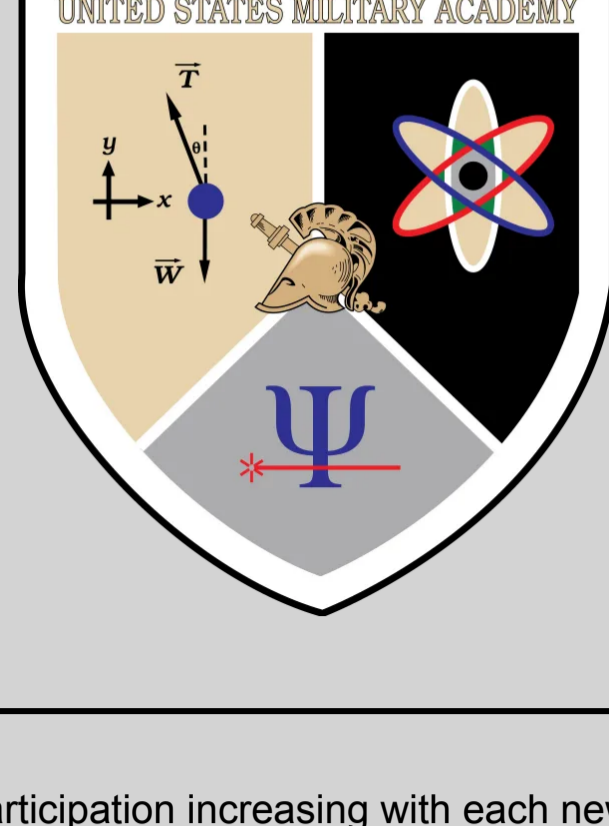
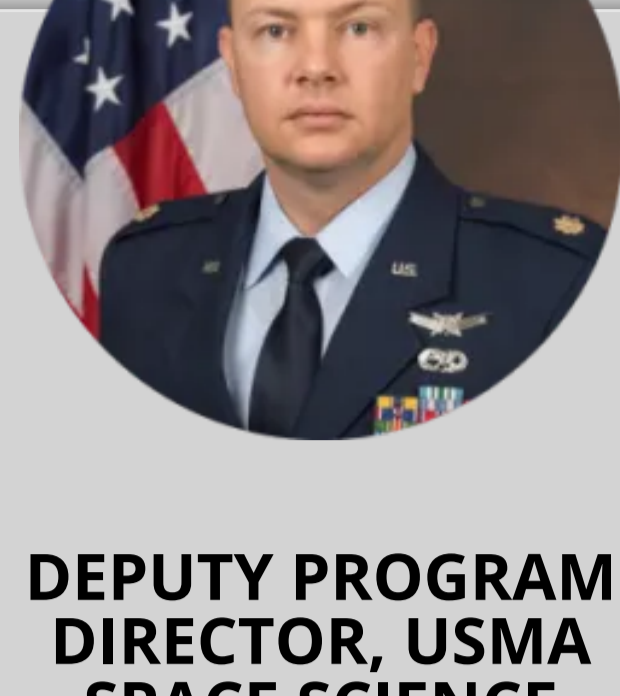


USMA SPACE RANGERS: THE FIRST CLASS



The new Space Science Program at West Point is growing at a rapid rate with participation increasing with each new class of cadets. Offered by the Department of Physics and Nuclear Engineering, the faculty of the Space Science Program are diverse in experience and background. The cadets graduating from the program are qualified space professionals and will go on to serve in a variety of roles supporting operations in the space domain for the Army and the DoD.

