FLIGHT TEST ENGINEERING

Individual Courses
Graduate Certificate
Basic Master’s Degree
Enhanced Master’s Degree for EASA Level 1
A GRADUATE SCHOOL ROOTED IN RESEARCH.

Florida Tech is a national, doctoral-granting research university that offers an immersive, hands-on research environment where curiosity is embraced and innovation is championed.

Located in the heart of the fourth-largest high-tech work force in the United States, students are in close proximity to major companies and organizations like:

- Collins Aerospace
- Northrop Grumman Corp.
- L3Harris Technologies
- Lockheed Martin
- Embraer
- SpaceX
- National Weather Service
- United Launch Alliance
LEARN

We take your passion seriously. Our students conduct groundbreaking research and exciting hands-on projects.

With plenty of on-campus housing options, there's a space that will fit your lifestyle. Take a dip in the pool, volunteer in the community garden or participate in more than 100+ clubs and organizations.

EXPLORE

Spend your free time at the beach, kayak the Indian River Lagoon or stroll Downtown Melbourne.

As an NCAA Division II school, we have 19 intercollegiate sports for women and men, as well as many intramural teams.

PLAY
ABOUT FLIGHT TEST ENGINEERING
AT FLORIDA TECH

PROGRAM OVERVIEW

The Flight Test Engineering (FTE) program seeks to expand the student’s knowledge, skills and abilities in the field of aircraft flight testing. Flight test engineering involves performance evaluation of existing aircraft, rather than designing aircraft to meet performance specifications. Core courses teach engineers how to test an aircraft safely, measure aircraft performance and determine aircraft flying qualities. Students learn the necessary measurement techniques, instrumentation and data analysis methods required to collect and reduce flight test data to standard atmospheric conditions and then expand those results for publication in pilots’ operating handbooks. Flight test results are also used for improving the design of future aircraft. Additionally, students learn how to test and evaluate various aircraft mechanical and electrical subsystems including propulsion, structure and avionics.

Program options include individual courses, a graduate certificate or a Master of Science (M.S.) degree in Flight Test Engineering. The basic M.S. in FTE program includes 15 flight hours. The enhanced M.S. in FTE program covers the European Aviation Safety Agency (EASA) Level 1 requirements.

ADMISSION REQUIREMENTS

An accredited bachelor’s degree in a field related to aerospace engineering is required. Applicants whose bachelor’s degrees are in other fields may require additional undergraduate coursework. In evaluating an international application, due consideration is given to academic standards in the country where the undergraduate studies have been performed.

MAIN CAMPUS TUITION

$1,241 per credit hour (2021–2022)
Unique graduate programs at a traditional university designed to expand the student’s knowledge, skills and abilities in the field of aircraft flight testing

Graduate Certificate
This 6-month program is designed for students who wish to take only four courses: Performance, Stability and Control and two more courses from a list of six courses will be awarded a graduate certificate in FTE. This option may appeal to students who wish to receive their master’s degree in a different discipline but still seek to expand their knowledge, skills and abilities in aircraft flight testing. This option may also appeal to professionals who may not have the time or resources to complete the full master’s program. Students must still meet the standard admission requirement.

Estimated costs below assume part-time students not living on campus.

<table>
<thead>
<tr>
<th>Estimated Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuition.............................$14,892</td>
</tr>
<tr>
<td>Lab Fees ......................... $1,800</td>
</tr>
<tr>
<td>Books .................................$308</td>
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<tr>
<td>Travel .............................. $5,000</td>
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<td>Total ..........................$22,000</td>
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</tbody>
</table>

Basic Master’s Degree
The 11-month basic M.S. in FTE program consists of 30 semester credit hours in three main components:

• A 12-hour core component: Flight test courses in Performance, Stability and Control, Avionics as well as Project Engineering.

• A 12-hour electives component: Students select four courses from a list of 16 courses. Students have the option to substitute a thesis for two of the four elective courses.

• A 6-hour math component: Students select two courses from a list of seven courses.

