China and Spacepower

AY 23 ACSC/AWC Elective – 14 Day Course
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Dr. Kun-Chin Lin – ACSC/DES, Room 125, WP: 953-2714, MP: 334-590-3780
Classroom: ACSC Building, Flight 26

Course Objectives:

1. Comprehend the People's Republic of China's military and civilian development of spacepower doctrines, strategies, and capacities.

2. Apply creative thinking, critical analysis, and persuasive communication on key topics of primary competitive implications for emerging power relations in the space and related domains for US and its allies.

3. Relate theories of international relations, innovations systems, civil-military fusion, and organizational and bureaucratic analyses to Chinese spacepower and broader developmental prospects.

Course Description:

Course Structure and Class Format: This elective is one of several optional courses identified as fulfilling requirements for the SSS and WSS programs. Each session utilizes informal lecture, guided discussion, student presentations, and multi-media offerings.

Course Assessment and Deliverables: Students will prepare a paper proposal on a Chinese space-related topic of their choice which includes a researchable question, a preliminary thesis statement, and a working outline. Students who may not have a topic in mind when joining the course are encouraged to review provided texts along with those listed in the Select Bibliography (below); as always, the course professor will assist. Students will use the proposal to guide preparation of a 10-15 page (? -word) final paper* on their chosen topic. Collaboration is encouraged yet final products will be each student's own work. Finally, students will be graded on their contributions toward successful seminar discussions; feedback will be provided periodically to ensure students know how they are performing:

Assigned Due Grade/Return Grade %
Paper Proposal EL 1 EL 4 w/in 5 class days 15%
Final Paper EL 1 EL 15 w/in 10 class days 65%
Class Contribution EL 1 EL 15 w/in 10 class days 20%

NOTE: All papers will follow the AU-1 Style and Author Guide, use Times New Roman 12, double–space between sentences, 1" margins all around, insert student Name and Date in the header, and include the page number (i.e., 1 of 3), in the center of the footer.

Texts (loaned to students from ACSC stock):

Class Schedule and Readings

NOTE: Schedule adjustments will be made as necessary due to inclement weather, government scheduling decisions, HHQ demands, etc.

EL 1 Introduction – space domain and national security for the PRC

Required Readings

Ashley J. Tellis, "China's Military Space Strategy", Survival, 49:3 (2007): 41-72.

Carla P. Freeman, "An Uncommon Approach to the Global Commons: Interpreting China's Divergent Positions on Maritime and Outer Space Governance", The China Quarterly, 241, March 2020, pp. 1–21.

Gregory Kulacki and Jeffrey G. Lewis, "A Place for One's Mat: China's Space Program, 1956–2003," American Academy of Arts & Sciences Research Paper, Jan. 2009.

Further Readings

Eric Heginbotham and Jacob L. Heim, "Deterring without Dominance: Discouraging Chinese Adventurism under Austerity". *The Washington Quarterly* 38:1 (2015): 185–199.

Kevin Pollpeter, "Space, the New Domain: Space Operations and Chinese Military Reforms",
Journal of Strategic Studies 39, no. 5-6: 718.

Scott Harold, "Defeat, Not Merely Compete: China's View of Its Military Aerospace Goals and Requirements in Relation to the United States", Prepared for the United States Air Force. RAND, 2017.

Fan Gaoyue, "A Chinese Military Perspective on the US Third Offset Strategy" in The Gathering Pacific Storm: Emerging US-China Strategic Competition in Defense Technological and Industrial Development, Tai Ming Cheung and Thomas G. Mahnken, ed. Cambria, 2018.

Baohui Zhang, "The Security Dilemma in the U.S.-China Military Space Relationship - The Prospects for Arms Control", *Asian Survey*, 51:2 (2011): 311–332. Or *China's Assertive Nuclear Posture State Security in an Anarchic International Order*. Routledge, 2015.

Mark Hilborne, "China's rise in space and US policy responses: A collision course?" *Space Policy* 29 (2013): 121-127.

Dean Cheng, et al. "Outer Space; Earthly Escalation? Chinese Perspectives on Space Operations and Escalation". A Strategic Multilayer Assessment (SMA) Periodic Publication, August 2018. https://nsiteam.com/outer-space-earthly-escalation-chinese-perspectives-on-space-operations-and-escalation/

Matthew Daniels, "The History and Future of US-China Competition and Cooperation in Space", A National Security Report of the Johns Hopkins Applied Physics Laboratory, 2020. https://www.jhuapl.edu/Content/documents/Daniels-Space.pdf

Scott Pace, "How far - if at all – should the USA cooperate with China in space?" *Space Policy* 27 (2011): 127-130.

Carla P. Freeman, "An Uncommon Approach to the Global Commons: Interpreting China's Divergent Positions on Maritime and Outer Space Governance", *The China Quarterly*, 241, March 2020, pp. 1–21.

David A. Koplow, "The Fault Is Not in Our Stars: Avoiding an Arms Race in Outer Space", *Harvard International Law Journal*, 58:331 (2018).

Rong Du, "China's approach to space sustainability: Legal and policy analysis", *Space Policy* 42 (2017): 8–16.

M. Taylor Fravel, "China's 'World-Class Military' Ambitions: Origins and Implications", *The Washington Quarterly*, 43:1 (2020): 85-99.

Namrata Goswami, "China in Space: Ambitions and Possible Conflict", *Strategic Studies Quarterly*, 12:1 (Spring 2018): 74-97. And "Explaining China's space ambitions and goals through the lens of strategic culture", *The Space Review*, May 18, 2020.