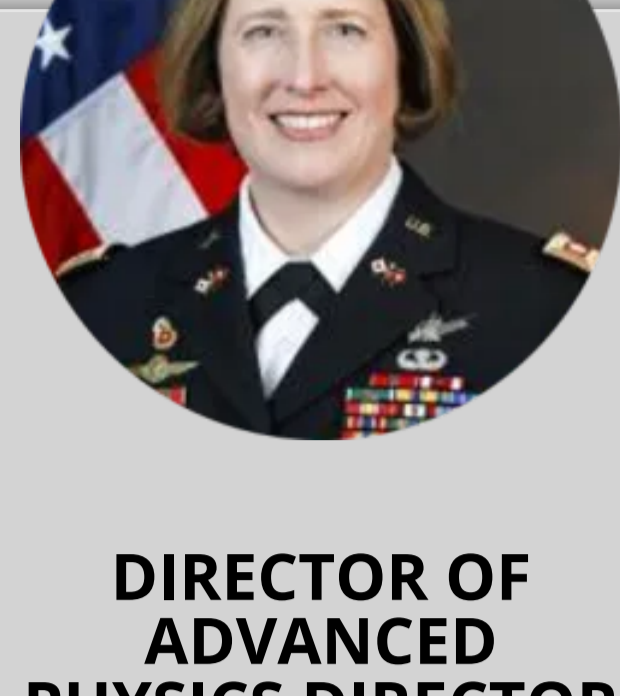


DEPUTY PROGRAM DIRECTOR, USMA SPACE SCIENCE PROGRAM

CO-AUTHOR / JUNIOR ROTATING FACULTY

Major Charlie Galliard is an Air Force exchange instructor at West Point. His primary duty is teaching Introductory Physics and Astronautics. He has briefed at the CubeSat Developers Workshop for the Space Test Program 2008-2010. Maj Galliard also leads the Space Engineering and Applied Research Club (SPEAR).

Contact Information: charlie.galliard@westpoint.edu



DIRECTOR OF ADVANCED PHYSICS DIRECTOR

CO-AUTHOR / ACTING DIRECTOR, SMDC-RESEARCH AND ANALYSIS CENTER

Lieutenant Colonel Diana Loucks is an Academy Professor, and serves as the Director of Advanced Physics in the Department of Physics and Nuclear Engineering (D/PaNE). She has taught courses in introductory physics, space science, and advanced physics. She served previously an Army Signaleer and FA40 Space Operations officer, and currently serves as the lead advisor on multiple cadet space research projects.



Program Director, USMA Space Science Program

ASSOCIATE PROFESSOR / RESEARCH ADVISOR

Dr. Paula Fekete is the USMA Space Science Program Director and a Department Academic Counselor. She is responsible for development of the Space Science curriculum and its instructors. She also manages the cadets who major or minor in Space Science. Additionally Dr. Fekete heads the USMA Astronomy Club and conducts space related research with cadets.



Graduate, USMA Space Science Program

ARMY 2LT / GRADUATE STUDENT / CADET RESEARCHER

Second Lieutenant AnnaMaria Dear, Class of 2020, is one of the first graduates of the USMA Space Science Program, graduating with a B.S. in Space Science with a Russian Minor. A Knight Hennessy scholar, she is attending graduate school before heading to Army flight training at Ft. Rucker, Alabama.