Students get a minimum of 15 flight hours.

Estimated costs below assume full-time students living on campus.

<table>
<thead>
<tr>
<th>Estimated Costs</th>
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</thead>
<tbody>
<tr>
<td>Tuition ......................... $37,230</td>
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<tr>
<td>Lab Fees ......................... $2,400</td>
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<tr>
<td>Housing ...........................$8,475</td>
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<tr>
<td>Meals .............................$7,350</td>
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<tr>
<td>Books ...............................$1,545</td>
</tr>
<tr>
<td>Travel .............................. $3,000</td>
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<tr>
<td>Total ..........................$60,000</td>
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</tbody>
</table>

Enhanced Master’s Degree
The 11-month enhanced M.S. in FTE program consists of all the elements of the basic M.S. in FTE program with two of the electives designed to cover EASA requirements. Those two electives add 48 flight hours to the 15 flight hours in the basic program for a total of 63 flight hours. Many of the 48 additional flight hours occur in various jet aircraft which are substantially more expensive to fly. Thus, lab fees for those two electives are substantially more than other FTE courses. Students also get one-on-one instruction and act as test conductors. For a breakdown of aircraft and flight hours for the two electives, see the FTE 5711 and FTE 5712 course descriptions.

Estimated costs below assume full-time students living on campus.

<table>
<thead>
<tr>
<th>Estimated Costs</th>
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</thead>
<tbody>
<tr>
<td>Basic M.S. in FTE ........$60,000</td>
</tr>
<tr>
<td>Added Lab Fees .......... $280,000</td>
</tr>
<tr>
<td>Total ..................$340,000</td>
</tr>
</tbody>
</table>
COURSE LIST

Graduate Certificate Core Courses
- FTE 5701 Airplane Performance Flight Test Engineering
- FTE 5702 Airplane Stability and Control Flight Test Engineering

Graduate Certificate Elective Course Choices (two required)
- ENM 5200 Project Engineering
- FTE 5703 Airplane Avionics Flight Test Engineering
- FTE 5704 Helicopter Flight Test
- FTE 5705 Weapon Systems Flight Test
- FTE 5706 Propulsion Testing
- FTE 5707 Hazardous Flight Test
- FTE 5708 Unmanned Aircraft Systems Flight Test

M.S. in FTE Core Courses
- FTE 5701 Airplane Performance Flight Test Engineering
- FTE 5702 Airplane Stability and Control Flight Test Engineering
- FTE 5703 Airplane Avionics Flight Test Engineering
- ENM 5200 Project Engineering

M.S. in FTE Elective Course Choices (four required)
- AVS 5207 Aviation Safety Management Systems
- AEE 5120 Aerodynamics of Wing Bodies
- MEE 5318 Instrumentation and Measurement Systems
- MEE 5320 Internal Combustion Engines
- MEE 5350 Gas Turbines
- AEE 5480 Structural Dynamics
- AEE 5486 Crash Worthiness
- FTE 5704 Helicopter Flight Testing
- FTE 5705 Weapon Systems Flight Test
- FTE 5706 Propulsion Testing
- FTE 5707 Hazardous Flight Test
- FTE 5708 Unmanned Aircraft Systems Flight Test
- FTE 5711 Airplane Performance Flight Test Conduct
- FTE 5712 Airplane Stability & Control Flight Test Conduct
- AEE 5801 Advanced Flight Dynamics and Control
- AEE 5802 Multivariable Feedback Control Systems
- AEE 5803 Nonlinear Control Systems
- AEE 5804 Guidance and Navigation of Aerospace Vehicles
- ECE 5245 Digital Signal Processing 1
- ECE 5251 Radar Systems
- ECE 5350 Optical Electronics
- SYS 5360 Electro-optics/Infrared Systems Engineering

Thesis Option
Students can substitute a thesis for two of the four electives. A thesis involves individual work under the direction of a member of the graduate faculty on a selected topic. Topics will involve some aspect of aircraft flight testing or simulation. Opportunities exist to conduct research off site at military flight test centers or commercial companies. The student will publish the thesis upon completion.

