FAA Industry Training Standards (FITS)
Scenario Based Transition Syllabus
For Integrated Flight and Navigation Systems

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EMBRY-RIDDLE AERONAUTICAL UNIVERSITY

UND AEROSPACE
UNIVERSITY OF NORTH DAKOTA

FITS Integrated Flight Navigation Systems Scenario Based Guide

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Acknowledgements:

The Syllabus prepared by:

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and the FITS Launch Partners:

ECLIPSE AVIATION

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How to use this generic FITS Syllabus

This FITS Integrated Flight Navigation Systems Syllabus is intended as a guide for aircraft manufacturers, training providers, and flight schools to use in developing a specifics FITS curriculum for a specific aircraft, geographic region, and customer base. The syllabus lays out a series of flight scenarios that enable a pilot transitioning into a piston engine Technically Advanced Aircraft (TAA) to master the aircraft, the technology, and most importantly the concepts of Risk Management and Aeronautical Decision Making.

To Instructors

Each lesson consists of a scenario description followed by a list of specific tasks to be accomplished by the student. Each scenario also includes a "student centered" set of grading criteria. Within the confines of each scenario the Pilot in training (PT) and instructor are free to plan all the training activities in a way that supports the overall scenario flow, and provides the most realistic replication of real world, day to day flying.

To Pilots in Training (PT)

The emphasis in each scenario is on PT planning and execution of each scenario with as little help as possible from the instructor. The value of scenario-based training is in the opportunities it provides to plan, execute, and respond to changing situations in a thoughtful way.

To Aircraft Manufacturers, Training providers, and Flight Schools

This generic syllabus is a guide for you to use in developing your specific transition curriculum. FITS "recognition" is achieved by developing your specific curriculum and submitting it to:

The FITS Program Manager,
Federal Aviation Administration, AFS-800
800 Independence Avenue, SW, Washington DC, 20591
202 -267-7922

Use of the FITS logo.

Once recognized, you are authorized to display the FITS Logo on approved FITS curriculums and in advertising about this particular curriculum. The FITS logo will not be used in relationship to non-FITS products.

Section 1 - FITS Introduction

FAA Industry Training Standards (FITS)

The FITS Program is a joint project of the FAA, the FAA -sponsored Center for General Aviation Research (CGAR), Embry Riddle Aeronautical University, The University of North Dakota, and various organizations and associations representing the General Aviation industry.

FITS Transition Training Mission Statement:

Improve pilot training to enable pilots to more safely, competently, and efficiently operate a Technically Advanced Aircraft (TAA) in the National Airspace System (NAS).

FITS "Essentials":

Pilot training in TAA requires an emphasis on realistic scenario-based training that will develop essential risk management skills, decision-making skills, and other higher-order thinking skills that are crucial in helping to reduce the general aviation (GA) fatal accident rate. Reduction of the GA fatal accident rate is one of the cornerstones of the FAA's "SAFER SKIES" initiative. FITS scenario-based training will also involve training for new communication, navigation and surveillance (CNS) systems, related airspace and procedures, and the problem of new-entrant pilots flying for transportation purposes

FITS recognizes the variety of advanced technology systems and the different combinations and permutations of these systems-

- Within a type of system (e.g. different operations of GPS navigators)
- Within categories of advanced technology systems such as a-
  - Primary Flight Display (PFD) that normally includes the following primary information on a single display:
    - Attitude
    - Heading
    - Altitude
    - Airspeed
    - Navigation (HSI, bearing, course, ground speed, etc.)
  - Multi Function Display (MFD) that could include any combination of the following information on a single display:
    - Traffic
    - Weather
    - Terrain
    - Navigation (bearing, course, ground speed, ETA, Sectional, Enroute or Terminal Approach charts, etc.)
  - Autopilot

FITS Training Goals

The advancement of:

- Higher Order Thinking
  - Risk Management
  - Aeronautical Decision-Making
  - Situational Awareness (SA)
  - Pattern Recognition (Emergency Procedure) and Decision-Making
- Aircraft Systems Competence
- Planning and Execution
- Procedural Knowledge
- Motor skills that do not require higher cognitive thinking before taking action (i.e. Psychomotor Skills.)