Christopher Fabian, "Psychology of Deterrence in Sino-U.S. Space Relations". *Space Force Journal*, https://spaceforcejournal.org/psychology-of-deterrence-in-sino-u-s-space-relations/

Mercy A. Kuo, "The Politics of China's Space Power: Insights from Lincoln Hines". *The Diplomat*, June 14, 2021. https://thediplomat.com/2021/06/the-politics-of-chinas-space-power/ Or Lincoln Hines, "Trans-Pacific View: Coping With the Challenge of China's Growing Space Power", *The Diplomat*, January 18, 2019.

Xiaodan Wu, "China and Space Security: How to bridge the gap between its stated and perceived intentions", *Space Policy* 33 (2015): 20-28.

Michael Sheehan, "'Did you see that, grandpa Mao?' The prestige and propaganda rationales of the Chinese space program", *Space Policy* 29:2 (2013): 107-112.

Yongjin Zhang, "The Eagle Eyes the Dragon in Space—A critique", *Space Policy* 29:2 (2013): 113-120.

He Qisong, "Space Strategy of the Trump Administration", *China International Studies*, 76 (2019): 166-180.

Seminar Description: The first hour of seminar reviews selective applications of three major theories of international relations to our understanding of China's space ambitions and strategies. Students are encouraged to delve into Further Readings to develop their specific interests and to get a better sense of the state of the key debates.

EL 2 State of the Field, from Beijing (in translation of Chinese primary sources)

Required Readings

Kevin Pollpeter, et al. "China's Space Narrative. Examining the Portrayal of US-China Space Relationship in China Sources…" CASI, 2020.
https://www.airuniversity.af.edu/Portals/10/CASI/Conference-2020/CASI%20Conference%20China%20Space%20Narrative.pdf?ver=FGoQ8Wm2DypB4FaZDWuNTQ%3D%3D : 7-74.

2022 White Paper
http://www.gov.cn/zhengce/2022-01/28/content_5670920.htm (original)
http://www.scio.gov.cn/zfbps/32832/Document/1719693/1719693.htm (translated): 30 pages

Skim: "In Their Own Words: Lectures on the Science of Space Operations: Foreign Military Thought," China Aerospace Studies Institute.

Further Readings

2016 White Paper
http://www.gov.cn/zhengce/2016-12/27/content_5153378.htm (original)
http://www.scio.gov.cn/zfbps/jdbps/Document/1435664/1435664.htm (translated): 5 pages

The following are PRC government-sponsored, English-language websites:
http://www.aerospacechina.org/EN/column/column299.shtml
https://china-aerospace.blog/
https://dongfanghour.com/
http://english.spacechina.com/n16421/index.html

Seminar Description: This seminar offers students a chance to read translated Chinese government statements on space developments and strategies, understanding that different PRC agencies offer different framing and data on Chinese space programs.

EL 3 Chinese Space Program Goals and Policies

Required Readings

Kevin Pollpeter, Jordan Wilson, Fan Yang, "China Dream, Space Dream," A report prepared for the U.S.-China Economic and Security Review Commission:
https://www.uscc.gov/research/china-dream-space-dream-chinas-progress-space-technologies-and-implications-united-states: (1-115)

Hui Zhang, "Chinese Perspectives on Space Weapons," American Academy of Arts and Sciences 2008,
https://www.amacad.org/sites/default/files/publication/downloads/militarySpace.pdf (31-77)

Kevin Pollpeter, "The US-China Reconnaissance-Strike Competition: Anti-Ship Missiles, Space, and Counterspace", SITC Research Briefs, Series 9 (2017-7). https://escholarship.org/uc/item/4s99s9rs (1-4).

Further Readings

Richard A. Bitzinger and James Char, ed. *Reshaping the Chinese Military: The PLA's Roles and Missions in the Xi Jinping Era*. Routledge, 2019.

James Char and Richard A. Bitzinger, "A New Direction in the People's Liberation Army's Emergent Strategic Thinking, Roles and Missions", *The China Quarterly*, 232, December 2017, pp. 841–865.

Dean Cheng, "Chinese Concepts of Space Security: Under the New Circumstances" in *Handbook of Space Security*, K.-U. Schrogl ed. Springer Nature, 2020.

Andrew Erickson and Lyle Goldstein, *Chinese Aerospace Power*. Naval Institute Press, 2012.

Marc Julienne, "China's Ambitions in Space: The Sky's the Limit", Études de l'Ifri, IFRI, January 2021.

M. Taylor Fravel, "China's Changing Approach to Military Strategy: The Science of Military Strategy from 2001 and 2013" in The Evolution of China's Military Strategy, Joe McReynolds ed. Washington, DC: Jamestown Foundation, 2016.

E. Burke, et. al. "People's Liberation Army Operational Concepts", RAND 2020. https://www.rand.org/pubs/research_reports/RRA394-1.html

Mark Stokes and Dean Cheng, "China's Evolving Space Capabilities: Implications for US Interests." Report prepared for USCC, April 26, 2012. https://www.uscc.gov/sites/default/files/Research/USCC_China-Space-Program-Report_April-2012.pdf

Brian Harvey, *China in Space: The Great Leap Forward, 2nd Edition*. Springer Nature, 2019.

Kai Liao, "The future war studies community and the Chinese revolution in military affairs", *International Affairs* 96:5 (2020): 1327–1346.

Roy Kamphausen and David Lai, ed. *The Chinese People's Liberation Army in 2025*. US Army War College, 2015.

Jacqueline Newmyer Deal, "The revolution in military affairs with Chinese characteristics" in *Strategic Studies: A Reader*, T. G. Mahnken and J. A. Maiolo, ed. Routledge, 2008. Or "The Revolution in Military Affairs with Chinese Characteristics", *Journal of Strategic Studies*
Volume 33:4 (2010).

