

# SPACE LAW EDUCATION IN THE UNITED STATES IN A NEW ERA OF SPACE ACTIVITIES

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## I. INTRODUCTION

Outer space activities are increasingly being reported on in the mass media and capturing the attention of the public. This is no surprise given the tremendous changes and advancements in the nature of space activities and the number of actors involved in space activities since the beginning of the space era with the launch by the Soviet government of the first satellite, Sputnik, in 1957. While only ten nations maintain launch capacity to space today, well over sixty have satellites in space, and nearly all nations benefit from or use satellite data or communications capacities in some form. A United States commercial company, Space Exploration Technologies (SpaceX), became the first commercial entity to successfully launch and recover an object from Earth orbit in December 2010, a milestone only six nations have achieved in the fifty-five years of space exploration. SpaceX has subsequently completed a successful cargo run to the International Space Station (ISS) in May 2012. Having retired the Shuttle program, NASA is relying on commercial companies to ultimately provide both cargo and crew carriage to the International Space Station (ISS). Additionally, while communications and remote sensing satellites have long been part of the space environment and have benefitted people in their banking, agricultural planting, sea traffic, and air navigation, as well as telecommunications needs, new space markets are being created by space entrepreneurs. For example, Virgin Galactic has collected well over 500 deposits for seats on its sub-orbital flights, not only for space tourists but also for those wishing to conduct zero-gravity research, and will

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begin flights from Spaceport America in New Mexico likely sometime in 2013. Additionally, Bigelow Aerospace successfully launched prototypes of its inflatable space hotels and research stations in 2007 and is awaiting commercial human transport to develop.

The number of nations involved in and benefitting from space activities and the increasing commercialization of space, along with the creation of new markets, leads to policy and, ultimately, to regulatory challenges. Indeed, the challenges are numerous in the increasingly contested, congested, and competitive space domain. First, space situational awareness must be improved, namely the ability to track and to catalogue objects in space and attempt to glean intentions behind the movements of such objects. Second, space debris, specifically non-functional man-made objects in space, is increasingly a risk to functioning satellites and other ongoing space activities, including the ISS. Third, striking a balance in how to regulate private commercial actors in space in a manner that is not overly burdensome but protects public safety is an ongoing challenge. Fourth, consideration of how rules regarding laws of war and neutrality should operate in a space environment in which militaries lease transponders on commercial satellites is underway. The list could go on.

These challenges all create a growing need for space lawyers, lawyers that can apply current international, federal, and state regulations regarding space activities and can suggest and draft new rules where necessary. Indeed, the United States' only Masters of Laws (LL.M.) degree in space law (combined with cyber and telecommunications law), launched just four years ago in 2008 at the University of Nebraska College of Law, already has graduates working at SpaceX (Hawthorne, CA), NASA Jet Propulsion Lab (Pasadena, CA), United States Strategic Command (USSTRATCOM) (Omaha, NE), United States State Department (on space policy) (Washington, D.C.), United States Cyber Command (Ft. Mead, MD), Air Force Cyber Command

(San Antonio, TX), Air Force Space Operations (Vandenberg Air Force Base, CA), New America Foundation (Washington, D.C.), Ammori Group (telecom consulting) (Washington, D.C.), Federal Communications Commission (Washington, D.C), Northrop Grumman (Washington, D.C.), and McKinsey Consulting (telecom/satellite group). But the teaching of space law *to train future space lawyers*, while certainly increasingly necessary and a primary goal of advanced space law education, is not the only driving force behind increased space law education opportunities.

## II. TRAINING SPECIALISTS FOR SPACE LAW AND TRAINING GENERALISTS

### THROUGH SPACE LAW

Space law education also allows a broader set of students to explore general international law using outer space as a “case study.” Indeed, one of the benefits of the creation of the LL.M. degree at Nebraska is the increase in course offerings available for Juris Doctor (J.D.) students as well.