Section 2 - FITS Terminology/Definitions

Key Terms

Technically Advanced Aircraft (TAA)– is a general aviation aircraft that contains a GPS navigator with a moving map display, plus any additional systems. Traditional systems such as autopilots when combined with GPS navigators are included. It includes aircraft used in both VFR and IFR operations, with systems certified to either VFR or IFR standards. Note: there will be application to non-TAAs.

Light Turbine TAA- a jet or turboprop TAA certified for single-pilot operations, weighing 12,500 lbs or less, equipped with cabin pressurization, conventional (non-swept) wings and capable of operating in Class A airspace on normal mission profiles. (Note: Light Turbine TAA is specifically defined as having a non-swept wing due to the significantly increased training demands for pilots transitioning to swept wing aircraft)

Scenario-based Training (SBT) – is training system that uses a highly structured script of real-world experiences to address flight training objectives in an operational environment. Such training can include initial training, transition training, upgrade training, recurrent training, and special training. The appropriate term should appear with the term "Scenario-based," e.g., "Scenario-based Transition Training," to reflect the specific application.

Single Pilot Resource Management (SRM) – is the "art and science" of managing all resources available to a single-pilot to ensure the successful outcome of the flight.

Related Terms and Abbreviations

Aircraft Automation Management – is the demonstrated ability to control and navigate an aircraft by means of the automated systems installed in the aircraft.

Automated Navigation leg – is a flight of 30 minutes or more conducted between two airports in which the aircraft is controlled primarily by the autopilot and the on-board navigation systems.

A **VFR Automated Navigation Leg** is flown on autopilot beginning from 1,000 ft above ground level (AGL) on the departure until the 45-degree entry to the downwind leg in the VFR airport traffic pattern.

An **IFR Automated Navigation Leg** is flown on autopilot beginning from 500 ft AGL on departure (unless the limitations of the autopilot require a higher altitude, then from that altitude) until reaching the decision altitude or missed approach point on the instrument approach. If a missed approach is flown, it will also be flown using the autopilot and on-board navigation systems.

Automation Competence- is the demonstrated ability to understand and operate the automated systems installed in the aircraft.

Automation Surprise- is the ability of an automated system to provide different cues to pilots when compared to the analog systems they replace, especially in time-critical situations.

Automation Bias – is the relative willingness of the pilot to trust and utilize automated systems.

Candidate Assessment- is a system of critical thinking and skill evaluations designed to assess a student's readiness to begin training at the appropriate level.

Critical Safety Tasks/Events – are those mission related tasks/events that, if not accomplished quickly and accurately, may result in aircraft damage, injury, or loss of life.

Data link Situational Awareness (SA) Systems – are systems that feed real-time information to the cockpit on weather, traffic, terrain, and flight planning. This information may be displayed on the PFD, MFD, or on other related cockpit displays.

Desired Pilot in Training (PT) Scenario Outcomes – The object of scenario-based training is a change in the thought processes, habits, and behaviors of the PT during the planning and execution of the scenario. Since the training is "student-centered," the success of the training is measured in the following desired PT performances:

(I) Learner-Centered Grading involves both maneuver and single-pilot resource management (SRM) grading.

(i) Maneuver Grades (Tasks)

• Explain -- at the completion of the scenario the PT will be able to describe the scenario activity and understand the underlying concepts, principles, and procedures that comprise the activity. *Significant instructor effort will be required to successfully execute the maneuver.*

• Practice -- at the completion of the scenario the student will be able to plan and execute the scenario. *Coaching, instruction, and/or assistance from the CFI will correct deviations and errors identified by the CFI.*

• Perform -- at the completion of the scenario, the PT will be able to perform the activity without assistance from the CFI. *Errors and deviations will be identified and corrected by the PT in an expeditious manner. At no time will the successful completion of the activity be in doubt.* ("Perform" will be used to signify that the PT is satisfactorily demonstrating proficiency in traditional piloting and systems operation skills)

• Not Observed -- Any event not accomplished or required

(ii) Single Pilot Resource Management (SRM) Grades

• Explain -- the student can verbally identify, describe, and understand the risks inherent in the flight scenario. *The student will need to be prompted to identify risks and make decisions.*

• Practice -- the student is able to identify, understand, and apply SRM principles to the actual flight situation. *Coaching, instruction, and/or assistance from the CFI will quickly correct minor deviations and errors identified by the CFI. The student will be an active decision maker.*

• Manage/Decide -- the student can correctly gather the most important data available both within and outside the cockpit, identify possible courses of action, evaluate the risk inherent in each course of action, and make the appropriate decision. *Instructor intervention is not required for the safe completion of the flight.*

• Not Observed -- Any event not accomplished or required.

