von der Dunk, 'Space for Tourism? Legal Aspects of Private Spaceflight for Tourist Purposes' (2006) 49 Proc Colloq Law Outer Space 18.

6. Education, Pedagogy and International Capacity Building

Of course, introducing space law into legal education is not without its hurdles. For a start, qualified instructors are, in many places, quite rare. Space law demands a blend of legal, technical, and policy knowledge that is not always easy to come by within a single faculty. This shortage can limit the feasibility of offering a sustained and meaningful programme.

Equally, resources tend to be patchy. Traditional legal textbooks rarely include comprehensive material on space law, and keeping up with ongoing international negotiations or emerging case law requires a degree of access and specialisation that some institutions lack. This can leave students with an overly theoretical grasp of the subject, disconnected from its practical applications.

Another issue is that space law often struggles to compete with more marketable legal subjects. Given constraints on time and funding, law schools may prefer to expand corporate law or human rights offerings instead. That perception—that space law is only relevant to a small subset of lawyers—continues to limit its academic growth, despite its increasing relevance across fields like IP, environmental regulation, and telecommunications.

A further difficulty is the limited accessibility of authoritative scholarship. Much of the most rigorous doctrinal work in space law, such as Marchisio's *Law of Outer Space Activities* or Hobe's *Space Law*,[76] is not available in open-access form. Students, therefore, often turn to freely accessible material of uneven academic quality, including non-peer-reviewed commentary published outside established journals. This dynamic reinforces the perception that the field lacks methodological depth and contributes to the very marginalisation it seeks to overcome. It also obscures the fact that space law emerged within the broader framework of International Law: a proper understanding of the field presupposes grounding in that discipline, with domestic law serving as a necessary complement rather than an alternative.

Olena Fatkhutdinova highlights the central role legal education plays in the development of space law, particularly within transitional and emerging jurisdictions. Drawing on Ukraine's experience, it argues that deepening legal curricula through practical, interdisciplinary methods is essential to preparing legal professionals capable of engaging with the complex legal dimensions of outer space governance. Her analysis stresses that knowledge of space law is increasingly relevant not only to international cooperation but also to domestic policymaking and legal infrastructure. Fatkhutdinova advocates for a practice-based, value-driven model of education—grounded in real-world application and integrated with broader geopolitical,

[76] Francesco Marchisio, *Law of Outer Space Activities* (Nuova Cultura 2022); Stephan Hobe, *Space Law* (2nd edn, Nomos/Hart 2023).

technological, and ethical frameworks—that can meaningfully support the legal foundations of space activity.[77]

That said, the prospects are far from bleak. Growing partnerships between universities and space industry players can, in some respects, solve several of these problems at once. Guest lectures, research collaborations, and internship opportunities can enrich academic programmes and provide students with a real sense of how space law works in practice. In turn, these connections can support faculty development and curriculum innovation.

There's also clear potential in interdisciplinary teaching. Cross-listed courses with departments of engineering, politics, or environmental science can offer students a broader perspective. Simulation-based teaching, such as the Manfred Lachs Moot,[78] provides a concrete example of how experiential learning can make the subject far more engaging.

Finally, online learning has opened up real possibilities. Massive open online courses (MOOCs), webinars, and certificate programmes can make space law accessible to students globally, helping to build a broader and more diverse cohort of legal professionals in the field.[79]

If space law is to become a serious academic discipline, it must do more than simply replicate the treaty history. The real pedagogical challenge lies in teaching students how to think legally about a domain that is still, in many respects, under construction. That requires not only doctrinal knowledge but also the capacity to engage with scientific, ethical, and political questions in tandem.

One way to approach this is through interdisciplinary teaching. Modules co-taught with departments of aerospace engineering, environmental science, or international relations can offer students a fuller picture of the issues at stake. Simulation-based exercises, such as those used in the Manfred Lachs Moot, give students a chance to apply legal principles in realistic settings. These are not just academic exercises—they mirror the kinds of scenarios future practitioners may face, from dispute resolution between satellite operators to litigation over orbital interference.

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[77] Olena Fatkhutdinova, 'Impact of Legal Education on the Development of Space Law' (2018) 1 Advanced Space Law 42.

[78] International Institute of Space Law, 'About the Manfred Lachs Space Law Moot Court Competition' <https://iisl.space/about-the-manfred-lachs-space-law-moot-court-competition/> accessed 12 May 2025.