Space law is often considered a *sub-specialty within international law*, allowing exploration of the general field through the lens of space. Many international law casebooks might have at most a few pages devoted to space law as a sub-specialty topic at the back of the casebook. Space law, however, is ripe with opportunities to explore general international law principles. One can explore the distinction between binding treaties, with space law featuring five Cold War era treaties concluded between 1967-1979, and so-called “soft law” or political commitments, which was the approach taken with respect to mitigating space debris, first in the Interagency Space Debris Coordinating Committee (IADC) and subsequently the UN Committee on the Peaceful Uses of Outer Space (COPUOS). Within binding treaties, one can explore the impact of more weakly worded obligations, such as the consultation requirement in Article IX of

the Outer Space Treaty before a nation proceeds with a space activity that “would cause potentially harmful interference.”<sup>1</sup> Application of this article arose in the context of China’s 2007 anti-satellite (ASAT) test on one of its aging weather satellites that created a debris field in low Earth orbit that remains today and that was conducted without advance consultation with other nations. Surprisingly few nations argued a violation of the article, perhaps because it only requires advance consultation but does not explicitly prohibit the activity. One can also explore the need for formal dispute settlement mechanisms in treaties given the lack of such mechanisms in the major space treaties. One of the hallmarks of the international trade and investment regimes is reliance on formal, binding dispute settlement, and yet the space regime lacks such mechanisms.

Further, space law is a field that allows students to view law as a *system of rules at the international, national, state, and local level* and come to understand the interaction between those various levels of regulation. For example, the issues of liability surrounding a sub-orbital space tourist flight involve the interaction of treaties with federal and state law. At the international level, the Liability Convention makes the launching state liable for damages on Earth (absolute liability) or in outer space (fault-based) with exceptions for foreign nationals “participating in the operation” of the spacecraft.<sup>2</sup> Questions, of course, arise as to whether a tourist would be considered to be participating in the operation of the spacecraft. Nations, such as the United States, have enacted federal legislation requiring operators to obtain insurance for third-party liability up to the maximum probable loss and required operators and their contractors

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<sup>1</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies art. IX, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205.

<sup>2</sup> See Convention on International Liability for Damage Caused by Space Objects arts. 2, 3, 7, Mar. 29, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187.

to engage in cross-waivers of liability with each other and with the United States government.<sup>3</sup> Space tourists, however, are not subject to the mandatory cross-waivers of liability except with respect to the United States government<sup>4</sup> and thus could potentially sue space operators for injury. While operators will undoubtedly obtain contractual waivers from tourists to avoid such suits, there is some chance these waivers would not be recognized by courts. Accordingly, several states, namely New Mexico,<sup>5</sup> Texas,<sup>6</sup> Florida,<sup>7</sup> and Virginia,<sup>8</sup> have enacted liability immunity legislation. This legislation provides additional protection to space flight operators and thus incentivizes launches from their territory. The scope of immunity afforded by these statutes, however, varies. Analyzing a liability issue arising from damage caused by a sub-orbital flight to either third parties or to tourists thus involves a multi-level regulatory analysis of international, federal, and state laws, with some ambiguity in each of these levels.

Space law can also be viewed as a *capstone course*, allowing law students to assimilate materials from numerous courses in their legal education to the challenging domain of outer space, including not only international law, but intellectual property law, administrative law, insurance law, international business law, contract law, tort law, and property law. It is true that even those students just having experienced first-year (1L) courses can do some exploration of space law. For example, the Liability Convention mentioned above provides an opportunity to explore the difference between absolute liability and fault-based or negligence standards for liability. Upper-level course materials can also be reviewed and assimilated further in the

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<sup>3</sup> See Financial Responsibility, 14 C.F.R. pt. 440 (2012). See generally Frans G. von der Dunk & A. Kerrest de Rozavel, *Liability and Insurance in the Context of National Authorisation*, in NATIONAL SPACE LEGISLATION IN EUROPE—ISSUES OF AUTHORISATION OF PRIVATE SPACE ACTIVITIES IN THE LIGHT OF DEVELOPMENTS IN EUROPEAN SPACE COOPERATION 125-61 (Frans G. von der Dunk ed., Brill 2011).