(II) Grading will be conducted independently by the student and the instructor, then compared during the post flight critique.

(III) Learner centered grading (outcomes assessment) is a vital part of the FITS concept. Previous syllabi and curriculum have depended on a grading scale designed to maximize student management and ease of instructor use. Thus the traditional: "excellent, good, fair, poor" or "exceeds standards, meets standards, needs more training" often meet the instructor's needs but not the student's. The grading scale/system is designed to emphasize two important point in student centered learning. First, the grading system should provide a clear picture about the progress the PT is making during the training. A typical grading scale including outstanding, satisfactory, marginal, and unsatisfactory can be accurate but often carries emotional baggage. That is, student have often been graded by this scale and have learned to identify that they are not doing well if they receive anything other than an outstanding grade on a graded task. Instructors recognize this problem and attempt to avoid sending negative signals to their students. When this happens, students are not given an accurate picture of the progress. This is often complicated by the problem the instructor has in attempting to show adequate progress during initial phases of training when students are not expected to be able to "Manage/Decide," but rather be able to accomplish the requirement with assistance and coaching. Second, the grading scale needs to communicate the instructor's assessment of the student progress clearly to the PT.

The grading scale needs to clearly indicate the student’s progress so that the instructor or another instructor understands the PT progress. Thus, the FITS researcher are recommending a grading system that involves a grading scale designed to provide a better picture of the actual PT progress without the emotional baggage of traditional grading. The learner centered grading described above is a way for the instructor and student to determine the student's level of

knowledge and understanding. "Perform" is used to describe proficiency in a skill item such as an approach or landing. "Manage-Decide" is used to describe proficiency in the SRM area such as ADM. Explain and practice are used to describe student learning levels below proficiency in both.

(IV) Grading should be progressive. During each flight, the student should achieve a new level of learning (e.g. flight one, the automation management area, might be a "describe" item by flight three a "practice" item, and by flight five a "manage-decide" item.

Emergency Escape Maneuver- is a maneuver (or series of maneuvers) performed manually or with the aid of the aircrafts automated systems that will allow a pilot to successfully escape from an unanticipated flight into Instrument Meteorological Conditions (IMC) or other life-threatening situation.

Mission Related Tasks- are those tasks required for the safe and effective accomplishment of the mission.

Multi-Function Display (MFD) - is a device that combines primarily navigation, systems, and situational awareness (SA) information onto a single electronic display.

Primary Flight Display (PFD) – is a device that combines the primary six flight instruments plus other related navigation and situational awareness (SA) information into a single electronic display.

Proficiency Based Qualification- is a qualification based on demonstrated performance rather than other flight time or experience.

Simulation- is any use of animation and/or actual representations of aircraft systems to simulate the flight environment. PT interaction with the simulation and task fidelity for the task to be performed are required for effective simulation.

Training Only Tasks – are training maneuvers that, while valuable to the PT's ability to understand and perform a mission related task, are not required for the PT to demonstrate proficiency. However, instructor pilots would be required to demonstrate proficiency in training-only tasks.

Section 3 - FITS TAA Transition Master Syllabus

Over the years, the airlines and the military have shifted their training philosophy toward a "train the way you will fly in the real world and fly the way you trained" approach to satisfy their flight training requirements. The airlines refer to this training approach as Line Oriented Flight Training (LOFT), and is now considered doctrine in the air carrier community.

The complexity of the national airspace under the FAA's Operational Evolution Plan (OEP) along with the introduction of new cockpit technologies make the idea of LOFT, or "scenario-based" flight training, an idea that demands serious consideration from the general aviation (GA) community.

