

*NTPS*  
*National Test Pilot School*

**National Flight Test Institute**

# **Catalog**



**2012-2013**

**Master's Degree Programs**

**National Test Pilot School**  
***National Flight Test Institute***

Master of Science in Flight Test Engineering

Master of Science in Flight Test and Evaluation

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## The National Test Pilot School



Welcome to the National Test Pilot School (NTPS). Flight Test is a demanding and exacting field, and the preparation required to succeed in it is no less so. During your time studying here at NTPS, your patience, talents and skills – both academic and aeronautical – will be challenged as perhaps never before.

The National Test Pilot School was established in 1981 as an independent, non-profit educational institution dedicated to providing graduates who are ready to contribute to the field of Flight Test and Evaluation. By offering a wide range of training programs covering both military and civilian flight test, NTPS provides its students with unparalleled advantages. The school has operated continually since its inception and NTPS **does not** have any pending petitions in bankruptcy, is not operating as a debtor in possession, have filed a petition within the preceding five years, or has had a petition in bankruptcy filed against it within the preceding five years that resulted in reorganization under Chapter 11 of the United States Bankruptcy Code (11 U.S.C. Sec. 1101 et seq.).

### Course Calendar

This catalog outlines the guidelines, policies, procedures and course of study, which will govern your tenure here at the National Test Pilot School. The National Test Pilot School educational and training program consists of two primary phases: the Performance and Flying Qualities Phase, and the Systems Phase. The Performance and Flying Qualities Phase begins in July and the Systems Phase begins in January. The Professional Track may be started either in January (the ‘A’ Class) or July (the ‘B’ Class) of each year. Professional students start with a week’s introduction followed by T&E 4001 Introduction to Flight Test, and then they begin the academic modules of the applicable phase.

Academic Track students may register and enroll in an academic course module any time during the calendar year but it is recommended that they complete T&E 4001 Introduction to Flight Test, as soon as practical.

The accompanying table shows the typical flow of the program of instruction.

The National Test Pilot School reserves the right to adjust the course outline, schedule, aircraft, flight hours, and teaching materials as the situation warrants.

Course Calendar					
		A Class	B Class		
Jan	Systems Phase	1	General	Vacation	T&E 4001 / A Class Start
		2	General	Vacation	T&E 4001
		3	General	OT&E/TMC	T&E 4001 / 4002
		4	Systems	Systems	T&E 4201
		5	Systems	Systems	T&E 4201 / Flying Module
		6	Systems	Systems	T&E 4202
		7	Systems	Systems	T&E 4202 / Flying Module
		8	Systems	Systems	T&E 4203
		9	Systems	Systems	T&E 4213
		10	Systems	Systems	T&E 4213
		11	Systems	Systems	T&E 4208
		12	Systems	Systems	T&E 4208 / Flying Module
		13	Systems	Systems	T&E 4209
		14	Systems	Systems	T&E 4207/4207a
		15	Systems	Systems	T&E 4217
		16	Systems	Systems	T&E 4217
		17	Systems	Systems	T&E 4204/4204a
		18	Systems	Systems	T&E 4214
		19	Systems	Systems	T&E 4214
		20	Systems	Systems	T&E 4206
		21	Systems	Systems	T&E 4216
Jul	Performance and Flying Qualities	22	Field Trip	Final Project	
		23	Field Trip	Final Project	
		24	Reports	Final Project	'B' Class Graduation
		25	Vacation		
		26	Vacation	General	T&E 4001 / B Class Start
		27	Vacation	General	T&E 4001
		28	OT&E/TMC	General	T&E 4002/4001
		29	P&FQ	P&FQ	T&E 4101
		30	P&FQ	P&FQ	T&E 4101 / Flying Module
		31	P&FQ	P&FQ	T&E 4101 / Flying Module
		32	P&FQ	P&FQ	T&E 4102
33	P&FQ	P&FQ	T&E 4102 / Flying Module		
34	P&FQ	P&FQ	T&E 4102 / Flying Module		
35	P&FQ	P&FQ	T&E 4103		
36	P&FQ	P&FQ	T&E 4103 / Flying Module		
37	P&FQ	P&FQ	T&E 4103 / Flying Module		
38	P&FQ	P&FQ	T&E 4104		
39	P&FQ	P&FQ	T&E 4104 / Flying Module		
40	P&FQ	P&FQ	T&E 4104 / Flying Module		
41	P&FQ	P&FQ	T&E 4104 / Flying Module		
42	P&FQ	P&FQ	T&E 4105		
43	P&FQ	P&FQ	T&E 4105 / Flying Module		
44	P&FQ	P&FQ	T&E 4105 / Flying Module		
45	P&FQ	P&FQ	T&E 4004		
46	P&FQ	P&FQ	T&E 4106		
47	P&FQ	P&FQ	T&E 4106 / Flying Module		
48	P&FQ	P&FQ	T&E 4106 / Flying Module		
Dec		49	Final Project	Field Trip	
		50	Final Project	Field Trip	
		51	Final Project	Reports	'A' Class Graduates
		52		Vacation	

### ***Mission of the National Test Pilot School***

Our primary objective at NTPS is to educate and train to the highest-level Test Pilots and Flight Test Engineers. Upon successful completion of the program they, will be capable of participating immediately in either a military or civilian developmental, certification or acceptance flight test program. NTPS provides a unique educational program applicable to a diverse student population. Our students, drawn from the worldwide aerospace community, have achieved a high level of maturity as pilots, engineers and managers. NTPS is committed to the fundamental values of honesty, objectivity, integrity, respect for others, and the pursuit of truth and excellence.



To address the high level of technical and academic requirements of this unique field of applied aeronautics, NTPS has defined academic and professional goals in the area of Flight Test Engineering at the graduate level. These include:

- The development of insight in, and understanding of, the fundamental ideas and methods of applied mathematics, physical science, and engineering,
- The scientific application of this knowledge to solution of real-world problems,
- The advancement of aeronautical science,
- The development of skills in effective management, reporting and communication, and
- An enhanced awareness of the scope and responsibility of the Flight Test Professional's role in aircraft development and design, and his or her ultimate contribution to the airworthiness and mission capability of the air vehicle under development and test.

### ***Educational Objectives***

NTPS has established five educational objectives in keeping with its Mission. Within a few years after graduation, graduates will:

- Have the technical ability as well as the management and communications skills required to perform the tasks of a test pilot/flight test engineer
- Be aware of the roles and responsibilities of a test pilot/flight test engineer in the aircraft/system design and development process
- Be prepared to validate the airworthiness and mission capability of an air vehicle and/or system
- Be capable of managing a flight test project
- Advance the flight test and evaluation discipline through reports, professional papers, journal articles, and/or symposia presentations

### ***The National Flight Test Institute***

Within the NTPS organizational structure, the National Flight Test Institute (NFTI) fulfills the role of both Graduate School and Office of Sponsored Research. Through NFTI, NTPS awards Master of Science degrees in Flight Test Engineering and Flight Test and Evaluation, depending upon the academic preparation of the student.

The year-long Professional curriculum for Test Pilots and Flight Test Engineers (fixed or rotary wing) emphasizes development of both technical and managerial skills, producing graduates capable of leading, supporting and managing a wide variety of aircraft flight test programs. NTPS teaches both Mil-Spec acceptance for military aircraft and FAR/JAR civilian aircraft certification. In addition, numerous non-credit short-courses are offered, covering a wide spectrum from FAA aircraft certification to night vision goggles testing and avionics systems integration.

Many aerospace companies, military services and government agencies from around the world send their best and brightest to NTPS. We pride ourselves in the ability to offer a diverse training program that



can be targeted directly at the specific needs of an organization and its test and evaluation program requirements.

NTPS is designed for the real world of Flight Test, with an internationally recognized team of Test Pilot and Flight Test Engineer instructors, housed in a state-of-the-art facility equipped with cutting edge equipment including a large fleet of aircraft ranging from gliders and helicopters to supersonic jet fighters.