Andrew Nien-Dzu Yang, "China's Revolution in Military Affairs: Rattling Mao's Army" and You Ji, "Learning and Catching Up: China's Revolution in Military Affairs Initiative" in *The Information Revolution in Military Affairs in Asia*, E. Goldman and T. Mahnken, ed. Palgrave MacMillan, 2004.

Ryan Fedasiuk, "Chinese Perspectives on AI and Future Military Capabilities", *CSET Policy Brief*, August 2020. https://cset.georgetown.edu/publication/chinese-perspectives-on-ai-and-future-military-capabilities/

Check out USAF's CASI Reports, CSIS-SIPRI China Power Project on general military data, https://www.csis.org/programs/china-power-project, and CSIS Aerospace Security Project, and Andrew Erickson's bookshelves: https://www.andrewerickson.com/category/bookshelf/

Seminar Description: This seminar draws on leading Western sources on the intentions and strategic implications of Chinese space power development, placed in the context of China's rising power status and pursuit of a modern military in the 21st Century.

EL 4 Chinese Space Program in Comparative Strategic Context

Required Readings

Saadia M. Pekkanen, "China, Japan, and the Governance of Space: prospects for competition and cooperation", *International Relations of the Asia-Pacific* Volume 21, (2021) 37–64. Or "Reflections on Space Governance by China and Japan" in GA. J. INT'L & COMP. L., Vol. 48 (2020): 731-737. (6 pages)

Skim James C. Moltz, *Asia's Space Race: National Motivations, Regional Rivalries, and International Risks*. Columbia University Press, 2011. Chapters 5-6. (136-290)

Kazuto Suzuki, "The Contest for Leadership in East Asia: Japanese and Chinese approaches to outer space", *Space Policy* 29:2 (2013): 99-106. And "Space Policies of Japan, China and India: Comparative Policy Logic Analysis", 立命館国際研究 31:5 (March 2019): 49-67. (18 pages)

Further Readings

Stroikos, Dimitrios, *China, India in space and the orbit of international society: power, status, and order on the high frontier*. PhD thesis, London School of Economics and Political Science, 2016. http://etheses.lse.ac.uk/3491/ : Chapters 5 & 7 (154-189) (225-256)

Mark P. Hilborne, "The Impact of China's Rise in Space" in *Yearbook on Space Policy, 2012/13*. Cenan Al-Ekabi, et al ed. Springer Verlag.

Yearbook on Space Policy, 2014, The Governance of Space. Cenan Al-Ekabi, et al ed. Springer Verlag. Part II Views and Insights, Chapters 3 and 6.

Robert C. Harding, *Space Policy in Developing Countries*. Chapter 3, "First Tier Space Actors – Launching BRICS into Space", esp. pp. 81-100 on the PRC. Routledge, 2013.

Jie Long, "China's Space Station Project and International Cooperation: Potential models of jurisdiction and selected legal issues", *Space Policy* 36 (2016) 28-37.

James Johnson, *The US-China Military and Defense Relationship during the Obama Presidency*. Palgrave MacMillan, 2018.

Richard Bitzinger, ed. *Emerging Critical Technologies and Security in the Asia-Pacific*. Palgrave MacMillan, 2016.

"Roundtable - Asia in Space: The Race to the Final Frontier", *Asia Policy*, 15:2 (April 2020): 1–56.

Seminar Description: This seminar considers Chinese space ambitions and plans within the context of rising powers in the Indo-Pacific.

EL 5 Sino-Russian Cooperation and Other Potential Partnerships

Required Readings

Bradley Bowman and Jared Thompson, "Russia and China Seek to Tie America's Hands in Space," Foreign Policy, March 31, 2021. https://foreignpolicy.com/2021/03/31/russia-china-space-war-treaty-demilitarization-satellites/

Nathaniel Rome, "A Chinese-Russian Moon Base? Not So Fast. Plans to compete with NASA's lunar exploration project face substantial obstacles." Foreign Policy, Oct. 17, 2021. https://foreignpolicy.com/2021/10/17/moon-base-china-russia-lunar-space-nasa/

Sergey Radchenko, "Driving a Wedge Between China and Russia Won't Work," War on the rocks, Aug. 24, 2021. https://warontherocks.com/2021/08/driving-a-wedge-between-china-and-russia-wont-work/

De Leon Petta Gomes da Costa, "Chinese Geopolitics: Space Program Cooperation among China, Brazil, and Russia", *Astropolitics*, 14:1 (2016): 90-98.

R. Lincoln Hines, "Houston, We Might Have a Problem: Russia's ASAT Test and the Limits of China-Russia Space Cooperation," *Modern War Institute*, Dec. 15, 2021. https://mwi.usma.edu/houston-we-might-have-a-problem-russias-asat-test-and-the-limits-of-china-russia-space-cooperation/

Justin Bronk, "Modern Russian and Chinese Integrated Air Defence Systems", *Royal United Services Institute (RUSI) Occasional Paper*, January 2020.

Further Readings

Erin Watson-Lynn, “The gravity of China’s space base in Argentina”, *The Interpreter*, June 11, 2020. Lowry Institute, https://www.lowyinstitute.org/the-interpreter/gravity-china-s-space-base-argentina

Cassandra Garrison, “China's military-run space station in Argentina is a 'black box'”, *Reuters*, January 31, 2019.

Steven Lee Myers, “China and Russia Agree to Explore the Moon Together,” *New York Times*, March 10, 2021.

Julie Michelle Klinger, “A Brief History of Outer Space Cooperation Between Latin America and China”, *Journal of Latin American Geography*, Volume 17, Number 2, July 2018, pp. 46-83.