Math Course Choices (two required)
- MTH 5102 Linear Algebra
- MTH 5130 Theory of Complex Variables
- MTH 5201 Mathematical Methods in Science & Engineering 1
- MTH 5202 Mathematical Methods in Science & Engineering 2
- MTH 5401 Applied Statistical Analysis
- MTH 5411 Mathematical Statistics 1
- MTH 5412 Mathematical Statistics 2

FTE COURSE DESCRIPTIONS

FTE 5701 Airplane Performance Flight Test Engineering
Examines flight test engineering techniques to determine airplane performance. Includes flight labs for data collections. Presents data analysis and interpretation methods, and uses airplane performance theory to develop the equations necessary to reduce flight test data taken at altitude to sea level. Covers both propeller and jet aircraft.

FTE 5702 Airplane Stability and Control Flight Test Engineering
Examines techniques to evaluate airplane stability and control by flight testing. Includes flight labs for flight test data collection. Presents methods for stick-fixed and stick-free extrapolation of stability neutral points and control characteristics. Also includes effects of high-speed and transonic flight due to aircraft configuration.

FTE 5703 Airplane Avionics Flight Test Engineering
Reviews current avionics systems for testing in flight. Includes flight labs to demonstrate testing methods and data collection. Also includes communications and navigation systems, sensor systems, avionics systems integration, human factors and radar for severe weather avoidance systems and tests to determine stability.

ENM 5200 Project Engineering
Principles of project management to design and develop projects and services within budget, on time and to specifications. Includes work planning, organization design, requirements analysis, project control and PERT/CPM.

FTE 5704 Helicopter Flight Test
Examines flight test engineering techniques to determine helicopter performance. Includes flight labs for data collection. Presents theory and methods for measuring hover, climb and level-flight performance. Addresses differences between airplane and helicopter flight testing.

FTE 5705 Weapon Systems Flight Test
Examines flight test engineering techniques to evaluate aircraft weapon systems. Presents theory and methods for testing electro-optic, infrared, radar and electronic warfare systems. Covers weapons integration, night vision imaging systems and helmet-mounted displays.

FTE 5706 Propulsion Testing
Examines ground and flight testing techniques to evaluate propulsion systems. Includes labs for data collection. Presents theory and methods for testing reciprocating and jet engines. Covers uninstall and installed tests to determine thrust and power.

FTE 5707 Hazardous Flight Test
Examines planning and execution of hazardous flight test. Includes case studies on historic mishaps. Covers the flight test safety review process including the development of general minimizing procedures as well as test-unique hazard analyses. Includes demonstrations of control room equipment and protocols.

FTE 5708 Unmanned Aircraft Systems Flight Test
Examines testing in all flight regimes of Unmanned Aircraft Systems including launch & recovery, in-flight vehicle performance, stability & control, sensor payload performance, communication & data link performance, ground station controls & displays, and human factors. Design considerations for reliability, robustness, and redundancy are examined.

FTE 5711 Airplane Performance Flight Test Conduct
Prepares engineers to conduct performance flight tests in the air and in a control room. Flight labs involve test card creation, safety, execution, data analysis and reporting. Flights occur in a variety of aircraft including multiengine and jet aircraft. In addition to multiengine data, data for one engine inoperative will be analyzed.

FTE 5712 Airplane Stability and Control Flight Test Conduct
Prepares engineers to conduct stability and control flight tests in the air and in a control room. Flight labs involve test card creation, safety, execution, data analysis and reporting. Flights occur in a variety of aircraft including multiengine and jet aircraft. In addition to multiengine data, data for one engine inoperative will be analyzed.
The EASA Part-21 requirements for Level 1 FTE are:

<table>
<thead>
<tr>
<th><strong>COMPETENCE LEVEL 1 — AEROPLANES</strong></th>
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<tbody>
<tr>
<td><strong>Theoretical knowledge</strong></td>
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<tr>
<td>• Aerodynamics</td>
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<tr>
<td>• Stability and control/handling qualities</td>
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<tr>
<td>• Engines and performance</td>
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<tr>
<td>• Measurements and flight test instrumentation (including telemetry)</td>
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<tr>
<td>• Human factors</td>
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<tr>
<td><strong>Flight test techniques and flight training</strong></td>
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<tr>
<td>Performance (at least one flight test report should be developed)</td>
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<tr>
<td>• Airspeed calibration</td>
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<tr>
<td>• Climb multiengine</td>
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<tr>
<td>• Takeoff and landing, including turboprop/turbofan one-engine inoperative (OEI)</td>
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<tr>
<td>• Level flight performance</td>
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<tr>
<td><strong>Engines</strong></td>
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<tr>
<td>• Turboprop/turbofan limitations and relight envelope</td>
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<tr>
<td><strong>Handling qualities</strong></td>
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<tr>
<td>(at least two flight test reports should be developed)</td>
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<tr>
<td>• Flight controls characteristics</td>
</tr>
<tr>
<td>• Longitudinal handling qualities</td>
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<tr>
<td>• Longitudinal maneuver stability</td>
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<tr>
<td>• Take off and landing multi-turboprop/turbofan, including Vmcg and Vma</td>
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<tr>
<td>• Lateral-directional handling qualities</td>
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<tr>
<td>• Handling qualities evaluation</td>
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<tr>
<td>• Variable stability demo flights including High-Order Flight Control Systems (HOFCS)</td>
</tr>
<tr>
<td>• Stalls</td>
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<tr>
<td>• Spins</td>
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<tr>
<td>• Vmca</td>
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<tr>
<td><strong>Systems</strong></td>
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<tr>
<td>(at least one flight test report should be developed)</td>
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<tr>
<td>At least three different systems:</td>
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<tr>
<td>• Autopilot/Automatic Flight Control System (AFCS)</td>
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<td>• Glass cockpit evaluation</td>
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<tr>
<td>• Radio navigation, instruments qualification and integrated avionics</td>
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<tr>
<td>• Enhanced Ground Proximity Warning System (EGPWS)</td>
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<td>• ACAS</td>
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<td><strong>High-speed certification test</strong></td>
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| **Final evaluation exercise** (a flight test report should be developed)**

350 hours of ground training

60 hours of flight training
- Six different aircraft types
- At least one certified to CS-25

The Florida Tech M.S. in FTE consists of 10 courses (30 credit hours). The courses are broken down into ground hours and flight hours. The two electives required for EASA Level 1, FTE 5711 and FTE 5712, are listed in italics.

387 hours of GROUND training and education
- FTE 5701: 39 hours
- FTE 5702: 39 hours
- FTE 5703: 42 hours
- ENM 5200: 45 hours
- FTE 5704 or 5706: 43 hours
- **FTE 5711: 22 hours**
- **FTE 5712: 22 hours**
- Elective: 45 hours
- Math 1: 45 hours
- Math 2: 45 hours

63 hours of FLIGHT training and education
- FTE 5701: 6 hours (PA32)
- FTE 5702: 6 hours (PA32)
- FTE 5703: 3 hours (PA31)
- FTE 5704 or 5706: 2 hours (R44 or PA31, PA32)
- **FTE 5711: 23 hours**
  (PA28, PA31, PA44, J-4, L-39, Falcon 20)
- **FTE 5712: 23 hours**
  (PA28, PA31, PA44, Citabria, Falcon 20,
  VSS Learjet, T-33 or MB-339CB)
INSTRUCTORS

RALPH KIMBERLIN. Dr.-Ing., wrote the textbook Flight Testing of Fixed-Wing Aircraft. He is a Fellow of the Society of Experimental Test Pilots with 9,000 flight hours in over 250 different aircraft including 25 first flights. He earned a Doktoringenieur degree from the Technical University of Aachen, Germany. He is a U.S. Naval Academy graduate and was commissioned as an Air Force officer. While serving in Vietnam, he was one of three officers responsible for the development and combat evaluation of the AC-47 side-firing gun ship. He was a test pilot and flight test engineer for Piper, Rockwell International and Beech Aircraft companies for 10 years. He was a professor and program chair at the University of Tennessee Space Institute for 27 years. Kimberlin has taught courses in performance flight test and stability and control flight test at Florida Tech since 2012.