### ***Graduate Programs at the National Test Pilot School***

Graduate programs at the National Test Pilot School are offered through the National Flight Test Institute. NFTI offers two graduate programs leading to either the Master of Science in Flight Test Engineering or the Master of Science in Flight Test and Evaluation, depending upon the student's undergraduate preparation. A Professional track trains test pilots and flight test engineers with an intensive year-long integrated mix of academic subjects, and flying and laboratory exercises. An academic track enables students to take a number of prescribed and elective courses from within the professional curriculum and upon completion of a satisfactory project report, be awarded the Master of Science degree. Courses are offered throughout the calendar year in modular format. Each course is of one week duration (five days) with eight hour-long lecture periods each day and addresses a specific topic pertinent to flight test and evaluation, such as Flying Qualities Flight Testing or Modern Flight Controls. Professional and Academic track students attend the same classes. Graduation from either program enables students to be employed immediately as Test Pilots or Flight Test Engineers either with air crew duties or in flight test support functions, as appropriate. Because NTPS provides a large continuing education program to the worldwide aerospace community, ample opportunity exists for students to interact with practitioners in the field.

The National Test Pilot School is approved by the Bureau of Immigration and Customs Enforcement to provide training to foreign nationals.

### ***Authorization and Accreditation***

The National Test Pilot School is authorized to award Masters Degrees by the California Bureau of Private Postsecondary Education (BPPE) and is in compliance with BPPE rules, regulations, and policies. The Master of Science in Flight Test Engineering degree is accredited by the Engineering Accreditation Commission of ABET, Inc.

NTPS is a private institution approved to operate in the State of California by the Bureau for Private Post-Secondary Education. Any questions a student may have regarding this catalog that have not been satisfactorily answered by the institution may be directed to the Bureau for Private Post-Secondary Education at 2535 Capitol Oaks Drive, Suite 400, Sacramento, CA 95833, [www.bppe.ca.gov](http://www.bppe.ca.gov), toll free telephone number (888) 370-7589 or by fax (916) 263-1897.

As a prospective student, you are encouraged to review this catalog prior to signing an enrollment agreement. You are also encouraged to review the School Performance Fact Sheet, which must be provided to you prior to signing an enrollment agreement.

A student or any member of the public may file a complaint about this institution with the Bureau for Private Post-Secondary Education by calling (888) 370-7589 toll-free or by completing a complaint form, which can be obtained on the bureau's internet website [www.bppe.ca.gov](http://www.bppe.ca.gov).

## **Facilities and Equipment**

Producing world-class Flight Test graduates requires world-class facilities. The NTPS campus is located at 1030 Flight Line Bldg. 72, Mojave, CA at the Mojave Civilian Flight Test Center, a Southern California airport established to accommodate the specialized needs of flight test activities. Mojave has unique facilities, airspace and climate.

The center of NTPS' training complex is a modern 18,000 square-foot classroom and laboratory building, which adjoins a 24,000 square-foot hangar. Three additional hangars, each approximately 20,000 square feet, are utilized for aircraft maintenance and storage. The building contains seven large classrooms, accommodating up to 100 students, a night vision technology lab, a high-tech data telemetry station, a data reduction lab, video lab, library and a life support equipment lab. There are two student/faculty lounges, a racquetball court, showers and locker rooms. The Professional Course classrooms are equipped with individual data ports so that students may utilize the school's computer intranet and the world wide web. The NTPS campus was specifically designed for conducting flight test training, and was officially dedicated in a special ceremony in October, 1988.



### *Library Resources*

The NTPS library maintains a select collection of reference textbooks, flight test reports, aircraft flight manuals and video training materials. NTPS' diverse student population comes from many locations around the globe, and many students will come and go between learning sessions in residence at NTPS, often with much of their capstone project research being performed from their home place of employment or duty station. To accommodate the research needs of this culturally and geographically diverse group, NTPS focuses on providing state-of-the-art online resources and a web-based virtual library. An on-staff Information Technologist provides the training and consultation services necessary for all students to avail themselves of this world-wide accessible library.



### *Laboratories, Systems and Training Aids*

NTPS provides its students with access to the latest in equipment needed to train them for the high-tech world of modern Flight Test. Here are some brief highlights of this equipment:

- **Simulators:** NTPS owns a number of flight and systems simulators that allow students to explore various conditions and environments that would otherwise be too expensive or dangerous to experience in a real aircraft. Included is a Variable Stability Simulator which can mimic the real-world characteristics of an experimental aircraft. NTPS also has contractual arrangements for students to visit other organizations' flight simulator centers for additional training and experience.



- **NVG Lab:** The ability to see in the dark is the focus of much cutting-edge aviation developments, and our Night Vision Goggles lab allows the students a sampling of how such systems operate, their limitations, and what they can expect when flight testing such systems in harsh environments. Experiences learned in the lab are then applied in our NVG-equipped rotary and fixed-wing aircraft.
- **Camber Radar:** NTPS has contracted with Camber Corp to provide a RADAR simulation program. The RADAR Simulation is a complex, real-world energy level model of the interaction of the emitted radio transmission and the simulated environment. The component based design provides ease of use and allows a user familiar with RADAR systems to quickly prototype complex RADAR systems and modes which include ground, weather, aircraft, ships and ground vehicle returns. Camber Corp is recognized worldwide as an industry leader in sensor simulation.
- **Forward Looking Infrared:** FLIR is used both in the military and civilian operations, and the technology is always changing and improving. Our FLIR courses train tomorrow's flight test personnel to test this growing technology.
- **Ejection Seat training module and Life Support Equipment lab:** NTPS stresses safety first and foremost, utilizing a number of training aids to acquaint the students with the use of life support equipment and aircraft emergency egress systems.
- **Telemetry:** Much of the data acquisition during flight test is recorded remotely via telemetry. In order to provide a real-life flight test environment for our students, NTPS has assembled a telemetry ground station using state-of-the art equipment. Additionally, a telemetry van can be specially fitted to conduct ground support operations of various student flight test projects.

Because NTPS provides a high quality-testing environment, various aircraft systems such as radar, electronic displays, FLIR and threat and warning systems are frequently provided to NTPS by their manufacturers for student evaluation and training. Access to resources can be requested by the student.



### *Aircraft Resources*

NTPS operates a diverse fleet of over 40 training aircraft and instrumented flying laboratories. These aircraft are representative of worldwide aviation and were specifically selected to demonstrate a broad range of flying qualities and performance capabilities. Several models are unique in terms of their utility as flight test teaching aids, and some aircraft of foreign manufacture feature design philosophies not commonly found in US-designed aircraft. Additionally, a number of NTPS aircraft have been modified and instrumented to duplicate and demonstrate unusual and abnormal flying qualities that the students may encounter during actual flight test.

The NTPS fleet includes the following aircraft:

- Helicopters: we operated a variety of piston- and turbine-powered military and civilian rotary-winged aircraft, and a UH-1N specifically equipped for FLIR and NVG flight test. NTPS operates OH-58C helicopters that are also equipped with flight test instrumentation.
- Fairchild SA226 Merlin and Saberliner NA-265: These aircraft have extensive instrumentation systems fitted in them, along with several data stations onboard, so that students may participate in the gathering of real-life data through a range of flight profiles.



- AerMacchi MB326 Impalas: Our fleet of these Italian-designed jet trainers introduces the students into the fast-paced world of high-performance jet aircraft. These aircraft are ideal for demonstrating unusual and abnormal flight situations, such as spins and upset attitude conditions, and how to cope with such during a test flight. Also, several of the Impalas have been modified with special systems for additional training utility.
- SAAB SK-35 Drakens: The SK-35 Draken is a European supersonic fighter jet, and provides an ideal platform for training in the high-speed fighter environment. Capable of carrying a number of different weapons and systems payloads.
- Special Aircraft: In order accommodate various student projects; NTPS also has arrangements to lease a variety of specialty aircraft, including a number of active and retired military models. NTPS/NFTI students also travel off-site to utilize some of these aircraft in a real-world flight test environment.
- General Aviation Aircraft: NTPS operates a large fleet of general aviation aircraft.