<sup>4</sup> See Human Space Flight Requirements, 14 C.F.R. pt. 460 (2012).

<sup>5</sup> See Space Flight Informed Consent Act, N.M. STAT. ANN. § 41-14-1 to -4 (West Supp. 2011).

<sup>6</sup> See Limited Liability for Space Flight Activities, TEX. CIV. PRAC. & REM. CODE ANN § 100A.001–.004 (Vernon Supp. 2012).

<sup>7</sup> See FLA. STAT. ANN. § 331.501 (West Supp. 2012).

<sup>8</sup> See Space Flight Liability and Immunity Act, VA. CODE ANN. § 8.01-227.8–.10 (West Supp. 2010).

context of space law study. For example, patent law is territorial-based. So how should the creation or use of inventions in outer space be treated? The United States passed the Space Patents Act<sup>9</sup> that states: “Any invention made, used, or sold in outer space on a space object or component thereof under the jurisdiction or control of the United States shall be considered to be made, used, or sold within the United States . . . .” While seemingly providing clarity, an exception is made for space objects on a foreign nation’s registry, thus providing a possible “loophole” or “flags of convenience” problem to the protection of patents when used in outer space.<sup>10</sup>

Finally, space law also provides ample opportunity for law students to witness and explore the *interaction between law and technology*. For example, restrictions on exports of satellites and defense services under the International Traffic in Arms Regulations (ITAR) may limit the ability to create a global market for active space debris remediation technologies and on-orbit satellite servicing, a problem considering debris mitigation efforts may be insufficient to secure the sustainability of certain valuable orbits.<sup>11</sup>

### III. SPACE LAW EDUCATION OPPORTUNITIES WITHIN THE UNITED STATES

The United States has nearly 200 law schools with only a handful or so that offer courses in space law, including Nebraska, Georgetown, George Washington, Mississippi, and Houston. The only one offering a Master of Laws (LL.M.), a one-year advance degree post-J.D., is the University of Nebraska College of Law.

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<sup>9</sup> 35 U.S.C. § 105(a) (2006).

<sup>10</sup> Theodore U. Ro, Matthew J. Kleiman, Kurt G. Hammerle, *Patent Infringement in Outer Space in Light of 35 U.S.C. § 105: Following the White Rabbit Down the Rabbit Loophole*, 17 B.U. J. SCI. & TECH. L. 202 (2011).

<sup>11</sup> Matthew Schaefer, Professor of Law and Director, Space, Cyber, and Telecom Law LL.M. University of Nebraska College of Law, Presentation to the International Interdisciplinary Congress on Space Debris, Montreal, Canada (Nov. 11, 2011).

### A. NEBRASKA'S SPACE LAW LL.M. PROGRAM

Nebraska's LL.M. program was created in 2008, and an online version of the degree began in the fall of 2012.<sup>12</sup> In addition to the LL.M. degree, Nebraska allows its J.D. students to earn a certificate of specialization in space, cyber, and telecommunications law. Nebraska is currently exploring the creation of a Doctor of Juridical Science (S.J.D.) degree to add further to the degree options in response to requests from potential students and is also considering revamping its M.L.S. (Masters of Legal Studies) degree as an option for non-lawyers not interested in practicing law but whom can benefit from a legal background in these areas.

J.D. students at the University of Mississippi also have the opportunity to earn a certificate of specialization in air and space law. It is, however, no longer at just the traditional schools in the space law education arena in which students are demanding a course in space law. Space law societies are sprouting up at various law schools throughout the country, including recently at Cal-Irvine, Michigan, and Wisconsin. Therefore, one may soon see more than a handful or so of United States law schools offering basic introductory space law courses.<sup>13</sup>

In creating its program, Nebraska discovered J.D. alumni, such as June Edwards, former Senior Attorney at NASA, Darren Huskisson, Chief of Space and Cyber Law at USSTRATCOM, and Fred Campbell, former Wireless Bureau Chief at FCC, that assisted in the program's development through service on the program's advisory board and/or as adjunct professors. Nebraska also was able to enlist an engineering college alum and former air force

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<sup>12</sup> Nebraska's 2012 incoming class of LL.M. students includes seven in-residence students and five more in the online program, with three more online students to begin in the spring of 2013. The online program is designed for students that have practiced law for three years and are continuing on in their employment.