Space Activities at the United States Military Academy, West Point, NY

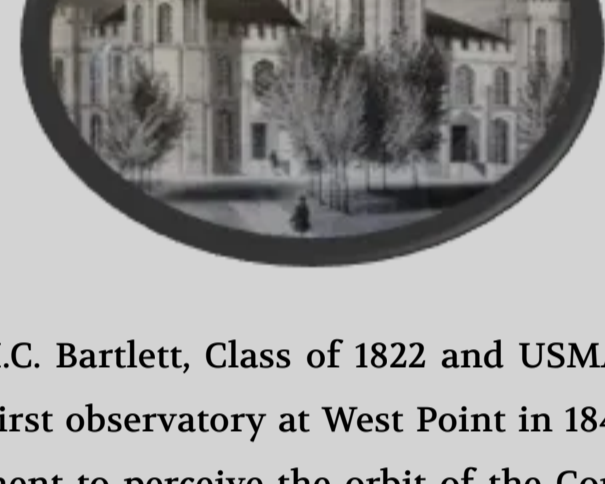
History

West Point



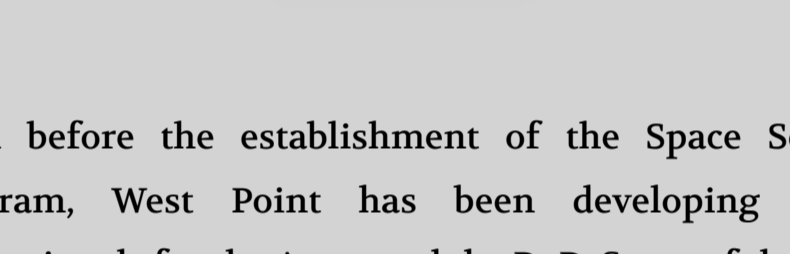
West Point's role in our nation's history dates back to the Revolutionary War, when both sides realized the strategic importance of the commanding plateau on the west bank of the Hudson River. General George Washington considered West Point to be the most important strategic position in America. Washington personally selected Thaddeus Kosciuszko, one of the heroes of Saratoga, to design the fortifications for West Point in 1778, and Washington transferred his headquarters to West Point in 1779. Continental soldiers built forts, batteries and redoubts and extended a 150-ton iron chain across the Hudson to control river traffic. Fortress West Point was never captured by the British, despite Benedict Arnold's treason. West Point is the oldest continuously occupied military post in America.

Early Space Science



William H.C. Bartlett, Class of 1822 and USMA professor built the first observatory at West Point in 1841 and used its equipment to perceive the orbit of the Comet of 1843 and photograph, for the first time in history, a partial solar eclipse on May 26, 1854.

Space Professionals



Even before the establishment of the Space Science Program, West Point has been developing Space Professionals for the Army and the DoD. Some of the most well known astronauts in history are USMA graduates.

It is not only the graduates who are Space Professionals but faculty as well. Today, COL (ret) Mark T. Vande Hei, who previously served as an assistant professor in the Physics and Nuclear Engineering Department, recently launched for his second trip to the ISS on 9 April 2021.

Currently, there are several Army FA40 Space Operations Officers serving as faculty at West Point along with two space qualified Air Force exchange officers. They endeavor to support and develop cadets who wish to pursue future duties supporting military operations in the space domain. This is accomplished by providing these future Space Professionals academic instruction, research opportunities, and professional military education focused on space science topics.



Advanced Individual Academic Development (AIAD)



Cadets work alongside world-class professionals gaining invaluable knowledge and insight into the facilities, methods, and procedures used to design, test and improve Army systems. These numerous opportunities are available around the country and internationally in support of their educational objectives. The Department of Physics and Nuclear Engineering has many partners that provide support for these opportunities. We support an average of 45 cadets per year for Advanced Individual Academic Development (summer internship) travel to such locations as Los Alamos National Laboratory, Lawrence Livermore National Laboratory, AFIT, German Bundeswehr Research Center, the Army Research Laboratory, NASA, and many others. A new offering this year is with the Pacific Spaceport Complex in Kodiak, Alaska to support an Army rocket launch.

Space Science Curriculum

Space Science Major Course Outline											
FOURTH CLASS			THIRD CLASS			SECOND CLASS			FIRST CLASS		
Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring
PHYS 1001	PHYS 1002	PHYS 1003	PHYS 1004	PHYS 1005	PHYS 1006	PHYS 1007	PHYS 1008	PHYS 1009	PHYS 1010	PHYS 1011	PHYS 1012
PHYS 1001	PHYS 1002	PHYS 1003	PHYS 1004	PHYS 1005	PHYS 1006	PHYS 1007	PHYS 1008	PHYS 1009	PHYS 1010	PHYS 1011	PHYS 1012
PHYS 1001	PHYS 1002	PHYS 1003	PHYS 1004	PHYS 1005	PHYS 1006	PHYS 1007	PHYS 1008	PHYS 1009	PHYS 1010	PHYS 1011	PHYS 1012
PHYS 1001	PHYS 1002	PHYS 1003	PHYS 1004	PHYS 1005	PHYS 1006	PHYS 1007	PHYS 1008	PHYS 1009	PHYS 1010	PHYS 1011	PHYS 1012

- The interim all-in-one course was the start of modern Space Science at West Point
 - The Advanced Physics major, the longest standing major within PaNE, had a single course, PH472: Space and Astrophysics
 - Started with orbital mechanics, moved onto planets and tides, and concluded with a section on solar evolution
- New Space Science Program was established 12 years after COL Thomas Pugsley, an instructor and FA40, began advocating for development of Space Professionals at USMA
 - Space Science Major/Minor
 - 4 Core Space Science Courses (PaNE)
 - Interdisciplinary approach brings in courses from other departments
 - Space Military Individual Advanced Development (MIAD)
 - The Army Space Cadre Basic Course (ASCBC)
 - Offered to cadets as competitive opportunity in the summer like Airborne or Air Assault
 - Space Badge awarding course for Space and Geospatial Information Science majors