### **Student Services**

#### *Course and Supporting Materials*

Full-time Master's Degree students are provided with all training notes and course material. For professional track students, NTPS covers all travel expenses undertaken as a part of the course, all fees for external training facilities and assets used by NTPS during the course, and transportation from and to Los Angeles International Airport at the beginning and end of the course.

#### *Visa and Immigration Services*

For students attending from countries other than the United States, the student or sponsoring agency is responsible for complying with any legislation or regulations of the United States or any other country governing entry into the United States.

NTPS provides assistance in immigration documentation, including government I20 forms. Additionally, NTPS provides liaison services with the United States Department of State with regards to obtaining authorization for students to engage in defense-related training.

The coursework specified may include project-related visits to countries other than the United States. Students are responsible for obtaining all necessary travel documentation for official course travel.

### ***Student Housing***

The National Test Pilot School is located at an active airport, and thus no on-campus housing is available. Typically, the students' sponsoring agencies provide housing as a condition of the students' employment. The near-by towns of Tehachapi, Rosamond, California City, Lancaster and Palmdale all offer a full range of housing opportunities and amenities for students who wish to avail themselves of them. All Academic Track students are responsible for their own accommodations while attending classes at the National Test Pilot School.

## **Academic Regulations and Procedures**

### ***Admission***

The unique nature of flight test and evaluation requires specialized knowledge embracing engineering, physical science, technical management, and human factors. Thus a strong technical background and superior engineering and science skills are mandatory to ensure success in the thorough, demanding, and specialized course of instruction at NTPS.

There are two ways to gain admission to NFTI, depending upon the program desired. Professional Course students are normally nominated by their sponsoring organization, which initially affirms that the student meets NTPS prerequisites. NTPS admits students to the Professional Course conditionally upon recommendation of the sponsoring organization, pending receipt and evaluation of university transcripts. Professional course students who elect to pursue a master's degree through NFTI must have an undergraduate technical degree or its equivalent, and for pilots, appropriate licenses and ratings and approximately 750 hours of operational flying time. Pilots and flight test engineers must be certified by an appropriate aviation authority as medically fit for flying duties. Academic Course students make application as individuals. The cost of the Professional Course precludes individuals from applying. Regardless of the track chosen, all students must meet minimum prerequisites. Enrollment is limited and applications are accepted in order of receipt. For students' protection in case of course cancellation, pre-registration is required.

English is the recognized language of the International Civil Aviation Organization (ICAO) and NTPS expects all incoming students to meet the ICAO requirements for speaking, reading, and understanding the English language. All applicants whose native language is not English, or who were educated at schools where English is not the language of instruction in all disciplines, must submit evidence of English language proficiency. Evidence consists of an official test report for the Test of English as a Foreign Language (TOEFL) submitted directly to NTPS from the testing agency. English is the only language that is used for instruction at NTPS.

All Academic track admissions are granted on a competitive basis, and criteria based on an undergraduate minimum grade point average can be misleading. Each applicant is considered individually and criteria may include scholastic ability, maturity, demonstrated accomplishment, statement of purpose, and capacity for growth.

Applicants must possess an earned Bachelor of Science or equivalent degree in an engineering discipline, mathematics, physical science, or technical management. Ideally, U.S. applicants should have earned a minimum overall cumulative grade point average (CGPA) of 2.50 on a 4.00 scale and a minimum CGPA of 3.00 in discipline in their junior and senior years. A master's degree from an accredited institution may satisfy this requirement. Students with other academic degrees will be considered on a case-by-case basis and may be provisionally admitted provided mathematics training through Differential Equations is demonstrated. Advancement to full graduate status is automatically gained after satisfactory completion of 12 credits at NFTI.

### ***Registration***

Academic Track students are required to register for each course module. Tuition and fee payments are due and payable at the NTPS Business Office prior to the start of instruction. Because of the intensive continuous block instructional format, late registration is not permitted.

### ***Transfer and Experiential Learning Credit***

Transfer credit is applicable to Academic track students only. A maximum of six credit hours or units (nine quarter credits) of transfer credit may be applied towards the Master of Science degree. Transfer credit will be granted if the following conditions are met:

1. Official transcripts from institutions where credit was earned were received directly from the institutions.
2. The courses were completed with a minimum grade of B or equivalent.
3. The courses were completed within the five-year period immediately preceding the date the Application for Admission was received by the National Flight Test Institute at NTPS.
4. No academic credit is awarded for experiential learning.

This Institution has not entered into an articulation or transfer agreement with any other college or university.

### ***Student Responsibilities***

Students are responsible for being fully aware of and informed about all procedures and regulations pertaining to their participation in the National Test Pilot School's educational programs. This information can be found in the NTPS catalog, periodic notices published by NTPS, and for Professional Track (flight) students, in the Federal Aviation Regulations, posted Operational Notes, and the NTPS Master Briefing Guide. Lack of awareness of regulations, standards and procedures is not sufficient reason for waiving any applicable rule.

### ***Attendance***

Students are expected to attend all classes, oral presentations, and when relevant, pre- and post-flight briefings, and Technical and Safety Review Boards unless excused for reasons of illness.

### ***Academic Advising***

Academic and Professional Track students' academic advisor is the Director of the National Flight Test Institute. In addition, each course module at NTPS has an assigned staff member who is responsible for its overall conduct and is available to advise and counsel students regarding course particulars. Students are free to call on these advisors whenever assistance or discussion is needed.

### ***Schedule of Classes***

A schedule of courses is published each calendar year by NTPS. NTPS reserves the right to make necessary and appropriate adjustments to the published schedule to include cancellation or rescheduling of any course module.

### ***Continuous Enrollment of Academic Course Students***

Students are not considered to be continuously enrolled if they:

1. Fail to enroll in at least one course module at NFTI in any one calendar year period.
2. Do not complete a NFTI master's degree within five years from their initial enrollment.

### ***Leaves of Absence***

Students enrolled in the Academic Track perform their coursework in modules, which can be scheduled according to the student's particular needs. Leaves of Absence are not granted for the interruption of modules (see *Withdrawing from a Course* for more details).

The Professional track incorporates sequential, consecutive coursework, and any interruption of study presents a serious problem with continuity of instruction. Thus, leaves of absence are not granted, except in extreme circumstances, and on a case-by-case basis.

### ***Academic Integrity***

The National Test Pilot School has a strong commitment to maintaining and upholding intellectual integrity. The National Test Pilot School operates under an honor system, which states that no employee or student will lie, cheat, or steal nor tolerate those who do during the conduct of school activities. NTPS considers activities such as plagiarism, unauthorized procurement of exams, trading or otherwise dealing with exams or exam questions and/or answers and written reports to be a serious breach of ethical conduct and its honor system. A student is subject to expulsion for any unethical conduct or willful conduct contrary to the code of behavior established at NTPS and the general welfare of the student body.

A charge of unethical conduct is an extremely serious matter and shall be detailed in writing to the President and shall be signed by the person(s) making the charge. If the President deems that there is sufficient evidence to warrant an investigation of any charge formally presented in accordance with the above, he will then notify the President. The President shall appoint an Investigating Board consisting of five members, comprised of three faculty members, one student, and the President who shall coordinate the investigation and act as Chairman of the Investigating Board.

The accused student shall be furnished with a copy of the charge and shall be given ample opportunity to refute the charge either in person or by counsel before the Board of Investigation at a hearing called by the Board.

All members of the Board shall be present at any hearing pertaining to unethical conduct and a unanimous vote of the Investigating Board shall be required for expulsion. In the absence of a unanimous vote of the Investigating Board, the charge shall be dismissed.

### ***Academic Freedom***

NTPS actively promotes a policy of academic freedom. Instructors are encouraged to present a variety of perspectives on their subjects, particularly from the vantage point of their individual experience, education, and reflection, whatever that may be, insofar as they believe it to promote understanding of the subject.

To encourage wide ranging viewpoints, it is NTPS general policy to assign instructors to teach a range of subtopics within their general area of expertise on a rotational basis so that a varied approach to any given subject area is assured.