BRIAN KISH, Ph.D., is the chair of Florida Tech’s Flight Test Engineering program. He earned a Ph.D. in aeronautical engineering from the Air Force Institute of Technology. He is a graduate of the Air Force Test Pilot School and has accumulated over 1,300 flight hours as a flight test engineer in 49 different aircraft during his 20-year Air Force career. He held leadership positions at three flight test units and served as the vice chair of the Education Department of the Air Force Test Pilot School from 2005 to 2008. Since retiring from the Air Force in 2011, Kish has taught experimental aerodynamics, control systems, propulsion, performance, aircraft stability and control, and avionics courses at Florida Tech.

CHRIS MCELROY has over 27 years professional experience flight testing modern military avionics and weapons. He is currently the test director for the Raytheon Technologies (RTX) Next Generation Jammer – Mid Band, providing support to the USN’s EA-18G test program. Prior to RTX, McElroy was a chief of academics/flight test instruction (systems) at the National Test Pilot School, CA. He also spent more than a decade testing at the U.S. Naval Air Weapons Center, China Lake, where he was responsible for UK Royal Air Force weapons/electronic warfare testing/training. McElroy is an FAA flight instructor, with approx. 1,000 hours PIC in high-performance technically advanced aircraft, holds a B.S. with honors in computer science, an M.S. with distinction in aeronautical science and human factors and has published original research with: AIAA, NATO-RTO/AGARD, SFTE and SETP.

ISAAC SILVER, Ph.D., is the chief jet pilot at Florida Tech. He earned his Ph.D. from Florida Tech in space sciences. He also holds a B.S. in astronomy and astrophysics from Florida Tech. He’s an airline transport pilot (airplane multiengine land), commercial pilot (airplane single-engine land and sea), gold seal flight instructor (single and multiengine), instrument pilot (airplane) and ground instructor (advanced). He has 17,500 hours of flight time with more than 4,000 hours as an instructor. Aircraft include DA-10, DA-20, DA-50/900, L-1329, BE-350, BE-400, IAI-1124, Learjet(24/25/31/35) and L39.

MAUDE GUESS has been conducting aircraft development and certification test flying since 2008. During her career, she has worked for Liberty Aerospace and Maule Aircraft companies where she performed development and certification flight testing including dive testing to VD. She is currently the chief of flight test for Black Hawk Helicopters at Sikorsky Aircraft. She is a pending member of the Society of Experimental Test Pilots with 2,000 flight hours in 20 different aircraft types. She has flown courses in performance and stability and control at Florida Tech since the beginning of the program in 2013.

JON HOLZMAN is the instructor of Florida Tech’s helicopter flight test course. Graduating from Embry-Riddle Aeronautical University in 2007, he served in the United States Army as an AH-64 Apache instructor pilot conducting multiple combat tours in Iraq and Afghanistan, logging over 2,300 flight hours of experience. He currently works with the United States Air Force as the flight test engineering representative to Global Strike Command during the acquisition and test of the MH-139A Grey Wolf helicopter. His projects of interest include helicopter live fire test and evaluation, helicopter combat maneuvering flight and weapons deployment testing. He is a member of the American Institute of Aeronautics and Astronautics as well as the Society of Flight Test Engineers.
FTE 5701
AIRPLANE PERFORMANCE
FLIGHT TEST ENGINEERING

TUITION: $3,723 | LAB FEE: $600

CATALOG DESCRIPTION: Examines flight test engineering techniques to determine airplane performance. Includes flight labs for data collection. Presents data analysis and interpretation methods, and uses airplane performance theory to develop the equations necessary to reduce flight test data taken at altitude to sea level. Covers both propeller and jet aircraft.