[79] London Institute of Space Policy and Law, 'Opportunities for Students' <https://www.space-institute.org/students/> accessed 12 May 2025.

There is also a growing body of international work aimed at building legal capacity in this field. One notable example is the *Education Opportunities in Space Law* Directory,[80] compiled and maintained by the United Nations Office for Outer Space Affairs. The 2024 edition documents a wide spectrum of academic institutions engaged in teaching space law, including their course offerings, facilities, admission standards, and available fellowships. What is significant is that the Directory explicitly aims to assist developing countries in establishing their own space law capacity, emphasising the importance of legal education not just for academic enrichment but as a practical tool of national policy development. The Directory also serves another purpose: it quietly draws attention to the uneven spread and variable depth of space law programmes, which might be enough to spark more coordinated efforts across borders.

As previously noted, the UNOOSA Directory provides the most complete overview of current educational provision, but it forms only part of the organisation's broader capacity-building agenda.[81] Beyond cataloguing global programmes, UNOOSA supports curriculum development through regional workshops and training initiatives, particularly within the Global South. The European Centre for Space Law runs annual summer schools and professional training courses.[82] These initiatives are more than symbolic; they provide a scaffold for developing a global community of space law practitioners who share a common legal vocabulary, if not always a common approach.

Finally, digital education platforms offer a way to overcome some of the resource constraints faced by institutions. MOOCs, webinars, and online certificate programmes can reach students who would otherwise have no access to this material.[83] They also allow for cross-border collaboration, giving students a sense of the truly international nature of the legal problems involved.

7. Conclusion

Space, once the exclusive theatre of a few superpowers, has now become a domain of commercial opportunity, scientific collaboration, and geopolitical friction. That

[80] United Nations Office for Outer Space Affairs, Education Opportunities in Space Law: A Directory (A/AC.105/C.2/2024/CRP.7, 15 April 2024). <https://www.unoosa.org/oosa/oosadoc/data/documents/2024/aac_105c_2crp/aac_105c_2crp_7_0.html> accessed 12 May 2025.

[81] UNOOSA, 'Online Learning' (UNOOSA) <https://www.unoosa.org/oosa/en/informationfor/students/online-learning.html> accessed 4 December 2025.

[82] European Centre for Space Law (ECSL), 'Summer Course on Space Law and Policy' <https://www.esa.int/About_Us/ECSL_-_European_Centre_for_Space_Law/ECSL_Summer_Course_on_Space_Law_and_Policy> accessed 4 December 2025.

[83] International Institute of Space Law, 'Manfred Lachs Space Law Moot Court Competition' <https://www.iislweb.org> accessed 12 May 2025.

transformation brings with it legal questions that older treaties can only partly answer.[84] From managing orbital traffic to resolving liability for space debris, the legal issues are becoming more urgent—and more complex.[85]

Given recent developments, legal education appears to have an increasingly relevant role. Universities may need to begin approaching space law not as a marginal subject, but as one of growing practical and academic importance. By integrating space law modules into postgraduate curricula—particularly within programmes concerned with governance, commercial regulation, or international legal structures—they can help ensure that graduates are at least reasonably prepared to engage with the emerging legal demands of this field.[86]

The obstacles are real, including faculty shortages, limited resources, and competition from more established subjects. But the opportunities, especially those offered by industry collaboration and digital learning, are not insignificant. Moreover, interdisciplinary approaches can make the subject more relevant and more compelling to a broader audience.

The regulation of space cannot simply be left to develop without direction; a future cohort of legal professionals will likely be required to engage critically and constructively with the frameworks that govern this increasingly significant domain. Their preparation will, in some measure, depend on whether space law is meaningfully incorporated into legal education today.

Law schools and relevant institutions should consider updating curricula, allocating suitable resources, and forming academic or professional partnerships to support the integration of space law. Such measures may help ensure that graduates are reasonably equipped to address the legal challenges emerging in this field.

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[84] Lyall and Larsen (n 28).

[85] Kessler DJ and Cour-Palais BG, 'Collision Frequency of Artificial Satellites: The Creation of a Debris Belt' (1978) 83 Journal of Geophysical Research: Space Physics A6.

[86] Joanne Irene Gabrynowicz (ed), Pacific Rim National Space Law Summit, (2009) 35(2) Journal of Space Law.