Students are encouraged to question, challenge, and respond. Faculty and students are free to examine all pertinent data, question ideas and concepts, and to be guided by evidence.

### ***Academic Standards and Grading System***

Academic and Professional Track students attend the same academic course modules. NTPS operates on a quarter credit system. Professional Track students participate in the follow-on flying modules and Academic Track students utilize that time for preparation of their Capstone project report (T&E 4003). Written examinations are graded on a numerical scale for all students. All other assignments such as graded flights, oral, and written reports are assigned a descriptive grade. Flying modules are an essential adjunct to the academic modules for Professional Track students but no separate academic credit is assigned to them. Demonstration and practice exercises are not graded. Not all assignments for Professional Track students are of equal scope; therefore weighting factors are assigned to specific assignments, and are used in calculating student's final grade. A final overall grade is determined for class standing.

A student who fails to attain an exam grade of at least 70 on assignments is placed on probation. Probation requires a repeat of the examination or assignment after remedial training or study. A second failure to achieve the minimum standard may result in dismissal at the discretion of the NTPS Director.

<b>NTPS/NFTI Grading System</b>		
<i>Letter Grade</i>	<i>Numerical Equivalent</i>	<i>Meaning</i>
<b>Grade</b>		
A	95 - 100	Nearly perfect in all aspects; little room for improvement
A-	90 - 94	A few errors; some areas could be improved
B+	85 - 89	Accomplishes the task with few errors or omissions; covers all important and critical tasks or items
B	75 - 84	An satisfactory grade with normal performance during flight or reporting
B-	70 - 74	Marginal performance; meets the minimum criteria
Unsatisfactory (U)	<70	Clearly fails in one or more aspects; requires remedial training; probationary status
Incomplete (I)		Passing but incomplete
In Progress (IP) (T&E 4003 and 4220 only)		Satisfactory progress is being made
Pass (P)		Passing grade (credit)
Withdrawal (W)		Withdrawal passing from a course
Withdrawal Failing (WF)		Withdraw from NFTI – Failing

### ***Capstone Project and Report***

Academic Track students in good standing must enroll in T&E 4003, Capstone Project and Report, in the calendar year in which they anticipate submitting their report. Should they be unable to complete their report in that year, a grade of IP (In Progress) will be assigned but they will be required to re-enroll in T&E 4003 in any subsequent year in which they submit their report. Upon submission of a satisfactory report, a grade will be awarded in place of IP. Academic Track students have the option of arranging for use of NTPS assets or submitting a report based on a work related project with the approval of their academic advisor and their employer. In either case the project must represent original work done without collaboration. The student will design a plan of action, execute that plan, collect and analyze data, and produce final reports, both oral and written. Students who have enrolled in T&E 4003 but who do not submit a satisfactory report within five years after initial enrollment at NFTI will be considered withdrawn from NFTI and receive a grade of W (Withdrawal).

### ***Withdrawing from a Course***

Students receive a grade of W if they withdraw from a course before the close of business on Wednesday of the week in which the course module is presented. Withdrawal after Wednesday will result in a WF grade.

### ***Incomplete Grades***

Incomplete grades are temporary grades assigned when extenuating circumstances prevent a student from completing a course. If a student does not complete the course within a time period mutually agreed to with the course advisor, the grade of I automatically converts to WF.

### ***Graduation Requirements***

Students will graduate with the degree of Master of Science after completing the curriculum requirements in effect at the time of their first enrollment as published in the NTPS catalog or, at their option, current published requirements. Completion of the entire prescribed curriculum is mandatory, including completion of all course work, and where applicable, flight and project assignments, reports, and final capstone (or unknown aircraft) project report. An average grade of B is required for graduation. Students will not be awarded a degree until all debts and obligations owed NTPS have been satisfied and the student is in good standing in accordance with NTPS policies and regulations.

### ***Degree Completion Time Limit (Academic Track)***

All requirements for a NPTI master's degree must be completed within five years from the date of initial enrollment.

### ***Student Records***

The National Test Pilot School respects the rights and privacy of students in accordance with the Family Rights and Privacy Act (FERPA).

Upon graduation, students are provided with a transcript of their academic records. The original records are permanently archived by NTPS, and additional transcripts may be requested from the NTPS Admissions Office by authorized persons.

### ***Non-Discrimination Policy***

The National Test Pilot School admits individuals of any sex, race, color, ancestry, religious creed, national origin\*, disability, medical condition, age, marital status, sexual orientation to all the rights, privileges, programs and activities generally accorded or made available to students at the school. NTPS also accommodate persons with disabilities. Please call the National Test Pilot School office to discuss your particular needs. Professional Track students who are engaged in flight activities, however, must be medically qualified by the appropriate authority in their home country or the FAA.

### ***Policy on Sexual Harassment and Student Grievances***

The National Test Pilot School has a zero-tolerance policy regarding sexual harassment and/or assault. Any employee or student found guilty of such unacceptable behavior is subject to dismissal. The State of California defines sexual harassment as unwanted sexual advances, or visual, verbal or physical conduct of a sexual nature. This definition includes many forms of offensive behavior and includes gender-based harassment of a person of the same sex as the harasser.

- Any occurrence of sexual harassment should be made known to the NTPS administration, i.e., the Deputy Director, who will:
- Fully inform the complainant of his/her rights and any obligation to secure those rights.
- Conduct a full and effective investigation that is immediate, thorough, objective, and complete. All those with information on the matter will be interviewed.
- Make a determination and communicate the results to the complainant, to the alleged harasser, and all others concerned, as appropriate.
- If the allegations are proven, initiate prompt and effective remedial action against the harasser and communicate this action to the complainant.
- Take steps to prevent further harassment and take appropriate action promptly to remedy the complainant's loss, if any.
- A copy of California pamphlet DFEH-185 is posted on the staff bulletin board. New students/staff are required to familiarize themselves with this policy as part of their incoming indoctrination and to the seriousness of violations of this sexual harassment policy. The above procedures also apply to any student grievance.

NTPS will use the procedures outlined in the Complaint and Grievance Procedures (available upon request) to respond to behavior which goes against the values of NTPS's community as defined in this statement. NTPS considers the procedures for resolving disputes a part of its educational mission and is committed to a process which provides both peer review and mediation. All complaints and grievances will be addressed through a formal statement; persons who have questions about the Statement should contact the Course Coordinator (CC). Resolution and appeal processes are administrative functions and are not subject to the same rules of civil or criminal proceedings. Because some violations of these standards are also violations of law, students may be accountable to both the legal system and NTPS.

A student or any member of the public may file a complaint about this institution with the Bureau for Private Post-Secondary Education by calling (888) 370-7589 toll free or by completing a complaint form, which can be obtained on the bureau's internet web site [www.bppe.ca.gov](http://www.bppe.ca.gov).

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\*Some foreign nationals require US Department of State approval to attend the National Test Pilot School.

## Financial Information

### *NTPS/NFTI Academic Track Expenses*

The National Flight Test Institute is committed to providing a superb educational experience at a reasonable cost. For more detailed information about tuition and fees, contact the Business Office at 661/824-2977.

Tuition for the current academic year is posted on the NTPS website (<http://www.ntps.edu/HTML/Schedule/>). Bills for tuition are issued when a student registers and are payable on the first day of class. There are no incidental fees at NTPS but, if a student employs NTPS assets such as aircraft or simulators during his or her project research, the use of those assets and any fees for such use will be negotiated on an individual basis. All fees are payable in U.S. dollars. If a loan is obtained, the student will have to repay the full amount of the loan plus interest, less then amount of any refund and that, if the student receives federal student financial aid funds, the student is entitled to a refund of the money not paid from the federal financial aid funds. If you, the student, default on a federal or state loan, both the following may occur: (1) The federal or state government or a loan guarantee agency may take action against the student, including garnishing an income tax refund; and (2) The student may not be eligible for any other government financial assistance at another institution until the loan is repaid. The National Test Pilot School is not a Title IV university and therefore cannot participate in federal or state financial aid programs.