The challenge is to develop an adaptable flight training system that will not only maintain but will greatly improve the safety and utility of increasingly complex (GA) flight operations. (Wright, 2002)

The concept of "scenario-based" flight training is attracting considerable support. This training approach, when coupled with state-of-the-art simulation and curricula, would be ideally suited to preparing GA pilots for operations in an increasingly complex national airspace system. In particular, it could provide an effective bridge between the training environment and the actual environment pilots will experience. The concept also provides a way for trainees to integrate various phases of training into a unified flight operation. Rather than, for example, conducting practice instrument approaches repeatedly, scenario-based training may enable a pilot to experience the complete transition from enroute to terminal to approach operations. (Wright, 2002)

GOAL

The goal of Transition Training is to prevent accidents by ensuring pilots have proper training in the specified systems and operating characteristics of every airplane model they fly. Transition Training, therefore, concentrates on those areas where the pilot will encounter something that is distinctive or unique to that airplane model. No attempt is made to review general piloting knowledge or skills that would be the same in any airplane. Instruction in these areas is highly beneficial, but should be accomplished through other means.

MASTER SYLLABUS

This Master Syllabus document is a general outline of the items to be included in the ground and flight training of pilots transitioning into technically advanced aircraft (TAA). The Master Syllabus should be used to develop a Transition Training Guide for a specific airplane. "Specific airplane" includes airplane models that are sufficiently similar so that a pilot trained or experienced in one airplane model would not normally require Transition Training to operate another model.

TRANSITION TRAINING GUIDES

A Transition Training Guide is written for a specific airplane and is based on the Master Syllabus. Any person or company such as a certificated flight instructor, training organization, manufacturer, or aviation publisher may produce it. It can be very specific or may be only an outline that refers to the Pilot's Operating Handbook (POH) or FAA-approved Airplane Flight Manual (AFM).

Because the sequence of training may need to be altered to accommodate individual progress or special circumstances, the training guide/syllabus should be flexible. As complexity varies between airplane models, developers of Transition Training Guides may find it necessary to expand upon the information described herein. If the prescribed sequence of training is changed, it is the responsibility of the pilot training school or instructor to make sure that all necessary training is accomplished.

IFR TRANSITION TRAINING

Certain maneuvers in the flight section are prescribed as "IFR only". These maneuvers are required only for instrument rated pilots. They are included so that an instrument rated pilot in training (PT) may practice key IFR maneuvers in an unfamiliar airplane under the supervision of an instructor. PTs who are instrument rated and elect not to perform the IFR maneuvers, or PTs who are not instrument rated (VFR only) will receive a "VFR" endorsement in their logbook when training is satisfactorily completed. This type of endorsement indicates that only VFR transition training was completed. The presence or absence of this endorsement does not legally affect the pilot's instrument privileges in any airplane.

COURSE ELEMENTS

Scenario-based flight training (SBT) represents a non-traditional approach to GA pilot training. The most significant shift is observed in the move away from the traditional practice of analyzing a maneuver and breaking it down into manageable chunks, establishing behavioral objectives, and measuring performance based on those objectives. SBT uses the same maneuvers, for the most part, but attempts to arrange or script them into more "real world" learning experiences. Practice of the task remains the cornerstone of skill acquisition, but the shift is away from meaningless drill in the practice area toward meaningful application as a part of a normal flight activity.

While the traditional approach to civilian flight training certainly has served the industry, there is ample evidence of the need for modifications to our traditional perspectives on developing safe, competent and efficient pilots. The traditional approach to pilot training is driven by regulations that use flight hours and the ability to fly maneuvers within certain parameters as the benchmark of competency. The emphasis during training is on individual psychomotor skill and, to a limited extent, pilot decision-making. After completion of training, the pilot goes on to fly in an environment that asks them to use skills, apply knowledge, and make decisions unassisted.

Consequently, traditional flight training curricula lack the continuity, consistency, and activities characteristic of the TAA of the future

While this Master Syllabus does not utilize the more traditional maneuver-based method of learning, it does attempt to provide a coordinated ground/flight sequence of training so that educational support materials are covered prior to the associated flight lessons. Additionally, the simple-to-complex "building block" approach is maintained in that each lesson increases in complexity and the PT is provided the opportunity to practice the maneuver in a "real world" flight experience.