Syllabus
Ch. 1  Introduction
Ch. 2  Methods for Reducing Data Uncertainty
Ch. 3  Airspeed Systems Theory and Calibration

Introductory Flight
Ch. 4  Stall Speed Measurement
Ch. 5  Determining Engine Power In-Flight

Airspeed Calibration Flight
Ch. 6  Propeller Theory
Ch. 7  Jet Thrust Measurement in Flight
Ch. 8  Level Flight Performance Theory

Stalling Speed Flight
Ch. 9  Level Flight Performance Flight Test Methods
Ch. 10  Level Flight Performance Jet Aircraft
Ch. 11  Range and Endurance

Level Flight Performance Flight
Ch. 12  Climb Performance Theory
Ch. 13  Climb Performance Flight Test Methods

Climb Performance Flight
Ch. 14  Energy Methods Theory and Methods
Ch. 15  Turning Performance
Ch. 16  Methods for Drag Determination in Flight

Level Acceleration Flight
Ch. 17  Airspeed vs Flight Path Angle Performance Method
Ch. 18  Takeoff and Landing Theory and Methods

Flight hours
PA32: 6 hours (5 students/sortie)
FTE 5702
AIRPLANE STABILITY & CONTROL
FLIGHT TEST ENGINEERING

TUITION: $3,723 | LAB FEE: $600

Catalog Description: Experiences techniques to evaluate airplane stability and control by flight testing. Includes flight labs for flight test data collection. Presents methods for stick-fixed and stick-free extrapolation of stability neutral points and control characteristics. Also includes effects of high-speed and transonic flight due to aircraft configuration.

Syllabus

Ch. 19 Introduction to Stability and Control Flight Testing
Ch. 20 Static Longitudinal Stability Theory
Instrumentation Calibration and Introductory Flight
Ch. 21 Static Longitudinal Stability Flight Test Methods
Ch. 22 Dynamic Longitudinal Stability Theory
Static Longitudinal Stability Flight
Ch. 23 Dynamic Longitudinal Stability Flight Methods
Ch. 24 Longitudinal Maneuvering Stability Theory
Dynamic Longitudinal Stability Flight
Ch. 25 Longitudinal Maneuvering Stability Flight Test Methods
Ch. 26 Longitudinal Control and Trim Theory & Test Methods
Longitudinal Maneuvering Stability Flight
Ch. 27 Methods for Improving Longitudinal Stability and Control
Ch. 28 Lateral-Directional Stability Theory & Methods
Longitudinal Control and Trim Flight
Ch. 29 Dynamic Lateral-Directional Stability Theory and Methods
Ch. 30 Lateral Control Power (Rolling Performance)
Ch. 31 Directional Control
Ch. 32 Flying Qualities
Lateral-Directional Stability Flight
Ch. 33 Stall Characteristics
Ch. 34 Spin Testing
Ch. 35 Dive Testing for Flutter, Vibration and Buffeting
Stall Characteristics Flight

Flight hours
PA32: 6 hours (5 students/sortie)
FTE 5703
AIRPLANE AVIONICS
FLIGHT TEST ENGINEERING

TUITION: $3,723 | LAB FEE: $600

Syllabus
Ch. 1  What is Avionics Flight Test
Ch. 2  Time, Space, Position Information
Ch. 3  MIL-STD-1553 and Digital Data Buses
Ch. 4  Communications Flight Test
Ch. 5  Navigation Systems

Comm and Nav Systems Flight
Ch. 6.4-6.8 Part 23/25 Avionics Civil Certifications

Collins Aerospace Tour and Lab
Ch. 6.9  Cockpit Control and Displays Evaluations

Embraer Cockpit Evaluations
Ch. 6.10  Weather RADAR Certification
Ch. 6.13  Proximity Warning Systems
Ch. 6.14  Terrain Awareness and Warning Systems
Ch. 6.16  Landing Systems
Ch. 6.17  Flight Management Systems

Wx Radar, Proximity Warning, Landing, FMS Flight
Avionics Project Description

Avionics Project Flight

Flight hours
PA31: 3 hours (5 students/sortie)

Catalog Description:
Examines flight test engineering techniques to determine airplane performance. Includes flight labs for data collection. Presents data analysis and interpretation methods, and uses airplane performance theory to develop the equations necessary to reduce flight test data taken at altitude to sea level. Covers both propeller and jet aircraft.