<b>Core Academic Modules</b>	<b>Cost</b>
T&E 4001 Professional Long Course Introduction (spread over three weeks)	\$2,025
T&E 4002 Test Management/Operational Test and Evaluation	\$2,025
T&E 4003 Capstone Project (excluding aircraft expenses)	\$2,025
<b>Systems Modules</b>	<b>Cost</b>
T&E 4201 Intro to Avionics and Weapons Systems Flight Testing	\$2,025
T&E 4201A Workload Demonstration Flight Lab (1 flight)	\$1,500
T&E 4201B Workload Data Flight Exercise (1 flight)	\$3,000
T&E 4202 Communication, Navigation and GPS Flight Testing	\$2,025
T&E 4202A Radio Aids to Navigation and GPS Demo Flight Lab (1 flight)	\$1,500
T&E 4202B Navigation, GPS and INS Flight Exercises (3 flight)	\$3,000
T&E 4203 CFR 14 Part 23/25/27/29 Avionics Certifications	\$2,025
T&E 4203A Civil Certification Project (6 Hours Sim + Travel)	\$8,500
T&E 4208 Night Vision Imaging System Evaluation Technique*	\$2,800
T&E 4208A Night Vision Imaging System Flight Demonstration Lab*	\$1,500
T&E 4208B Night Vision Imaging System Flight and Laboratory Evaluation*	\$2,300 (eng)/\$5,000(pilot)
T&E 4207 Electro-Optic and Infrared Systems Flight Testing*	\$2,025
T&E 4207A FLIR Demo Flight Lab ( 1 flight)*	\$3,100
T&E 4207B FLIR / EO Systems Evaluation Flight Exercise (3 flights)*	\$12,000
T&E 4204 Flight Test of RADAR and Electric Warfare Systems*	\$2,025
T&E 4204A RADAR Demo Flight Lab (1 flight)*	\$3,000
T&E 4204B RADAR Evaluation Flight Exercise (1 flight)*	\$3,000
T&E 4205 UAV Avionics Systems Flight Testing*	\$7,500
T&E 4206 Air-to-Air and Air-to-Ground Weapons Integration*	\$3,400
T&E 4206A Real-time analysis of Weapons Accuracy, TM Exercise*	Included
T&E 4209 Helmet Mounted Display Test and Evaluation*	\$2,025
<b>Performance &amp; Flying Qualities Modules</b>	<b>Cost</b>
T&E 4101/4111 Performance Flight Testing I	\$2,025
T&E 4102/4112 Performance Flight Testing II	\$2,025
T&E 4103/4113 Flying Qualities Flight Testing I	\$2,025
T&E 4104/4114 Flying Qualities Flight Testing II	\$2,025
T&E 4105 Modern Flight Controls	\$2,025
T&E 4106 Loads & Flutter	\$2,025
T&E 4210 Civil Aircraft Icing Certification	\$1,000
T&E 4210A Icing Demo Flight	\$1,500

\* These modules are limited to US citizens or organizations approved by the US Department of State.

**THE MINIMUM CHARGE FOR THE ACADEMIC TRACK MASTER'S DEGREE IS \$34,700. UPON ENROLLMENT FOR ANY ACADEMIC MODULE THE FULL AMOUNT OF SAID MODULE IS DUE AND PAYABLE ON THE FIRST DAY OF CLASS.**

### *Refund/Cancellation Policy*

A full refund of registration fees will be available if requested in writing and received 10 working days before the start of the course. After that date refunds will be made, less the actual training/material costs incurred. Additionally, a 10% administrative fee

will also be charged. Fees can be applied in full for a later course. Student's rights are covered under the California Student Tuition Recovery Fund.

The National Test Pilot School reserves the rights to cancel any course and return all fees in the event of insufficient registration. The liability of the National Test Pilot School is limited to the registration fee. NTPS will not be responsible for any losses incurred by the registrants, including but not limited to airline cancellation charges or hotel deposits.

Students have the right to cancel the enrollment agreement and obtain a refund of charges paid through attendance at the first class session, or the seventh day after enrollment, whichever is later.

### **State of California Student Tuition Recovery Fund (STRF):**

The State of California created the Student Tuition Recovery Fund (STRF) to relieve or mitigate economic losses suffered by California residents who were students attending schools approved by, or registered to offer Short-term Career Training with the Bureau for Private Post-Secondary and Vocational Education (Bureau). You may be eligible for STRF if you are a California resident, prepaid tuition, paid the STRF fee and suffered an economic loss as a result of any of the following:

- The school closed before the course of instruction was completed.
- The school's failure to pay refunds or charges on behalf of a student to a third party for license fees or any other purpose, or to provide equipment or materials for which a charge was collected within 180 days before the closure of the school.
- The school's failure to pay or reimburse loan proceeds under a federally guaranteed student loan program as required by law or to pay or reimburse proceeds received by the school prior to closure in excess of tuition and other costs.
- The school's breach or anticipatory breach of the agreement for the course of instruction.
- There was a decline in the quality of the course instruction within 30 days before the school closed, or if the decline began earlier than 30 days prior to closure a time period of decline determined by the Bureau.
- The school committed fraud during the recruitment of enrollment of the program participation of the student.
- You may also be eligible for STRF if you were a student that was unable to collect a court judgment rendered against the school for violation of the Private Post-Secondary and Vocational Education Reform Act of 1989. You must pay the state-imposed fee for the Student Tuition Recovery Fund (STRF) if all of the following applies to you if:
  - 1) You are a student, who is a California resident and prepays all or part of your tuition either by cash, guaranteed student loans, or personal loans, and
  - 2) Your total charges are not paid by any third party payer such as an employer, government program or other payer unless you have a separate agreement to pay the third party.

You are not eligible for protection from the STRF and you are not required to pay the STF fee if either of the following applies:

- 1) You are not a California resident, and
- 2) Your total charges are paid by a third party, such as an employer, government program or other payer, and you have no separate agreement to repay the third party.

### ***NTPS/NFTI Professional Course Expenses***

Tuition is determined by contract for each student, and often varies due to the specific requirements specified by the sponsoring agency, including variations in the types of aircraft to be flown by the student. The tuition and all fees are detailed in the contract.

## **Masters Programs and Curricula**

The National Test Pilot School (NTPS), through its Graduate unit, the National Flight Test Institute (NFTI), offers two tracks leading to the degree of Master of Science in Flight Test Engineering (MSFTE) or Master of Science in Flight Test and Evaluation (MSFT&E). The degree title awarded depends upon the student's undergraduate preparation.

Within the degree programs, the Professional Track is reserved for those students additionally qualified for the NTPS flying program. Upon successful completion students will be awarded a Certificate of Graduation from NTPS attesting to their qualifications for flight test crew duties as a Test Pilot or Flight Test Engineer in addition to the appropriate MS degree. NFTI operates on a Quarter Credit hour system wherein a minimum of 10 clock hours of classroom instruction equals one quarter credit hour and 20 hours of laboratory and certain flight exercises, including preparation, data analysis, report writing and presentation equal 1 quarter credit hour. In-flight instruction and demonstrations do not receive academic credit. A maximum of 26 students can be accommodated in any instructional module, with a maximum of 20 Professional Track students. Should there be less than 20 Professional Track students enrolled, the shortfall may be filled by Academic Track students.

### Prerequisites

The prerequisites for enrollment in the Masters programs are a baccalaureate degree in engineering, physical or computer science, mathematics or technical management. Students presenting other undergraduate credentials will be evaluated on a case-by-case basis, but, in general, students with non-technical degrees are not admitted to the programs.