Collaboration Opportunities



- Collaboration is Key
- We are looking to build collaboration opportunities with space professionals from industry, academia, government organizations, sister-service academies and post graduate schools
- We have there is value in partnerships, and we have a valuable asset in the innovative ideas that are born in the fresh mind of cadets seeking knowledge
- We know knowledge, expertise, and opportunities lie with those who blazed the path before us
- We look to you to help us bring efficiency to our processes and make quick lessons of our mistakes so we can focus on innovation



Space Engineering and Applied Research (SPEAR)



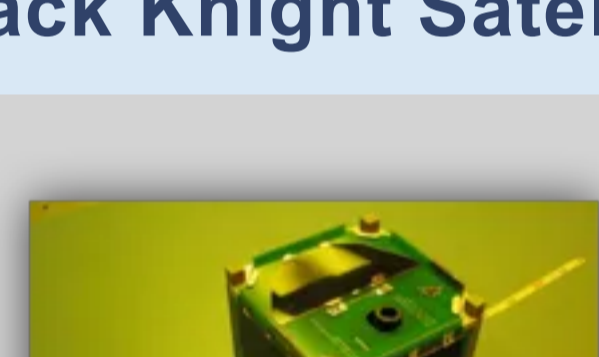
The Space Engineering and Applied Research Club at West Point provides opportunity for cadets, staff and faculty to develop skills relevant to operating in the space domain. Club members are working an array of space related research projects across the Academy and funding by various sponsors.

Space and Missile Defense Command-Research and Analysis Center (SMDC-RAC)



The US Army Space and Missile Defense Command Research and Analysis Center (SMDC-RAC) mission is to promote and facilitate USMA cadet and faculty research in support of the US Army Space and Missile Defense Command (SMDC) objectives; enhance the professional development of the USMA faculty; and inspire cadets through space and missile defense education and research to face technical challenges with confidence.

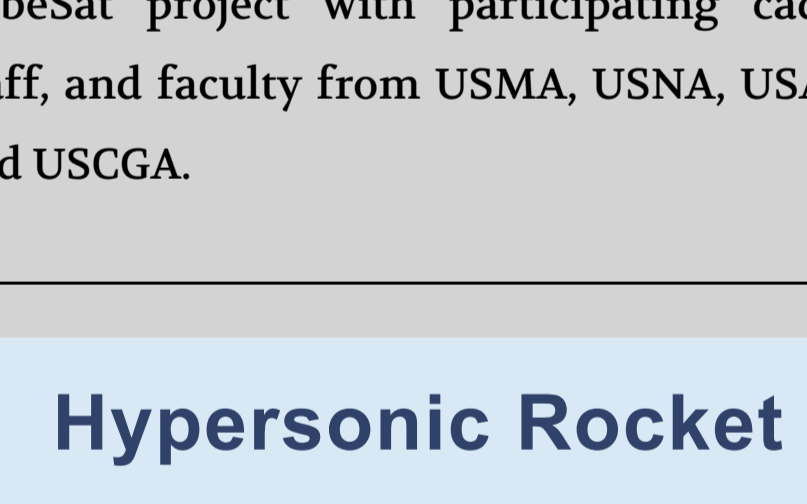
Black Knight Satellite



- 1U CubeSat
- Pumpkin CubeSat Kit
- Tech Demo
- Manifested under NASA ELaNA program on ORS-3
- Launched Sep 2013
- Orbit: 500 km, 40.5°
- No contact established
- Reentered July 2016

Black Knight-1 was West Point's first venture into the arena of the student built small satellites. Headed by then Major Thomas Pugsley, an FA40 and instructor in the Electrical Engineering Department, BK-1 set USMA on the path to establishing an independent Space Science Program. Future plans are in work for a joint service academy CubeSat project with participating cadets, staff, and faculty from USMA, USNA, USAFA, and USCGA.

Hypersonic Rocket Team (HRT)



SPEAR-HRT is a cadet initiated and led multi-disciplinary research capstone. This year cadets have designed a new high altitude ignition system for a two stage sounding rocket with the goal of reaching the Kármán line. Cadets expect to continue to improve the design through annual capstone projects. The long term vision is a cadet designed and developed rocket capable of putting a 3U CubeSat into Low Earth Orbit.