FTE 5704
HELIICOPTER FLIGHT TEST

TUITION: $3,723 | LAB FEE: $600

Syllabus
Course Introduction, Short History of Rotary Wing Flight
Helicopter Aerodynamics
Helicopter Stability and Control
Auto Rotation and other Unique Helicopter Characteristics
Introduction to Rotary Wing Flight Testing
Helicopter Engines, Helicopter Engine Assessment
Propeller and Rotary Theory
Hover Performance Theory and Flight Test Methods

Hover Performance Flight Demo in Robinson R44
Airspeed Calibration Theory and Methods
Vertical Climb Performance Theory and Flight Test Methods
Forward Flight Performance Theory and Flight Test Methods

Forward Flight Performance Demo in Robinson R44
Forward Flight Climb and Descent Performance Theory and Flight Test Methods

Flight hours
R44: 2 hours (3 students/sortie)

Catalog Description: Examines flight test engineering techniques to determine helicopter performance. Includes flight labs for data collection. Presents theory and methods for measuring hover, climb and level-flight performance. Addresses differences between airplane and helicopter flight testing.
FTE 5705
WEAPON SYSTEMS
FLIGHT TEST

TUITION: $3,723

Syllabus
Ch. 7  Electro-optical and Infrared Systems
Ch. 8  Radio Detection and Ranging - RADAR
Ch. 9  Electronic Warfare
Ch. 10  Air-to-Air/Air-to-Ground Weapons Integration
Ch. 11  A Typical Avionics Integration Flight Test Program
Ch. 12  Unmanned Aerial Vehicles (UAV)
Ch. 13  Night Vision Imaging Systems (NVIS) and Helmet Mounted Displays (HMD)
Ch. 14  Acquisition, Test Management, and Operational Test and Evaluation

Flight hours
Lecture only: No labs or flights.

CATALOG DESCRIPTION: Examines flight test engineering techniques to evaluate aircraft weapon systems. Presents theory and methods for testing electro-optic, infrared, radar and electronic warfare systems. Covers weapons integration, night vision imaging systems and helmet-mounted displays.
FTE 5706
PROPULSION TESTING

TUITION: $3,723  |  LAB FEE: $600

Syllabus
- Normally-Aspirated Reciprocating (Piston) Engines Theory
- Normally-Aspirated Reciprocating (Piston) Engines Ground Lab
- Normally-Aspirated Reciprocating (Piston) Engines Flight
- Turbojet Engines Theory
- Turbojet Engines Ground Lab
- Turbojet Engines with Afterburner Ground Lab at Larsen Motorsports
- Turbocharged Reciprocating (Piston) Engines Theory
- Turbocharged Reciprocating (Piston) Engines Flight
- Student Project Preparation
- Student Project Ground Tests
- Student Project Flight Tests
- Turbofan Engines Theory
- Turbine-Powered Engines (Turboprop and Turboshaft) Theory

Flight hours
- PA31: 2 hours (5 students/sortie)
- PA32: 2 hours (5 students/sortie)

CATALOG DESCRIPTION: Examines ground and flight testing techniques to evaluate propulsion systems. Includes labs for data collection. Presents theory and methods for testing reciprocating and jet engines. Covers uninstalled and installed tests to determine thrust and power.
FTE 5711
AIRPLANE PERFORMANCE
FLIGHT TEST CONDUCT

TUITION: $3,723 | LAB FEE: $140,000

Syllabus

Introduction to Conducting Performance Flight Tests

Instrumentation Familiarization Flights

Takeoff and Landing Tests
Steady Climb and Level Acceleration
One Engine Inoperative Climbs