### Academic Track Curriculum

Academic track students undertake a prescribed curriculum of academic subjects but do not engage in test pilot or flight test engineer flight training. This program is ideally suited for students engaged in flight test support and management activities, aeronautical engineering, or acquisition. Students take a core curriculum and select one of two specialty tracks (P&FQ or Systems). Courses are offered in modules nominally of one week duration. Completion of a Capstone Project (T&E 4003), and depending upon their specialty, the Modeling and Simulation Project (T&E 4108) or a Systems module to include a flight exercise and report is required for all Academic Track students (minimum 3 credits). *Graduation from the Academic Track does not qualify a student as a test aircrew member.*

<b>Academic Track Curriculum</b>	
<i>Core</i>	<i>Quarter* Credits</i>
T&E 4001 – Introduction to Flight Test	3
T&E 4002 – Test Management	3
T&E 4003– Capstone Project and Report	3
<b>Required</b>	<b>9</b>
<b>Performance and Flying Qualities Specialty Modules</b>	
T&E 4101 or 4111 – Performance Flight Testing I	3
T&E 4102 or 4112 – Performance Flight testing II	3
T&E 4103 or 4113 – Flying Qualities Flight Testing I	3
T&E 4104 or 4114 – Flying Qualities Flight Testing II	3
T&E 4105 – Modern Flight Controls	3
T&E 4106 – Structures, Loads, Flutter and Vibration	3
T&E 4107 or 4115 Flight Test Laboratory or equivalent flight modules	3*
T&E 4210 – Civil Aircraft Icing Certification	2
Electives from Systems Specialty	18
<b>Minimum Performance and Flying Qualities Specialty</b>	<b>48</b>
<b>Systems Specialty Modules</b>	
T&E 4201/4201A,B – Introduction to Avionics and Weapons Flight Test	3/2
T&E 4202/4202A, B – Navigation, Communications, and GPS	3/3*
T&E 4203/4203A – Civil Avionics Systems Certification	3/4*
T&E 4204/4204A,B – RADAR and EW Systems	3/3*
T&E 4206/4206A – Weapons Integration	3/1
T&E 4207/4207A,B – Electro-optical and Infrared Systems Flight Test	3/5*
T&E 4208/4208A,B – Night Vision Imaging System Evaluation	3/2
T&E 4209 – Helmet Mounted Displays	3
Electives from Performance and Flying Qualities Track	0-12
<b>Minimum Systems Specialty</b>	<b>48</b>

\* When doing Performance Specialty the Flight Test Laboratory or equivalent must be taken for 3 credits. When doing Systems Specialty at least one Systems module must include the associated flight exercise and report requirement with a minimum of 3 credits.

### Professional Track Curriculum

Pilots and engineers who have the requisite academic background and who satisfactorily complete the year-long Professional Track, are eligible to receive the Master of Science degree. The Professional course of 50 weeks duration is for fixed and rotary wing pilots and engineers who require the full scope of flight test instruction. Graduates of this course are capable of performing first flight, envelope expansion, and engineering evaluations of performance, handling qualities and aircraft systems. Throughout the course of instruction, emphasis is given to flight test means of showing compliance with the Federal Airworthiness Regulations (FAR), the Joint Airworthiness Regulations (JAR) and Military Standard (MIL-STD) for piloted aircraft.

Unknown Aircraft Project (Capstone Project)

The culmination of the Professional Course is a final project. This project serves dual purposes: one, it is a comprehensive project that covers much of the material taught during the entire course, and two, it serves as the final engineering (Capstone) report for those students pursuing Master's degree. Unlike many of the prior elements of the curriculum, this project is always an individual event.

Teaming with other students is not permitted. Thus every student will have the opportunity to take an assignment, design a test plan, execute that plan, collect and analyze data, and finally produce final reports, both oral and written, as an individual effort. The aircraft chosen for the student is one with which the student is not familiar. Every effort is made to select an aircraft in keeping with the student's expected duties after graduation.

<b>Professional Track Curriculum</b>	
<i>Core</i>	<i>Quarter* Credits</i>
T&E 4001 – Introduction to Flight Test	3
T&E 4002 – Test Management	3
T&E 4003 – Capstone Project and Report	3
T&E 4101 or 4111 – Performance Flight Testing I	3
T&E 4102 or 4112 – Performance Flight testing II	3
T&E 4103 or 4113 – Flying Qualities Flight Testing I	3
T&E 4104 or 4114 – Flying Qualities Flight Testing II	3
T&E 4105 – Modern Flight Controls	3
T&E 4106 - Structures, Loads and Weapons Testing	3
T&E 4201– Introduction to Avionics and Weapons Flight Test	3
T&E 4202 – Navigation, Communications and GPS	3
T&E 4203 – Civil Avionics Systems Certification	3
T&E 4204 – RADAR and EW Systems	3
T&E 4206 – Weapons Integration	3
T&E 4207 – Electro-optic and Infrared Systems Flight Test	3
T&E 4208 – Night Vision Imaging System Evaluation Techniques	3
T&E 4209 - Helmet Mounted Displays	3
T&E 4210 Civil Aircraft Icing Certification	2
<b>Total</b>	<b>53</b>
*Systems modules include all associated labs and exercises	

<b>Typical Flight Time Breakdown</b>			
<b>Fixed-Wing Professional Track Students</b>			
Type Aircraft	Pilot (hrs)	Engineer (hrs)	
Jets	57.7	30.4	
Turboprop	17.2	17.2	
Light Aircraft	47.5	51.1	
Simulator	8.0	8.0	
Helicopters	3.3	2.2	
<b>Total</b>	<b>133.7</b>	<b>108.9</b>	
<b>Rotary-Wing Professional Track Students</b>			
Type Aircraft	Pilot (hrs)	Engineer (hrs)	
Helicopter (SE)	66.1	36.5	
Helicopter (ME)	23.9	19.4	
Fixed Wing (prop)	18.0	32.2	
Fixed Wing (jet)	14.4	9.4	
Simulator	7.0	7.0	
<b>Total</b>	<b>131.4</b>	<b>104.5</b>	

### ***Transfer Credit***

Academic Track students may transfer up to 9 Quarter (6 Semester) credits toward the Master of Science degree.

### **Notice Concerning Transferability of Credits and Credentials Earned at our Institution**

The transferability of credits you earn at NTPS is at the complete discretion of an institution to which you may seek to transfer. Acceptance of the MSFTE and the MSFT&E you earn in the graduate program is also at the complete discretion of the institution to which you may seek to transfer. If the credits or degree that you earn at NTPS are not accepted at the institution to which you seek to transfer, you may be required to repeat some or all of your coursework at that institution. For this reason you should make certain that your attendance at this institution will meet your educational goals. This may include contacting an institution to which you may seek to transfer after attending NTPS to determine if your credits or degree will transfer.

## Course Descriptions

### ***T&E 4001 Introduction to Flight Test***

A broad look at the factors involved in conducting a flight test program, including job functions, human factors, test planning, safety, data analysis and reporting. All of these elements are tied together when the student plans, conducts, and reports on a cockpit suitability evaluation performed on a real aircraft.

### ***T&E 4002 Test Management and Operational Test and Evaluation***

An overview of the testing conducted on various aircraft subsystems (hydraulic, electrical, environmental, brakes, pneumatic, etc.) as well as the procedures and regulatory requirements for noise test and icing tests. Special topics include: crew resource management, first flight procedures and aircraft agility.

### ***T&E 4003 Capstone Project***

Conduct systems or flight test engineering project under supervision of a faculty advisor (or a designated representative) and prepare an acceptable report. The project may be one that the student is working on and is responsible for in his/her professional career or it may be an independent project selected with approval of NTPS staff.

### ***T&E 4005 FAA Aircraft Certification Procedures***

Course has Elements of Introduction to Flight Test and Test Management and Operational Test and Evaluation with emphasis on FAA regulations and procedures for certification of civil aircraft. Course is open to FAA personnel only.

### ***T&E 4101 Performance Flight Testing I***

An intensive overview of the methods used to make performance evaluations of propeller driven aircraft. Emphasis is placed on subsonic aerodynamics, pitot-statics and reciprocating engine theory.

### ***T&E 4102 Performance Flight Testing II***

A continuation of the theory and flight test techniques employed during the performance evaluations of turbine and jet powered aircraft. An intensive overview of the methods used to make performance evaluations of propeller driven aircraft. Emphasis is placed on supersonic aerodynamics and turbine/jet engine theory. (Prerequisite: Successful completion of T&E 4101).