<sup>13</sup> Interestingly, Nebraska actually offered a space law course in the early 1970s shortly after the major space law treaties came into force, such as the 1967 Outer Space Treaty (OST) that remains the primary binding international treaty governing space activities, and the first man, Neil Armstrong, walked on the Moon in July of 1969. One of Nebraska's J.D. alumni, Dennis Burnett, Vice-President of Trade and Export Controls of EADS North America, was a student in that early 1970s course at Nebraska and now serves on Nebraska's space, cyber, and telecom law advisory board as vice-chair and teaches a mini-course to LL.M. and J.D. students in Export Control and International Traffic in Arms Regulations at Nebraska as an adjunct faculty member.

test pilot as well as a leader in Air Force acquisitions and procurement, Major General Claude Bolton, (US Air Force, retired) to serve as chair of the program's advisory board.

Nebraska's LL.M. program draws students from across the country, indicating the breadth of interest in the subject of space law. Students in the program hail from Vermont to Hawaii, from New York to San Diego, and have included four Michigan J.D. students in the past three years (with the director of the program and another faculty member in the program being Michigan law alums). The program also draws one Air Force JAG to the in-residence program each year. The online program is drawing additional JAGs. One impetus for creation of the program was a recommendation by then Commander of USSTRATCOM and, subsequently Vice-Chair of the Joint Chiefs of Staff, General James Cartwright on the need for a degree-bearing program in space law in the United States. The vast majority of students in the LL.M. program, however, are not coming directly from the military, a signal that commercial space is increasingly relevant.

#### *B. PAIRING SPACE LAW WITH CYBER AND TELECOMMUNICATIONS LAW*

Numerous reasons supported Nebraska's decision to combine its space law program with cyber and telecommunications law. First, these areas of law are connected substantively. For example, the International Telecommunications Union (ITU), an international organization under the UN umbrella, allocates slots in the geostationary orbit, the most beneficial orbit for communications satellites. Second, the space and cyber domains share some common problems as a result of being "borderless" domains. Regulatory authority is typically connected to sovereignty, which is usually connected to geography. Thus, these "borderless" domains create regulatory challenges for states. Moreover, regulation in these domains often involves discussion of analogies and metaphors to the "real" terrestrial world. For example, those in favor

of further space exploration and exploitation analogize to the homesteading movement of the 1800s in the United States. Third, these sectors involve a more general consideration of the interrelationship between technology and the law. Fourth, while not every lawyer will practice space law, nearly every lawyer, in some context or sense, is going to practice cyber law, as nearly every single client that walks through the door in today's world has a cyber presence and, thus, potentially a cyber legal problem. Indeed, some Nebraska LL.M. students have enrolled to become cyber savvy for their firm's existing client base. Fifth, the space and cyber domains are connected technologically as well. For example:

Space capabilities supplement and enhance cyber capabilities, and vice versa. The timing function provided by GPS enables all of the base stations in a data network to stay synchronized. And[,] the measurements and observations collected by our weather satellites are transmitted and processed through cyberspace, enabling more precise weather forecasts, enabling tactical, operational capabilities that otherwise could not be implemented. In many cases, space and cyber capabilities ride on the same infrastructure. That bit of data may ride on fiber for a while before being directed up through a satellite and back down to another terrestrial network. Our space and cyberspace capabilities are distributed, networked, and global; we must utilize and protect them accordingly.<sup>14</sup>

Sixth, it enhances the employment opportunities for students, who will have possibilities in all three sectors. The employment opportunities to Nebraska's LL.M. graduates have indeed been in all three sectors—space, cyber, and telecommunications. Seventh, it distinguishes Nebraska's program from the other major space law programs in the world, which all combine the study of space law with air law, including McGill (Montreal), Leiden (Netherlands), Cologne (Germany), and Mississippi.

