



Study Space Systems Engineering at The Craft Academy



www.moreheadstate.edu/craft-academy

www.moreheadstate.edu/academics/colleges/science/engineering-sciences/space-science-center/

Launch into Space Systems through the Craft Academy

During their time at the Craft Academy, students interested in the cutting-edge field of space systems engineering can start their journey to the stars while still in high school. Craft Academy students have the opportunity to enroll in space systems engineering courses, participate in aerospace training programs, work on projects with NASA and other aerospace companies, and join clubs and other special programs.

Why Aerospace?

Aerospace plays a significant role in the economy of Kentucky. Kentucky is home to a robust aerospace industry and became the number one industry as measured by the value of manufactured exports in 2014. The job market for aerospace and defense professions in Kentucky is equally robust. In the US, aerospace jobs are expected to grow at a rate of 6% faster than the average, and at a comparable rate in Kentucky through 2028.

Kentucky's Top Industries (2011 to 2021)*



The average annual salary of an aerospace engineer in the US is **\$130,720.00**

In 2024 Kentucky Aerospace Exports totaled **\$18,754,429,633** sent to **100** countries

More than **3,936** aerospace-related jobs have been created in Kentucky since 2017

Kentucky's over 100 aerospace-related facilities employ over **23,000** people

In private industry, the US Space Economy supports over **360,000** jobs!

Kentucky has announced **73** aerospace-related projects since 2017, totaling over **\$1.6 billion** in investments

Why Morehead State University?

The Space Science Center at Morehead State University is an internationally recognized Research and Development facility and educational center that focuses on the development and operation of small satellites, particularly CubeSats. The Center provides space mission services for lunar and interplanetary missions with its 21-meter space tracking antenna (STA) - which is also part of NASA's Deep Space Network. MSU offers space related academic programs, including a BS in space systems engineering, an MS in space systems engineering, and a Doctor of Engineering in systems engineering with a track in space systems engineering, delivered by outstanding faculty with industry experience in satellite systems design, defense electronics, and space mission operations.

Space Systems Engineering Course Sequence for Craft Academy Students

Fall Semester 1

SSE 105 & Lab: Fundamentals of Space Systems Engineering

(FALL COURSE ONLY)

Introduction to the physical realization of electronic assemblies, fundamental electronic calculations, operation of basic test and measurement equipment, development of skills such as soldering, mechanical systems design, wiring, and packaging.

Craft Academy STEM Elective

Spring Semester 1

SSE 120 & Lab: Satellites and Space Systems I

(SPRING COURSE ONLY) (Prereq: SSE 105, MATH 174 or 175)

Introduction to satellites and space systems; orbital mechanics; space environments; satellite applications; spacecraft design considerations; the roles played by universities, industries, and government in space; and future technologies of spacecrafts and satellites.

Craft Academy Science Core

Fall Semester 2

SSE 122 & Lab: Satellites and Space Systems II

(FALL COURSE ONLY) (Prereq: SSE 120, MATH 174 or 175)

Introduction to developing spacecraft subsystems such as structures, electrical power systems, command and data handling, communications, thermal management and operations.

Craft Academy Science Core

Spring Semester 2

SSE 210: Spacecraft Mechanical Systems (SolidWorks CAD Modeling)

(SPRING COURSE ONLY) (Prereq: SSE 120)

Introduction to computer-assisted development of space vehicle structural and mechanical systems. Students will develop skills in SolidWorks, parametric 3-D modeling, machined components design and machine tooling.

Craft Academy STEM or +X Elective

Craft Academy Students have the opportunity to

**COMPLETE
UP TO**

50% of their

**Space Systems Engineering Degree
by the time they graduate High School****

**Dependent on student's starting placement in mathematics when entering the Craft Academy.

The Padawan Program

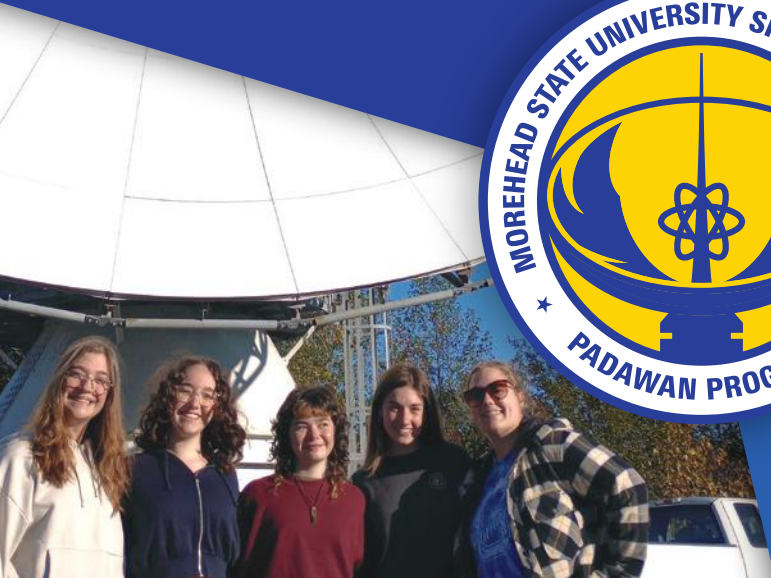
The Padawan Program at the Space Science Center is a training and mentorship program that pairs faculty, staff, and space systems engineering research assistants with undergraduate classmen and Craft Academy students interested in space systems engineering. Students in the Padawan Program participate in Space Science Center projects and missions with aerospace organizations including NASA, Intuitive Machines, Advanced Space and more.