Sarah Kirchberger, “The End of a Military-Industrial Triangle: arms-industrial co-operation between China, Russia and Ukraine after the Crimea crisis”, *SIRIUS - Zeitschrift für Strategische Analysen*, June 12, 2017. https://doi.org/10.1515/sirius-2017-0053

Julie Michelle Klinger, “China, Africa, and the Rest: Recent Trends in Space Science, Technology, and Satellite Development”, *SAIS-CARI Working Paper No. 38*, May 2020.

N. D. Nte, B. A. Abdulaziz, and M. Uzorka, “Understanding Geospatial Intelligence and the Challenges of Effective Counter-Terrorism Strategy: A Case Study of Nigeria’s Boko Haram Challenge”, *Unnes Law Journal*, 6:2 (2020): 163-186.

Degang Sun and Yuyou Zhang, “Building an “Outer Space Silk Road”: China’s Beidou Navigation Satellite System in the Arab World”, *Journal of Middle Eastern and Islamic Studies (in Asia)*, 10:3 (2016): 24-49,

Mingyan Nie, “Asian Space Cooperation and Asia-Pacific Space Cooperation Organization: An Appraisal of Critical Legal Challenges in the Belt and Road Space Initiative Context”, *Space Policy* 47 (2019): 224-231.

Jana Robinson, Tereza B. Kupková, and Patrik Martínek, “Strategic Competition for Space Partnerships and Markets” in *Handbook of Space Security*, K.-U. Schrogl ed. Springer Nature, 2020.

Cameron Hunter, “The Forgotten First Iteration of the ‘Chinese Space Threat’ to US National Security,” *Space Policy*, 47 (Feb. 2019): 158-165.

Zhihui Zhang and Bruce Seely, “A Historical Review of China-U.S. Cooperation in Space: Launching Commercial Satellites and Technology Transfer, 1978-2000”, *Space Policy* 50 (2019): 1-15.

Lorenzo M. Capisani, “’To Think European’: The ESA Approach to Space Cooperation with China (1976-1989)”, *JEIH Journal of European Integration History* 25 (2019): 263-282.

Seminar Description: This seminar explores Sino-Russian partnership for air and space power, as well as China's historical relations with the US in space development and emerging ones with the Global South.

EL 6 Domestic Politics as a Driver of Change in Space Policy

Required Readings

R. Lincoln Hines, "Heavenly Mandate: Public Opinion and China's Space Activities," *Space Policy* (2020).

Excerpts from R. L. Hines, "A Place in the Stars: Prestige and Legitimacy in China's Quest for Space Power." PhD Thesis, Cornell University, 5-2021. https://ecommons.cornell.edu/handle/1813/109747 (Ch.1-2) (47 pages)

Roger Handberg and Zhen Li, *Chinese Space Policy: A Study in Domestic and International Politics*. Routledge, 2007. Ch.5 127-151

Further Readings

Shahar Hameiri & Jinghan Zeng, "State Transformation and China's Engagement in Global Governance: the case of nuclear technologies", *The Pacific Review*, 33:6 (2020): 900-930

Taylor Fravel, "Shifts in Warfare and Party Unity: Explaining China's Changes in Military Strategy", *International Security*, Vol. 42, No. 3 (Winter 2017/18), pp. 37–83.

Liu Hao and Fabio Tronchetti, "Should the Red Dragon arise? Assessing China's options vis-a-vis the enactment of a domestic space resources utilization law", *Space Policy* 39-40 (2017) 9-13.

Xiaodan Wu, "China's Space Law: Rushing to the Finish Line of its Marathon", *Space Policy* 46 (2018): 38-45.

Chen Gang, "What is New for China's Technocracy in Xi Jinping's Time?" *China: An International Journal*, 18:1 (February 2020): 123-133.

Chengzhi Lia, Dehui Zhang, and Danian Hu, "Making Breakthroughs in the Turbulent Decade: China's Space Technology During the Cultural Revolution", *Endeavour* Vol. 41, No.3 (2017). https://pubmed.ncbi.nlm.nih.gov/28780221/

Seminar Description: This seminar focuses closely on the domestic political motivations behind China's space program and on how narratives and concerns over legitimacy factor into China's space ambitions.

EL 7 Military-Civil Fusion

Required Readings (Total pages: 82 pages)

Andrea Gilli and Mauro Gilli, "Why China Has Not Caught Up Yet Military-Technological Superiority and the Limits of Imitation, Reverse Engineering, and Cyber Espionage", *International Security*, Vol. 43, No. 3 (Winter 2018/19), pp. 141–189.

Lorand Laskai, "Civil-Military Fusion and the PLA's Pursuit of Dominance in Emerging Technologies", *Jamestown Foundation China Brief* 18:6, April 9, 2018. (7 pages)

Alex Stone and Peter W. Singer, "China's Military-Civil Fusion Strategy: What to Expect in the Next Five Years", *Defense One*, February 18, 2021. (7 pages)

Emily Weinstein, "Don't Underestimate China's Military-Civil Fusion Efforts," *Foreign Policy*, February 5, 2021. (7 pages)

Elsa B. Kania and Lorand Laskai, "Myths and Realities of China's Military-Civil Fusion Strategy," *Center for New American Security*, January 2021. (4-17)

Further Readings

Alex Stone and Peter Wood, "China's Military-Civil Fusion Strategy: A View from Chinese strategists", A BluePath Labs Report for CASI June 15, 2020. https://www.airuniversity.af.edu/CASI/Display/Article/2217101/chinas-military-civil-fusion-strategy/ (8-109)

Elsa B. Kania and Lorand Laskai, "A Sharper Approach to China's Military-Civil Fusion Strategy Begins by Dispelling Myths", *Defense One*, February 4, 2021. (9 pages)

Mingyan Nie, "Space Privatization in China's National Strategy of Military-Civilian Integration: An Appraisal of Critical Legal Challenges", *Space Policy* 52 (2020) 101372.