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<sup>14</sup> Madelyn R. Creedon, Assistant Secretary of Defense for Global Strategic Affairs, Remarks to the USSTRATCOM Cyber and Space Symposium (Nov. 15, 2011), *available at* <http://www.au.af.mil/au/ssq/2012/spring/creedon.pdf>.

### C. *ONLINE VERSION OF NEBRASKA'S LL.M. DEGREE*

Nebraska launched an online version of its LL.M. degree in space, cyber, and telecommunications law in August 2012. The successful launch of the online program offers proof that attorneys throughout the country are finding it necessary or beneficial to pursue further study in these fields and also an indication that an in-residence program alone would not meet the demand for such education. It is labeled an online degree, rather than remote learning, because that is the standard-term used by law schools and generally expected by attorneys. Online students, however, will take the same courses, taught by the same professors, as the in-residence students.<sup>15</sup> Online students thus benefit from the real-life experiences of the professors that teach these areas—including Professor Frans von der Dunk, who has consulted widely with the Dutch government, the UN, and private space companies; Professor Jack Beard, former Associate Deputy General Counsel (International Affairs) at the Department of Defense; and Professor Matthew Schaefer, former director in the International Economic Affairs Office of the National Security Council (White House), as well as outstanding adjunct faculty with real-world experience.

#### IV. OUTSIDE THE CLASSROOM—THE LACHS SPACE LAW MOOT COURT COMPETITION

The classroom is not the only forum for law students to learn the field of space law, particularly at law schools not yet offering such a course. The Manfred Lachs Space Law Moot Court Competition has been held annually since 1992. It generally draws 10-12 teams to participate in the North American Rounds, and over forty teams participate internationally. The

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<sup>15</sup> In other words, the online program is taught live, synchronously via Adobe Connect software, but with flexibility for students' work schedules and commitments. The formal rule is that online students must participate live, synchronously 75 percent of the time in each class, unless a waiver is obtained from the professor and the program director. Work schedules and commitments, as well as dramatic time zone differences, can be a reason for a waiver. The online degree can be completed in up to six semesters (so an average of four credit hours per semester), or in as short a time frame as two semesters. Online students are required to take three of the 24-credit hours in residence. Because several one-credit mini-courses are offered in condensed fashion in specialized areas of space, cyber, and telecom, however, this requirement will really only lead to students having to be in Nebraska (away from their home in most cases) for nine days or so over the two or three year period.

competition was named after the famous International Court of Justice (ICJ) judge from Poland who served on the court from 1967 to 1993 and who, in 1972, wrote one of the seminal books on space law. The number of schools recently creating student space law societies may well lead to an increase in the number of teams entering the North American round of the Lachs competition. Newly formed space law societies often look to the Lachs competition as well as to outside speakers as a way to begin their engagement in this field of study.

Nebraska LL.M. students have participated in the North American Rounds of the Lachs Space Law Moot Court competition each of the past three years. In some years, they have combined with J.D. students interested in space law to form a team.

#### V. OUTREACH, FORUMS FOR DISCUSSION, AND BUILDING BRIDGES BETWEEN STUDENTS AND THE SPACE COMMUNITY

In addition to bricks and mortar classrooms, virtual classrooms, and the Lachs competition, there are increasing opportunities to learn about space law through conferences hosted by academic institutions and professional associations.