Reciprocating Engine T/O, Climb, Level Acceleration, Landing Flights

Cruise and Engine Testing
In-Flight Restarts

Reciprocating Engine Cruise and Engine Flights

Jet Aircraft Testing

Jet Aircraft Performance Flights
Performance Project
Performance Project Flight

Flight hours
PA28: 5 hours
PA31: 3 hours
PA44: 5 hours
Piper J-4 Cub: 1 hour
L-39 jet: 3 hours
Falcon jet: 6 hours

CATALOG DESCRIPTION: Prepares engineers to conduct performance flight tests in the air and in a control room. Flight labs involve test card creation, safety, execution, data analysis and reporting. Flights occur in a variety of aircraft including multiengine and jet aircraft.

Piper PA44 Seminole: multiengine, propeller aircraft. Cruise, climb, level-acceleration, one-engine inoperative climbs, in-flight restarts.

Piper PA28 Warrior: reciprocating engine t/o, climb, level acceleration, cruise, landing flights

Piper PA31 Navajo Chieftain: multiengine, turbocharged, propeller aircraft. Cruise, climb, level-acceleration, one-engine inoperative climbs, in-flight restarts.

Piper J-4: vintage aircraft demo with conventional (or tailwheel-type) landing gear

Dassault Falcon 20: Jet Aircraft Performance Flights

Aero L-39 Albatross: high-speed certification testing, air-to-air and air-to-ground missions, photo or safety chase.
FTE 5712
AIRPLANE STABILITY & CONTROL FLIGHT TEST CONDUCT

TUITION: $3,723 | LAB FEE: $140,000

Syllabus

Introduction to Conducting Stability and Control Flight Tests

Instrumentation Familiarization Flights
Flight Controls Characteristics
Longitudinal Handling Qualities
Longitudinal Maneuvering Stability
Longitudinal Handling Qualities Flights
Lateral-Directional Handling Qualities

Lat-Dir Handling Qualities Flights
Stalls, Spins, Vmca, Vmcg

Stalls and Spins Flights
Variable Stability Demo Flights
Stability and Control Project
Stability and Control Project Flights

Flight hours
PA28: 5 hours
PA31: 2 hours
PA44: 5 hours
Citabria: 1 hour
MB-339CB or T-33 jet: 2 hours
Falcon jet: 4 hours
Calspan VSS Lear: 4 hours

Catalog Description: Prepares engineers to conduct stability and control flight tests in the air and in a control room. Flight labs involve test card creation, safety, execution, data analysis, and reporting. Flights occur in a variety of aircraft including multiengine and jet aircraft. In addition to multiengine data, data for one engine inoperative will be analyzed.

Citabria: Stalls and Spins.

Variable Stability Learjet: longitudinal and lateral/directional handling qualities. High-order flight control systems

T-33: Longitudinal and Lateral/Directional Handling Qualities


Piper PA44 Seminole: Multiengine Longitudinal and Lateral/Directional Handling Qualities

Dassault Falcon 20: Jet Aircraft Multiengine Longitudinal and Lateral/Directional Handling Qualities

Piper PA28 Warrior: Longitudinal and Lateral/Directional Handling Qualities
The Melbourne Orlando International Airport (MLB), Florida Tech’s hometown airport and home to F.I.T. Aviation, is among the Top 10 Most Scenic Airport Landings of 2019 as ranked by PrivateFly.com. Ranking #1 in the United States and #4 in the world, voters cited MLB’s stunning vistas of the Atlantic Ocean, Indian River Lagoon, beautiful beaches and bridges, and potential to glimpse the Kennedy Space Center complex.
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» APPLICATION FEE: $50 for master’s programs

» EXAMS: Applicants to the FTE master’s program are encouraged to take the Graduate Record Examination (GRE); however, consideration can be given to candidates with extensive industry experience.

» TRANSCRIPTS: Transcripts from all postsecondary schools at which you’ve completed 12 or more semester credit hours and/or have received a degree are required. Final official transcripts will be required prior to enrollment.

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