Students learn about training opportunities at Padawan Palooza, an informational event early in the fall semester.

The Padawan Program at the Space Science Center Involves:

- Satellite Ground Operations
- Satellite Ground Station Technologies
- Space Environmental Testing (Thermal Vacuum and Vibration Testing)
- RF and space communications systems (Anechoic Chamber Testing)
- Spacecraft Mechanical Systems (3D printing, CAD modeling, and Manufacturing Processes)
- Ground Support Equipment Mechanical Systems
- Flight Software and Ground Support Software
- Star Theater Operations (Summer Employment Possible)

Some Padawan program training and participation activities qualify for Craft Academy special project/research credit and may include dissemination opportunities. Craft Academy graduation with honors and honors with distinction requires students to successfully complete a professionally mentored and approved research/special project. Projects and dissemination opportunities are approved by the Craft Academy Assistant Professor of Research.





Meet Frida Ferrer Valladares

Craft Academy Class of 2027
Padawan Program Participant
SpaceTrek Alum '24

"I learned about the Craft Academy when I was at the SpaceTrek summer program. We worked in the Space Science Center on a space mission and lived in Craft Tower. During SpaceTrek I got to meet Craft Academy staff and students and learn more about the program and how ingrained space systems engineering was in the Craft experience."

"Now I'm taking courses in space systems engineering and getting real world experience in ground station operations as a member of the Padawan Program. This program has prepared me to participate in the tracking of the Artemis II mission taking the first female astronaut to the moon."

Ongoing Student Projects

CXBN (Cosmic X-Ray Background Nanosatellite)

The Cosmic X-ray background nanosatellite is a student-lead mission with the objective to measure the cosmic x-ray background using commercial off the shelf detectors and systems built in house by space systems engineering students.

Craft Academy students can participate in the development of technologies related to CubeSats, like CXBN.

Students develop teamwork and project management skills. They also develop specialized skills in the development of sensor systems, control systems, power systems, communication systems, structural building and environmental testing for the space environment, and flight software development.

The CXBN series reinforces critical skills learned through the Padawan program and in space systems engineering classes.



Clubs

Society of Women in Space Exploration (SWISE) - The Society of Women in Space Exploration is a student-led organization dedicated to empowering and supporting women who are passionate about careers and innovation in space science, aerospace, and exploration.

Rocketry Club - Students in the MSU Rocketry Club participate in the designing, building, testing, and launching of AA to G class rockets. Craft Academy students in the Rocketry Club develop teamwork and leadership skills needed in the aerospace industry.

Astronomy Club - The Astronomy Club at the SSC provides amateur astronomy education and outreach through public Star Parties focusing on night sky observation and astronomical observation instrumentation. The Astronomy Club is open to all MSU students including Craft Academy students. Students in the Astronomy Club develop skills in communication, night sky orientation, and telescope operation. Participation in the club provides a foundation in astronomy, physics, celestial mechanics, and general scientific equipment care.

Spacecraft Coding Club - The Spacecraft Coding Club provides students with an opportunity to learn satellite software development skill consistent with those utilized in the industry.

Competitive Teams

Craft Academy Robot Gladiator League (RGL) Team

Coach: Michael Combs, instructor and space systems engineer

The Craft Academy Robot Gladiator League Team is a group of passionate students who design, build, and battle custom-made combat robots. They combine creativity, engineering, and teamwork to create powerful machines ready to compete in thrilling robot battles. From brainstorming ideas and designing parts to assembling and testing their robots, the team gains hands-on experience in robotics, programming, and problem-solving. Through innovation and determination, the Craft Academy Robot Gladiator Team is turning imagination into action — one epic robot battle at a time!

Craft Academy Technology Student Association (TSA)

Coach: Chloe Hart, ground station engineer/operations lead

In the Craft Academy Technology Student Association (TSA), students engage in hands-on STEM activities that challenge them to apply science, technology, engineering, and mathematics skills to real-world problems. Students design and build projects such as robots, software applications, engineering prototypes, and research presentations for competitive events at the regional, state, and national levels. Students develop leadership, teamwork, communication, and critical thinking skills.

Volunteer Opportunities*

SpacePrep: Aerospace Exploration Workshop

Up to 90 Service Hours Annually

Craft Academy students can earn service hours supporting SpacePrep workshop preparation and implementation as lab assistants, registration support, and lab management.

Star Theater Operator

Up to 80 Service Hours Annually (summer employment possible)

Students are trained to operate the star theater to present public and private shows including special features and laser shows and live presentations of the night sky.

**Craft Academy graduation requires students to complete 30 service hours. Graduation with honors requires 60 service hours. Graduation with honors with distinction requires 80 service hours. At least 70% of service hours must be completed at MSU or in the Rowan County community. Service Hours are managed and approved by the Craft Academy Visiting Assistant Professor of Counseling.*



SpaceTrek™

Space Systems Program for Young Women in Appalachia

The Pathway to the Aerospace Industry Runs Through Morehead



Learn More
On Our Website

moreheadstate.edu/spacetrek



SpaceTrek is a two-week space systems engineering residential summer program for rising 9th - 12th grade girls and girls entering their freshman year of college held at Morehead State University.

SpaceTrek provides an opportunity to explore aerospace as a college and career option through a curriculum aligned with the needs of aerospace degree programs and industry.

Participants experience the primary elements of a space mission including the build and launch of a scientific instrument, the operation of a satellite tracking station to collect data, and the development and presentation of mission results.

Questions? Contact us at:

stemxcenter@moreheadstate.edu (606) 783-2300



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SpaceTrek



SpaceTrek in Appalachia