Nebraska's College of Law has, to date, held four annual conferences in Washington, D.C., and six annual conferences in Lincoln, NE. Each of the past two years, the Washington, D.C., conference has had over 100 participants/attendees over the two days/sessions.<sup>16</sup>

Nebraska's program also holds an annual space and cyber law seminar in Omaha each year in conjunction with STRATCOM's Space and Cyber Symposium. The attendance at the 2011 Omaha seminar was its largest ever with nearly fifty attendees. In 2010, as a result of a NASA grant, Nebraska College of Law also held regional conferences in San Diego, CA, which focused

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<sup>16</sup> All LL.M. students attend the D.C. conference, which includes a visit by the LL.M. students to a major government agency involved in space, cyber, or telecommunications along with the conference. In 2011, Nebraska's LL.M. students visited NASA General Counsel's Office. In fall 2012, Nebraska's LL.M. students will visit the FAA-Administrator for Space Transportation and General Counsel's Office.

on space insurance, and Ann Arbor, MI, which focused on space and cyber laws. The conferences hosted by the Nebraska Law College have involved private sector, military, and civilian government experts and provided a forum for interaction between the various segments of the space, cyber, and telecommunications field.

Keynote Speakers at conferences have included General James Cartwright, Vice-Chair Joint Chiefs of Staff; Lori Garver, Deputy NASA Administrator; Alan Ladwig, Senior Advisor to the NASA Administrator; General Kevin P. Chilton, Commander United States Strategic Command (and also a former NASA Mission Specialist); Ambassador Richard Butler, former chief UN weapons inspector for Iraq and former Australian Ambassador to the UN, Thailand, and Cambodia; Rusty Schweickart, former Apollo 9 astronaut and head of Association of Space Explorer's Near Earth Object Committee; Jonathan Adelstein, FCC Commissioner; and Alec J. Ross, Senior Advisor for Innovation to the United States Secretary of State. Lead lawyers from NASA, the Federal Aviation Administration Office of Commercial Space Transportation (FAA-AST), National Oceanic and Atmospheric Administration (NOAA), and the leading commercial space companies, including SpaceX, Virgin Galactic, and Boeing, are among the speakers at past conferences.

The Lincoln conference, in particular, typically has an international-related theme. The Law College's 2011 Lincoln conference was in essence a space law summit drawing speakers and participants from eighteen different nations. Two Lincoln spring conferences (2010 and 2012) have been co-organized with European entities, namely the European Space Policy Institute (ESPI), located in Vienna, and the 2012 Lincoln conference also included the University of Vienna as a co-sponsor. The Law College was also able to establish a cooperative agreement

with the International Space University (ISU) that will allow the Law College to send an LL.M. student to the ISU space studies program each summer and for additional cooperation as well.

The other major annual conference in the United States focused on space law exclusively is the annual Galloway Symposium in Washington, D.C., hosted by the University of Mississippi. The Symposium is named after Eileen Galloway, widely considered one of the founders of space law through her work in drafting the NASA Act and as United States representative during the drafting of the major space law treaties. The ABA Forum on Air and Space Law has an annual conference that includes several space law sessions. The American Branch of International Law Association's International Law Weekend typically has a space law panel as well.

In order to further buttress contacts between LL.M. students and leading lawyers in the space law arena, Nebraska College of Law created a mentor program in 2010 that pairs each LL.M. student with a practicing professional in the space, cyber, or telecommunications fields for thesis assistance and professional development advice.

## VI. CONCLUSION

With the increase in governmental and commercial actors in space, there is an increasing need for space law specialists. The addition of the study of space law to United States legal education also draws support in providing generalists an opportunity to learn international law through the lens of space, an opportunity to view law as a system of rules at various levels (international, federal, and state), an opportunity to assimilate materials from 1L and upper-level courses in a capstone course, and an opportunity to explore the interaction of law and technology. Combining the study of space law with cyber law makes a package that can benefit all lawyers, as all lawyers will practice cyber law in some form, due to virtually all clients

maintaining a cyber presence. It also allows students to compare the problems of law and regulation in these “borderless” domains. Opportunities to focus on these areas of law in an advanced LL.M. degree exist in the United States at the University of Nebraska College of Law, both in-residence and online. Opportunities to explore space law in the J.D. curriculum only exists at a handful or so of law schools currently, but that number is likely to grow as the number of entities engaging in and benefitting from space activities continues to grow.