C4ADS, "Open Gates: Technology Transfer from Chinese Universities to the Defense Industry Through Joint Ventures", *C4ADS*, June 2021. https://c4ads.org/open-gates

Marcus Clay, "The PLA's Pursuit of Terahertz: Facts and Fallacies", *Jamestown Foundation China Brief* 20:20, November 12, 2020. https://jamestown.org/program/pla-pursuit-terahertz-facts-and-fallacies/

Tai Ming Cheung, Thomas G. Mahnken, and Andrew L. Ross, "Assessing the State of Understanding of Defense Innovation", The Study of Innovation and Technology in China (SITC) Research Briefs, 2018-1. UC Press, May 2018.

Tai Ming Cheung, "How China's Defense Innovation System Is Advancing the Country's Military Technological Rise", The Study of Innovation and Technology in China (SITC) Research Briefs, 2018-3. UC Press, May 2018.

Pablo Alonso-García, "China's Space Strategy: A Three-Headed Dragon" in *Space Strategy at a Crossroads: Opportunities and Challenges for 21st Century Competition*, Benjamin

Bahney ed. Center for Global Security Research, Lawrence Livermore National Laboratory, May 2020.

Anja Manuel and Kathleen Hicks, "Can China's Military Win the Tech War? How the United States Should—and Should Not—Counter Beijing's Civil-Military Fusion", Foreign Affairs, July 29, 2020.

Evan Feigenbaum, *China's Techno-Warriors: National Security and Strategic Competition from the Nuclear to the Information Age*. Stanford University Press, 2003.

Andrew S. Erickson, Kathleen A. Walsh, "National security challenges and competition: Defense and space R&D in the Chinese strategic context", *Technology in Society* 30 (2008): 349-361.

Kevin Pollpeter, "Upward and Onward: Technological Innovation and Organizational Change in China's Space Industry", *The Journal of Strategic Studies*, 34:3 (2011): 405-423.

Tai Ming Cheung, "Innovation in China's Defense Technology Base: Foreign Technology and Military Capabilities", *Journal of Strategic Studies*, 39:5-6 (2016): 728-761.

Tai Ming Cheung, *Forging China's Military Might: A New Framework for Assessing Innovation*. Johns Hopkins University Press, 2014.

Seminar Description: This seminar is a deep dive into China's military-civil fusion efforts, examining its progress, its challenges, and assessing what these efforts mean for China's space program and broader military objectives.

EL 8 PLASSF and PLARF

Required Readings

Kevin L. Pollpeter, Michael S. Chase, and Eric Heginbotham, *The Creation of the PLA Strategic Support Force and Its Implications for Chinese Military Space Operations*. RAND, 2017. https://www.rand.org/pubs/research-reports /RR2058.html (1-36)

Elsa B. Kania & John Costello, "Seizing the Commanding Heights: the PLA Strategic Support Force in Chinese military power", *Journal of Strategic Studies*, 44:2 (2021). (218-264)

Michael S. Chase, "PLA Rocket Force Modernization and China's Military Reforms - Testimony before the U.S.-China Economic and Security Review Commission, February 15, 2018". RAND. https://www.rand.org/content/dam/rand/pubs/testimonies/CT400/CT489/RAND_CT489.pdf (1-11)

Adam Ni and Bates Gill, "The People's Liberation Army Strategic Support Force: Update 2019", *Jamestown Foundation China Brief* 19:10, May 29, 2019. (13 pages)

Further Readings

Kenneth W. Allen, Brendan S. Mulvaney & James Char, "Ongoing Organizational Reforms of the People's Liberation Army Air Force," *Journal of Strategic Studies*, 44:2 (2021).

John Costello, "China's Strategic Support Force: A Force for a New Era," Testimony to the U.S.-China Economic and Security Review Commission, February 15, 2018. https://www.uscc.gov/sites/default/files/Costello_Written%20Testimony.pdf

Mark Stokes, et. al. "China's Space and Counterspace Capabilities and Activities", A Research Report prepared for The U.S.-China Economic and Security Review Commission (USCC), March 30, 2020. Section II: PLA Space/Counterspace Infrastructure: The Role of the PLA Strategic Support Force.

Diptendu Choudhury, "Expanding Role of PLAAF in China's National Security Strategy", *Strategic Analysis*, 44:6 (2020): 521-541

Roger Cliff, et al., "Shaking the Heavens and Splitting the Earth: Chinese Air Force Employment Concepts in the 21st Century", RAND Corporation, February 2020. https://www.rand.org/pubs/monographs/MG915.html

Bates Gill & Adam Ni, "The People's Liberation Army Rocket Force: reshaping China's approach to strategic deterrence", *Australian Journal of International Affairs*, 73:2 (2019): 160-180.

Jaganath Sankaran, "Missile Wars in the Asia Pacific: the threat of Chinese regional missiles and U.S.-allied missile defense response", *Asian Security* (2020).

Andrew S. Erickson, "China's Space Development History: A Comparison of the Rocket and Satellite Sectors", *Acta Astronautica* 103 (2014): 142–167.

James Char, "The People's Liberation Army in its Tenth Decade: Assessing 'Below the Neck' Reforms in China's Military Modernization", *Journal of Strategic Studies* (2020).

Various expert testimonies at the USCC Hearing on China's Advanced Weapons, February 23, 2017. https://www.uscc.gov/hearings/hearing-chinas-advanced-weapons

Ji-Jen Hwang, "China's Military Reform: The Strategic Support Force, Non-Traditional Warfare, and the Impact on Cross-Strait Security", *Issues & Studies: A Social Science Quarterly on China, Taiwan, and East Asian* Affairs, 53:3 (September 2017).