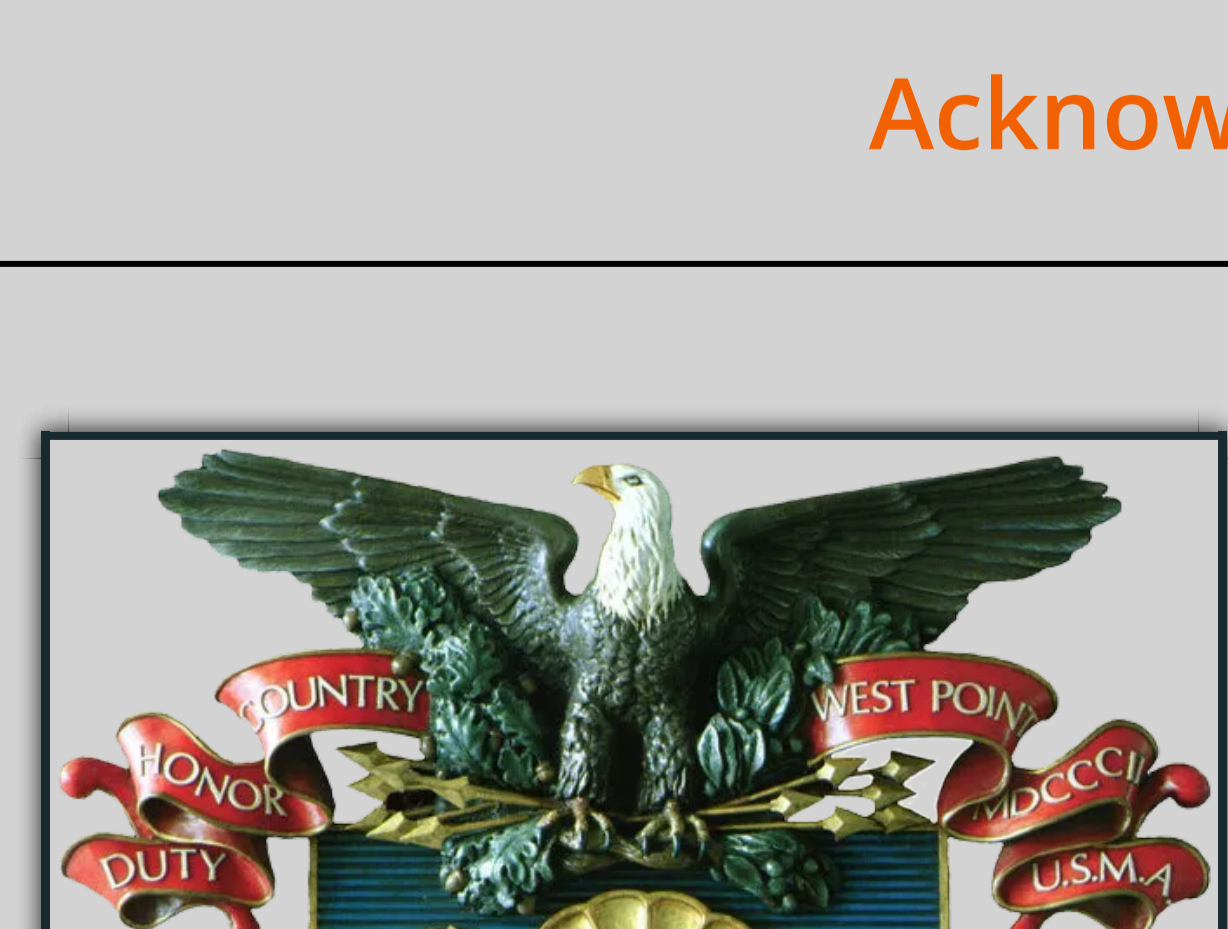
Balloon Satellite

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House of PaNE (2018, Start of Space Science Program)



Acknowledgements



The U.S. Military Academy at West Point's mission is "to educate, train, and inspire the Corps of Cadets so that each graduate is a commissioned leader of character committed to the values of Duty, Honor, Country and prepared for a career of professional excellence and service to the Nation as an officer in the United States Army."



The views expressed are those of the author and do not reflect the official policy or position of the United States Military Academy, US Army, US Air Force, Department of Defense or the US Government.

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