### ***T&E 4103 Flying Qualities Flight Testing I***

An in-depth review of the methods used to make static stability determinations of aircraft. Subjects include the regulatory requirements and flight test techniques involved to determine the longitudinal, lateral, directional, maneuvering, and flight path stability of single and multi-engine aircraft. Included is a discussion of mechanical flight control systems, Mach effects and roll performance.

### ***T&E 4104 Flying Qualities Flight Testing II***

An intensive overview of the methods used to make dynamic stability determinations of aircraft. Subjects include aircraft equations of motion, dynamics requirements and flight test techniques, coupling dynamics, closed-loop handling qualities and spins. Included is a brief review of matrices, axis transforms, differential equations, and Laplace transforms.

### ***T&E 4105 Modern Flight Controls***

An in-depth study of linear controls that includes the impact that controls and displays have upon flight control evaluations. Frequency domain testing, parameter identification and flight test instrumentation requirements are also covered. Course learning objectives are reinforced when the student completes a culminating project employing the use of a variable stability flight control simulator. (Prerequisite: Successful completion of T&E 4101.)

### ***T&E 4106 Loads & Flutter***

An analysis of vehicle structures, loads and flutter testing, taking the student from basic properties of materials through advanced instrumentation methods for determining flutter regions and divergence. Industry standards for determining loads limits and freedom from flutter are addressed as well as possible ways for obtaining required data in a limited amount of flight time. A study of the instrumentation installation on an Aeromacchi MB-326 Impala aircraft enhances the students' knowledge of the correct test methods for in-flight loads determination. Stores clearance may be considered an extension of aircraft loads and flutter testing. Unique stores load and flutter issues are examined as well as theory and methods for clearing stores for external carriage and separation/launch.

***T&E 4107 Airplane Performance and Flying Qualities Flight Laboratory***

An introductory flying laboratory designed to satisfy the requirement of engineers and flight test support personnel for practical experience in airplane performance, stability and control, handling qualities, flight test instrumentation data acquisition and analysis, and a working knowledge of FAA and Military Standard pertaining to piloted airplanes.

***T&E 4111 Helicopter Performance Flight Testing I***

An intensive overview of the analytical theory and procedures used to evaluate performance characteristics of helicopters. Emphasis is placed on subsonic aerodynamics, rotor blade aerodynamics, pitot-static system performance, hover performance, vertical climb performance and level flight performance.

***T&E 4112 Helicopter Performance Flight Testing II***

A continuation of the intensive overview of theory and flight-test techniques employed during the evaluation of helicopter performance characteristics. Emphasis is placed on turbo shaft engine performance, climb and descent performance, takeoff and landing performance, and the performance characteristics of multi-engine helicopters. (Prerequisite: T&E 4111)

***T&E 4113 Helicopter Flying Qualities Flight Testing I***

Helicopter equations of motion, static stability characteristics, and engine failure characteristics. Subjects include an introduction to mathematical analysis techniques, theory and flight test procedures to evaluate helicopter static stability characteristics, and engine failure characteristics evaluation procedures. Also included is a brief introduction to mechanical flight control systems and closed loop handling qualities.

***T&E 4114 Helicopter Flying Qualities Flight Testing II***

Theory and test procedures for evaluating helicopter dynamic stability, controllability, low speed flight characteristics, and ground handling. Subjects include analysis of helicopter dynamic motion, airworthiness certification requirements and flight test techniques for dynamic stability, low speed flight, automatic flight control systems, ground handling test methodology, and closed-loop handling qualities testing. (Prerequisite: T&E 4113)

***T&E 4115 Helicopter Performance and Flying Qualities Flight Laboratory***

An introductory flying laboratory designed to satisfy the requirement of engineers and flight test support personnel for practical experience in helicopter performance, stability and control, handling qualities, flight test instrumentation data acquisition and analysis, and a working knowledge of FAA and Military Standard pertaining to piloted helicopters.

***T&E 4201 Introduction to Avionics and Weapons Systems Flight Test***

This course provides the fundamental groundwork for all subsequent systems modules. Basic theory of operation of modern avionics systems are discussed and the methods of testing these systems are explained in detail. Types of Time, Space, Position Information systems (TSPI) and their relationship to flight test requirements are discussed. In addition, discussions cover the latest advancements in data acquisition, correlation, merging and analysis with an inclination towards true versus predicted performance.

***4201A Workload Demonstration Flight***

Students will apply their knowledge of evaluating aircrew workload by preparing flight test cards and conducting an airborne workload evaluation.

***4201B Workload Flight Exercise***

Flight test techniques for evaluating aircrew workload. Prepare flight test cards and conduct an airborne workload evaluation based on a tasking assignment. One flight. Pre-requisites: T & E 4201 and 4201A

***T&E 4202 Communications, Navigation and GPS Flight Testing***

Avionic communications and navigation systems, their modes of operation, and procedures for evaluating and testing the equipment. Antenna patterns, electromagnetic interference and compatibility testing. Basic navigation principles for non-aircrew are introduced.

***4202A Radio Aids to Navigation and GPS Demonstration***

The flight demonstration begins with a short tutorial on basic navigation and airmanship, stressing the importance of having reliable and accurate systems in the cockpit. Basic theory and operation of these systems is covered with a look at typical systems employed in today's aircraft. Proper test techniques are examined with relationship to these systems; Speech Intelligibility, antenna patterns, accuracy, EMI/EMC, CEP/CEA and integration with other avionics systems.

***4202B. Navigation, INS and GPS Flight Exercise***

Flight test techniques for evaluating communication and navigation systems. Prepare flight test cards and conduct an airborne flight evaluation based on a tasking assignment. One flight. Pre-requisites: T & E 4202 and 4202A.

***T&E 4203 14 CFR Part 23/25/27/29 Avionics Certifications***

Introduction to civil avionic systems. Analysis of cockpit controls and displays, including heads-up displays. Emphasis is placed on test procedures to ensure the integrity and correctness of data as well as human factors implications. Discussion of autopilots, Flight Management Systems, and warning and avoidance systems such as TCAS, TAWS, EGPWS, and EFIS.

***4203A Civil Certification Project***

Working as a group, students will accomplish a certification project on an unknown aircraft system in a simulator. Students will write a certification test plan, address safety considerations, and present an oral and written report upon completion of the exercise.

***T&E 4204 Flight Test of RADAR and Electronic Warfare Systems***

Designed to assist the student in the development and test of airborne RADAR systems, highlights of this course include hands-on operation of the Camber Corporation's RADAR Toolkit. This simulation is a complex, real-world, energy level model of the emitted radio transmissions and simulated environment. Students will see firsthand what the effect of changing RADAR parameters has on RADAR performance. Lectures cover the many types of functions of today's multi-mode RADARs and stresses the most correct, efficient way of demonstrating performance through flight test.

***4204A RADAR Demonstration Flight***

A demonstration of flight test techniques for evaluating an airborne ground-mapping RADAR.

***4204B RADAR System Evaluation Flight Exercise***

Students will prepare the flight test cards, develop the Test Hazard Analysis, conduct the mission, analyze the data, and present an oral and written report summarizing findings of their evaluation of a RADAR system.

***T&E 4206 Air-to-Air and Air-to-Ground Weapons Integration***

An overview and of Mil-Std-1760D, Interface Standard for Aircraft/Store Electrical Interconnection Systems as the baseline for Weapons Integration. Evaluation of Stores Management Systems. Hazard analysis and special considerations for live fire exercises. Error budgeting and analysis.

***T&E 4206A Real-time Analysis of Weapons Accuracy Telemetry Exercise***

Students will prepare test cards, brief the mission, develop and Test Hazard Analysis and be responsible for the test conduct and control, data acquisition and analysis using the NTPS telemetry system. Students will prepare and present an oral report.

***T&E 4207 Electro-Optics and Infrared Systems Flight Testing***

Designed to review basic Infrared and Electro-optical theory, as well as the practical application of this theory, this course stresses the correct and most efficient ways to demonstrate performance through flight test. The first part of the course is designed to review radiation theory, while the remainder is arranged to review, in significant detail, typical electro-optical systems components, both passive and active electro-optical systems, and various countermeasures. Test plan formulation and the determination of the necessary test points for validating system capabilities are also addressed.