Seminar Description: This seminar focuses on the PLASSF and PLARF, examining how China organizes its military space activities and its attempts military reform and modernization.

EL 9 Private Firms and Commercialization

Required Readings

Irina Liu, Xueying Han, Bhavya Lal, "Assessing China's commercial satellite communications sector as a potential case of disruptive innovation", *Acta Astronautica* 181 (2021): 130–138. Or "Evaluation of China's Commercial Space Sector," IDA Science and Technology Policy Institute: Sept. 2019. https://www.ida.org/research-and-publications/publications/all/e/ev/evaluation-of-chinas-commercial-space-sector (97 pages)

R. Lincoln Hines, "Can China's commercial space sector achieve lift off?" East Asian Forum, May 5, 2021. https://www.eastasiaforum.org/2021/05/05/can-chinas-commercial-space-sector-achieve-lift-off/ (3 pages)

Yuan Yuan and W. Peeters, "Research Viewpoint: Rapid Growth of the Chinese Commercial Space Sector", *Astropolitics*, 17:3 (2019): 191-207. (16 pages)

Greg Autry and Steve Kwast, "America Is Losing the Second Space Race to China: The private sector can give the United States a much-needed rocket boost." Foreign Policy, Aug. 22, 2019. https://foreignpolicy.com/2019/08/22/america-is-losing-the-second-space-race-to-china/ (4 pages)

Namrata Goswami, "China's Get-Rich Space Program", *The Diplomat*, February 28, 2019. (1-14 pages)

Further Readings

Jeremy Goldkorn, "New funding values Chinese private satellite company Galaxy Space at $1.2 billion", SupChina, November 18, 2020. https://supchina.com/2020/11/18/new-funding-values-chinese-private-satellite-company-galaxyspace-at-1-2-billion/

Andrew Jones, "Chinese space resource utilization firm Origin Space signs deal for space telescope", *SpaceNews*, April 23, 2020.

Neel V. Patel, "China's surging private space industry is out to challenge the US", *MIT Technology Review*, January 21, 2021. https://www.technologyreview.com/2021/01/21/1016513/china-private-commercial-space-industry-dominance/

Jianxiang Bi, et al. "From imitation to innovation: The discursive processes of knowledge creation in the Chinese space industry", *Technological Forecasting & Social Change* 120 (2017): 261–270.

Mia M. Bennett, "Is a pixel worth 1000 words? Critical remote sensing and China's Belt and Road Initiative", *Political Geography* 78 (2020) 102127.

Weijie Zhao and Chi Wang, "China's lunar and deep space exploration: touching the moon and exploring the universe", *National Science Review* 6 (2019): 1274–1278. doi: 10.1093/nsr/nwz120

Michael Raska and Richard A. Bitzinger, "Strategic Contours of China's Arms Transfers", *Strategic Studies Quarterly*, Spring 2020: 91-116.

Seminar Description: In 2014, China announced that it would allow investments of private capital into its space sector. Since this time, over 100 commercial space firms have emerged in China. This seminar explores China's growing commercial space sector, as well its strengths and weaknesses, and implications for its military modernization.

EL 10 Cyber Warfare

Required Readings

Hearing on "China's Cyber Capabilities: Warfare, Espionage, and Implications for the United States," *U.S.-China Economic and Security Review Commission*, February 17, 2022: https://www.uscc.gov/hearings/chinas-cyber-capabilities-warfare-espionage-and-implications-united-states

Adam Segal, "An Expansive, and Dangerous, Chinese View on Cyber Deterrence," *Council on Foreign Relations*, January 25, 2016: https://www.cfr.org/blog/expansive-and-dangerous-chinese-view-cyber-deterrence

Adam Segal, "The Code Not Taken: China, the United States, and the Future of Cyber Espionage," *Bulletin of the Atomic Scientists*, September 1, 2013: https://journals.sagepub.com/doi/full/10.1177/0096340213501344

Adam Segal "The US, China, and the Technology Cold War," March 11, 2020: https://www.youtube.com/watch?v=n6RyxarpJh0

Further Readings

Dakota Cary, "China's National Cybersecurity Center: A Base for Military-Civil Fusion in the Cyber Domain," *Center for Security and Emerging Technology*, July 2021: https://cset.georgetown.edu/publication/chinas-national-cybersecurity-center/

Lyu Jinghua, "What Are China's Cyber Capabilities and Intentions," *Carnegie Endowment*, April 1, 2019: https://carnegieendowment.org/2019/04/01/what-are-china-s-cyber-capabilities-and-intentions-pub-78734

J.D. Work, "China Flaunts Its Offensive Cyber Power," *War on the Rocks*, October 22, 2021: https://warontherocks.com/2021/10/china-flaunts-its-offensive-cyber-power/

Nigel Inkster, *China's Cyber Power*, *The International Institute for Strategic Studies*, 2016: https://www.amazon.com/Chinas-Cyber-Power-Adelphi-Inkster/dp/1138211168

Nick Beecroft, "The West Should Not be Complacent About China's Cyber Capabilities," *Carnegie Endowment for International Peace*: https://carnegieendowment.org/2021/07/06/west-should-not-be-complacent-about-china-s-cyber-capabilities-pub-84884

Rush Doshi, Emily de La Bruyère, Nathan Picarsic, and John Ferguson, "China as a 'Cyber Great Power': Beijing's Two Voices in Telecommunications," *Brookings Institution*, April 2021: https://www.brookings.edu/research/china-as-a-cyber-great-power-beijings-two-voices-in-telecommunications/

"Strong Cyber Power," *China Media Project*, May 6, 2021: https://chinamediaproject.org/the_ccp_dictionary/strong-cyber-power/

Michael Kolton, "Interpreting China's Pursuit of Cyber Sovereignty and its Views on Cyber Deterrence," *The Cyber Defense Review*, Vol.2, No.1 (2017), 119-154: https://www.jstor.org/stable/pdf/26267405.pdf

Michael T. Klare, "Cyber Battles, Nuclear outcomes? Dangerous New Pathways to Escalation," *Arms Control Association*, November 2019:https://www.armscontrol.org/act/2019-11/features/cyber-battles-nuclear-outcomes-dangerous-new-pathways-escalation

Adam Segal, "Chinese Cyber Diplomacy in a New Era of Uncertainty," *Aegis Paper Series* No. 1703, https://www.hoover.org/sites/default/files/research/docs/segal_chinese_cyber_diplomacy.pdf

Seminar Description: Cyber capabilities touch upon every domain and inherently interwined with China's counterspace efforts. This seminar examines China's growing cyber capabilities and approach to cyber warfare and deterrence.

EL 11 AI/Quantum in Military

Required Readings

Elsa B. Kania, "Artificial Intelligence and Chinese Power: Beijing's Push for a Smart Military—and How to Respond," *Foreign Affairs*, December 5, 2017. (15 pages)

Elsa B. Kania, "AI Weapons" in China's Military Innovation," *Center for Security and Emerging Technology*, April 2020. (3-10)

Elsa B. Kania, "Artificial Intelligence in China's Revolution in Military Affairs," *Journal of Strategic Studies*, Vol.44, No.4, 2021. (515-542)

Elsa B. Kania, "China's Quantum Future," Center for New American Security, September 27, 2018, https://www.cnas.org/publications/commentary/chinas-quantum-future.

Further Readings

Matt Sheehan, "China's New AI Governance Initiatives Should Be Ignored," *Carnegie Endowment for International Peace*, January 4, 2022:

https://carnegieendowment.org/2022/01/04/china-s-new-ai-governance-initiatives-shouldn-t-be-ignored-pub-86127

"Can China Create a World-Beating AI Industry," *The Economist*, January 22, 2022: https://www.economist.com/business/2022/01/22/can-china-create-a-world-beating-ai-industry

Sara Hsu, "China and Artificial Intelligence," *The Diplomat*, April 19, 2021: https://thediplomat.com/2021/04/china-and-artificial-intelligence/

"China's Race for AI Supremacy," *Bloomberg*, October 2021: https://www.youtube.com/watch?v=zbzcZr_Nadc

Adam Clark Estes, "Maybe Losing the AI Race to China Isn't Such a Bad Idea," *Vox*, October 13, 2021: https://www.vox.com/recode/22725044/china-ai-race-pentagon-wechat

Hessy Elliot, "China and AI: What the World Can Learn and What it Should be Wary of," *The Conversation*, July 1, 2020: https://theconversation.com/china-and-ai-what-the-world-can-learn-and-what-it-should-be-wary-of-140995

"China Has Won AI Battle With U.S., Pentagon's Ex-Software Chief Says," *Reuters*, October 11, 2021:https://www.reuters.com/technology/united-states-has-lost-ai-battle-china-pentagons-ex-software-chief-says-2021-10-11/

Yujia He, "How China is Preparing for an AI-powered Future," *Wilson Center*, June 2017: https://www.wilsoncenter.org/publication/how-china-preparing-for-ai-powered-future

Ashwin Acharya and Zachary Arnold, "Chinese Public AI R&D Spending: Provisional Findings," *Center for Security and Emerging Technology*, December 2019, https://cset.georgetown.edu/publication/chinese-public-ai-rd-spending-provisional-findings/

Ngor Luong and Zachary Arnold, "China's Artificial Intelligence Industry Alliance: Understanding China's AI Strategy Through Industry Alliances," *Center for Security and Emerging Technologies*, May 2021:

Gregory C. Allen, "Understanding China's AI Strategy," *Center for New American Security*, February 6, 2019: https://www.cnas.org/publications/reports/understanding-chinas-ai-strategy

Elsa B. Kania, "'AI Weapons' in China's Military Innovation," *Brookings Institution*, April 2020, https://www.brookings.edu/research/ai-weapons-in-chinas-military-innovation/

Michael Dahm, "Chinese Debates on the Military Utility of Artificial Intelligence," *War on the Rocks*, June 5, 2020: https://warontherocks.com/2020/06/chinese-debates-on-the-military-utility-of-artificial-intelligence/

Ryan Fedasiuk, Jennifer Melot, and Ben Murphy, "How the Chinese Military is Adopting Artificial Intelligence," *Center for Security and Emerging Technology*, October 2021: https://cset.georgetown.edu/publication/harnessed-lightning/

Daniel Garisto, "China is Pulling Ahead in Global Quantum Race, New Studies Suggest," July 15, 2021, https://www.scientificamerican.com/article/china-is-pulling-ahead-in-global-quantum-race-new-studies-suggest/

Elsa B. Kania, "Testimony before the U.S.-China Economic and Security Review Commission
Hearing on Trade, Technology, and Military-Civil Fusion, Chinese Military Innovation in Artificial Intelligence", CNAS, June 7, 2019.
https://www.cnas.org/publications/congressional-testimony/chinese-military-innovation-in-artificial-intelligence

Elsa B. Kania, "New Frontiers of Chinese Defense Innovation: Artificial Intelligence and Quantum Technologies," *Center for New American Security*, June 14, 2018:
https://www.cnas.org/publications/commentary/new-frontiers-of-chinese-defense-innovation-artificial-intelligence-and-quantum-technologies

Elsa B. Kania and John Costello, "Quantum Hegemony," *Center for New American Security*, September 12, 2018, https://www.cnas.org/publications/reports/quantum-hegemony

Seminar Description: China's push for advanced space technologies is part of its larger efforts to become a leading technological power. This class examines China's progress and motives in other emerging technologies, including artificial intelligence and quantum computing.