***4207A FLIR Demonstration Flight***

A flight demonstration of the flight test techniques for evaluating a Forward Looking Infrared (FLIR) Systems.

***4207B FLIR/EO System Evaluation***

Students will prepare flight test cards, brief the mission, develop a Test Hazard Analysis, conduct the mission, and analyze the flight data and pilot comments, and present an oral report evaluating FLIR/EO performance. Three flights. Pre-requisites: T & E 4201, 4202, 4207, and 4207A.

***T&E 4208 Night Vision Imaging Systems Theory and Evaluation Techniques***

To perform an evaluation of a night vision imaging system (NVIS) requires knowledge of night vision goggles (NVGs), NVG-compatible interior and exterior lighting, and the integration of these components in the aircraft. To prepare for this task, the basic theory and human factors of NVIS are discussed, and the methods of testing the integrated system are explained in detail. Included are an NVG Lab, an NVIS Lighting Lab, an NVIS Test Equipment Lab and an NVIS Evaluation Setup Lab. This course provides the ground work for all other NVIS Evaluation Techniques modules.

***4208A Night Vision Flight Demonstration***

A flight demonstration of the techniques required for evaluation NVGs, NVG-compatible lightings and component integration.

***4208B Night Vision Imaging System Flight and Laboratory Evaluation***

During the course, ground and flight evaluations will be conducted using an operationally representative NVIS-modified aircraft. After being given an evaluation assignment, the student will develop data cards for both laboratory and flight evaluations. For the laboratory evaluation the student will set-up test equipment, gather data, and analyze the findings. The findings will be used to structure the flight evaluation, which will be conducted by an NVIS test pilot. After completion of all testing, the student will analyze the data, determine conclusions and recommendations, and report the findings orally.

***T&E 4209 Helmet Mounted Displays***

This course is designed to provide technical and human factors information regarding Helmet Mounted Display (HMD) systems. Emphasis is placed on various approaches to system design that impact usability and methods of test that will identify potential deficiencies. Topical information in the lectures is reinforced with hands-on demonstrations.

***T&E 4210 Civil Aircraft Icing Certification***

An in-depth discussion of icing cloud microphysics and atmospheric thermodynamics, FAA icing certification requirements, and ground and flight test procedures necessary to validate aircraft ice protection systems and show compliance with the Federal Aviation Regulations.

***T&E 4301 Independent Research***

Independent research on a topic selected with the approval of the student's advisor. Academic Track only.

**Faculty and Administration**

In aspiring to meet its mission goals, the National Test Pilot School has assembled an highly qualified team of practicing professionals. Its faculty of test pilots, flight test engineers, and scientists possess broad experience in industry, defense, air transportation, and academia and has the teaching experience necessary to integrate the theory of the classroom with the realities of the cockpit.

***Senior Management of NTPS***

**Peterson, Allen L.** President/CEO and Test Pilot Instructor. B.S., U.S. Military Academy. M.S, University of Southern California. Sc.D., Northcentral University. Graduate, U.S. Naval Test Pilot School.

**Lewis, Gregory V.** Vice President/ Director and Test Pilot Instructor. B.S., M.S., Massachusetts Institute of Technology. M.S., Golden Gate University. Graduate, US Air Force Test Pilot School. FAA Designated Engineering Representative.

**Hill, Michael L.** Director of Business Operations and Test Pilot Instructor. B.S., California Polytechnic University, M.S., M.B.A., Embry-Riddle Aeronautical University. Graduate, U.S. Naval Test Pilot School.

**Ingham, Lester A.** Director, National Flight Test Institute and Flight Test Engineering Instructor. B.Eng., P.D.E. Stellenbosch University. M.S., National Flight Test Institute. Ph.D., Stellenbosch University, FTE Graduate NTPS.

**McShea, Robert.** Deputy Director, Systems Testing. Flight Test Engineering Instructor. B.S., Syracuse University.

**Solski, Ed.** Deputy Director, Performance & Flying Qualities. Test Pilot Instructor. B.S., Royal Military College of Canada. Graduate, U.S. Air Force Test Pilot School, Canadian Forces Command and Staff College

***Instructors of NTPS***

**Antonio, Chuck.** Aerospace Medicine and Night Vision Systems Pilot Instructor. B.S., Georgia Institute of Technology. B.S., Armstrong State University. M.D., Medical University of South Carolina.

**Arush, Ilan.** Flight Test Engineering Instructor. B.S., Israel Institute of Technology. M.S., Ben Gurion University. Graduate, U.S. Naval Test Pilot School.

**Cherry, Steve.** Test Pilot Instructor. B.S., U.S. Air Force Academy. M.S., Purdue University. Graduate, U.S. Air Force Test Pilot School.

**Clarke, Ken.** Flight Test Engineering Instructor. B.Sc., Liverpool University, M.Sc., Cranfield University. Graduate, Empire Test Pilot School.

**Donovan, Terrence J.** Director Emeritus and Chief Scientist, National Flight Test Institute. Test Pilot Instructor. B.S., Midwestern State University. Ph.D., University of California, Los Angeles. Graduate, National Test Pilot School. FAA Designated Engineering Representative

- Nelson, Kent.** Operational Test and Evaluation Instructor. B.S., University of Wyoming, M.S., University of Southern California. Graduate, U.S. Air Force Test Pilot School.
- Norton, John.** Operational Test and Evaluation Instructor. B.S., United States Air Force Academy. M.S., Aeronautical Science, Embry-Riddle Aeronautical University. M.S., Mechanical Engineering, California State University, Fresno. Graduate of Flight Test Short Course, National Test Pilot School.
- Olson, Ryan.** Flight Test Instructor, BS in Aerospace Engineering and BS in Aeronautical Science, Embry-Riddle Aeronautical University. MS in Flight Test Engineering, National Flight Test Institute/National Test Pilot School.
- Pecile, Nicola.** Test Pilot Instructor. B.S., Italian Air Force Academy, M.S., University of Rome, Graduate, French Test Pilot School (EPNER).
- Searfoss, Rick.** Test Pilot Instructor. B.S., U.S. Air Force Academy, M.S., California Institute of Technology. Graduate, U.S. Naval Test Pilot School.
- Speedy, Nigel .** Test Pilot Instructor. B.Sc. University of New South Wales. Graduate, U.S. Naval Test Pilot School, Australian Defence Force Academy, Royal Military College (Australia).
- Stewart, Russ.** Test Pilot Instructor. B.E., M.E., Rensselaer Polytechnic Institute. Graduate, U.S. Air Force Test Pilot School.
- Swaney, Mark.** Flight Test Engineering Instructor. B.S., University of Cincinnati, M.S. University of Southern California. Graduate, U.S. Naval Test Pilot School.
- Tsolekas, Ioannis.** Test Pilot Instructor. B.S., Hellenic Air Force Academy. Graduate, U.S. Air Force Test Pilot School, U.S. Air Force Squadron and International Officers Schools.

### ***Support Staff***

- Crawford, Andrew.** Chief of Operations, TP Graduate NTPS.
- Davies, Sonnett.** Receptionist
- Delaney, Mike.** Technical Support/Flight Test Engineer, B.S. University of Pittsburgh.
- Gonzalez, Veronica.** Administration Specialist / Librarian
- Holliday, Maria.** Scheduler.
- Lewis, Steve.** Network Administrator. Multi-Platform Certified Network Engineer, Advanced Career College MCSE, MCP+I, A+.
- Litchfield, Brandon.** Assistant Scheduler.
- Matos, Lynda.** Business Support Manager.
- Stanton, Sindy.** Student Services.
- Whittemore, Andrea,** Assistant Registrar/Academic Records.

### ***Graduate Assistants***

- Milliard, Craig,** B.S., Embry-Riddle Aeronautical University.
- Rock, Rachel.** B.S., University of Illinois.