EL 12 Space, Nuclear Weapons and Deterrence

Ed. Li Bin and Tong Zhao, *Understanding Chinese Nuclear Thinking*, Carnegie Endowment for International Peace, 2016. (51-79) Chapter 3

Fiona S. Cunningham and M. Taylor Fravel, "Assuring Assured Retaliation: China's Nuclear Posture and U.S.-China Strategic Stability," *International Security*, 40, No.2 (2015) (7-50)

Fiona S. Cunningham, "Dangerous Confidence? Chinese Views on Nuclear Escalation," *International Security* 44, No.2 (2019). (61-109)

Joby Warrick, "China is Building More Than 100 New Missile Silos in Its Western Desert, Analysts Say," *The Washington Post*, June 30, 2021 (3 pages)

Further Readings

Caitlin Talmadge, "Would China Go Nuclear? Assessing the Risk of Chinese Nuclear Escalation in Conventional War with the United States," *International Security*, 41, No.4 (2017) (50-92)

David C. Logan, "Are They Reading Schelling in Beijing? The Dimensions, Drivers, and Risks of Nuclear-Conventional Entanglement in China," Journal of Strategic Studies: 1-5

Jeffrey Lewis, *Paper Tigers: China's Nuclear Posture*, Adelphi Series, (2014)

Naomi Egel and R. Lincoln Hines, "Chinese Views on Nuclear Weapons: Evidence from an Online Survey," *Research & Politics* (2021).

James M. Smith and Paul J. Bolt, ed, *China's Strategic Arsenal: Worldview, Doctrine, and Systems*. Georgetown University Press, 2021. Chapters 3, 6, 8.

James S. Johnson, "Chinese Evolving Approaches to Nuclear 'War-Fighting': An Emerging Intense US–China Security Dilemma and Threats to Crisis Stability in the Asia Pacific", *Asian Security*, 15:3 (2019): 215-232.

Tong Zhao, "Conventional long-range strike weapons of US allies and China's concerns of strategic instability, *The Nonproliferation Review* (Sept 2020).

Seminar Description: China's space ambitions are inherently interconnected with its nuclear program. China has a unique No First Use (NFU) nuclear doctrine, yet China's recent nuclear buildup calls into question its broader nuclear ambitions. This seminar examines China's nuclear doctrine and the pressures and motives shaping it.

EL 13 Implications for Network Warfare and Joint Warfighting

Required Readings

Larry M. Wortzel, "What the Chinese People's Liberation Army Can Do to Thwart the Army's Multi-Domain Task Force", *Land Warfare Paper* No. 126, July 2019. Institute of Land Warfare, US Army. (1-11)

James S. Johnson, "China's vision of the future network-centric battlefield: Cyber, space and electromagnetic asymmetric challenges to the United States", *Comparative Strategy*, 37:5 (2018), 373-390.

Joel Wuthnow, "A Brave New World for Chinese Joint Operations", *Journal of Strategic Studies*, 40:1-2 (2017): 169-195.

Kevin Pollpeter, "Controlling the Information Domain Space, Cyber, and Electronic Warfare," Chapter in Strategic Asia 2012–13. NBR, September 13, 2012. https://www.nbr.org/publication/controlling-the-information-domain-space-cyber-and-electronic-warfare/ (5 pages)

Further Readings

Jeffrey Engstrom, "Systems Confrontation and System Destruction Warfare: How the Chinese People's Liberation Army Seeks to Wage Modern Warfare," RAND Corporation, 2018. https://www.rand.org/pubs/research_reports/RR1708.html

Fiona S. Cunningham, "Maximizing Leverage: Explaining China's Strategic Force Postures in Limited Wars", PhD thesis, Massachusetts Institute of Technology, September 2018.

https://dspace.mit.edu/handle/1721.1/121602?show=full Also see Dr Cunningham's Testimony before USCC, Hearing on "Deterring PRC Aggression Towards Taiwan", February 18, 2021. https://www.uscc.gov/sites/default/files/2021-02/Fiona_Cunningham_Testimony.pdf

Steve Lambakis, "A guide for thinking about space deterrence and China," *Comparative Strategy*, 38:6 (2019): 497-553.

Sarah Kirchberger and Patrick O'Keeffe, "Military and Strategic Aspects of the South China Sea Issue" in *Traversing the Challenges: Political, Economic, and Security Dimensions of Maritime and Regional Security*, B. Seemann and S. Bersick, ed. Konrad-Adenauer Stiftung, 2017. https://www.ruhr-uni-bochum.de/ipea/docs/KAS_Publication2017-Manila

Eric Hagt & Matthew Durnin, "Space, China's Tactical Frontier", *Journal of Strategic Studies*, 34:5 (2011): 733-761. And "Response to David Wright's Commentary", *Journal of Strategic Studies*, 34:5 (2011): 775-781.

David Wright, "Response to 'Space, China's Tactical Frontier' by Eric Hagt and Matthew Durnin", *Journal of Strategic Studies*, 34:5 (2011): 763-773.

Seminar Description: Beyond pursuing counterspace capabilities, China is increasingly incorporating space capabilities into its broader warfighting efforts. This seminar explores the implications of China's pursuit of advanced space technologies for its future plans of network-centric warfare and joint operations.

EL 14 Conclusions

Seminar Description: Beyond pursuing counterspace capabilities, China is increasingly incorporating space capabilities into its broader warfighting efforts. This seminar explores the implications of China's pursuit of advanced space technologies for its future plans of network-centric warfare and joint operations.