STANDARDS

Several training items require a discussion of the limitations of an airplane component or system. In every airplane system, there are limitations based on two factors:

1. The capability of the equipment to perform a particular function and;
2. The individual pilot's ability to use that equipment.

Effective training and experience can enable safe operation of an airplane within its limitations. Some airplane systems are more complex and require a higher level of skill and interpretation. Pilot skills and knowledge vary with a pilot's total flight time, time-in-type, and recent flight training or experience. Therefore, pilots must be trained to recognize their personal limitations and the airplane's limitations.

Throughout the ground school and flight curriculum, emphasis should be placed on operating within airplane and pilot limitations. Risk management and decision-making skills should be especially emphasized. A discussion of limitations, as they apply to the PT's experience level, and with reference to potential problem areas, may prevent many accidents. For that reason, Transition Training Guides should include items that instructors may discuss with transitioning pilots concerning limitations of various systems, flight characteristics of the specific airplane, and how these items may apply to a particular pilot.

GROUND TRAINING

The ground-based segments of the Master Syllabus are an integral part of the SBT course and should be mastered prior to in-flight training. The PT should demonstrate, through written and oral review, the knowledge to safely operate the specific airplane using the Pilot's Operating Handbook (POH) or FAA-approved Airplane Flight Manual (AFM) and airplane checklists. All immediate-action emergency procedures must be committed to memory. The instructor will discuss each incorrect response with the pilot to ensure complete understanding.

FLIGHT TRAINING

Each lesson in the flight-training phase of the SBT course consists of a scripted scenario, and each scenario increases in complexity as the PT progresses through the course. The instructor and PT should use the scenario as a "lesson plan" with the intent for the PT to study the plan and brief it as part of the pre-flight preparation.

The PT should demonstrate the necessary skill and experience required for the specific airplane. Operations must be accomplished within the parameters specified in the FAA Practical Test Standards (PTS) appropriate to the grade of PT's pilot certificate.

In addition, a PT who holds an instrument rating must demonstrate competency in the instrument maneuvers and procedures identified in the flight portion of the Master Syllabus within the parameters specified in the Instrument Rating PTS. If a PT chooses not to demonstrate competency in instrument flight in the specific airplane, the PT's logbook endorsement will indicate "VFR only". An instrument rated pilot with a "VFR only" logbook endorsement for Transition Training may remove the endorsement at a later date by completing the designated instrument maneuvers and training. The presence or absence of this endorsement does not legally affect the pilot's instrument privileges in any airplane.

Section 4 - FITS Integrated Flight Navigation Systems Master Syllabus

GOAL

The goal of Integrated Flight Navigation System Training is to prevent TAA accidents by ensuring pilots have proper training in the specified systems and operating characteristics of their aircraft. Integrated Flight Navigation Systems Training, therefore, concentrates on areas unique to that airplane, whether a normal or an emergency procedure or event. No attempt is made to review general piloting knowledge or skills that would be the same in any airplane. Instruction in these areas is highly beneficial, but should be accomplished through other means.

MASTER SYLLABUS

This document, the Master Syllabus, is a general outline of the items to be included in the ground and flight training of pilots using integrated flight navigation systems. The Master Syllabus should be used by companies or individuals to develop an Integrated Flight Navigation Systems Training Guide for a specific avionics. "Specific avionics" includes models, grouped by the manufacturer, that are sufficiently similar so that a pilot trained or experienced in one model would not normally require Integrated Flight Navigation Systems Training to operate another model.

TRANSITION GUIDES

A Integrated Flight Navigation System Training Guide is written for a specific avionics and is based on the Master Syllabus. It may be produced by any person or company, such as a Certificated Flight Instructor (CFI), training organization, manufacturer, or aviation publisher. Because sequence of training may need to be altered to accommodate individual progress or special circumstances, the training syllabus should be flexible. As technical complexity varies from TAA to TAA, those who develop Integrated Flight Navigation Systems Training Guides may find it necessary to expand upon the information described in the Master Syllabus. If the prescribed sequence of training is changed, it is the responsibility of the curriculum developer to make sure that all necessary training is accomplished.

IFR TRAINING

Certain maneuvers in the flight section are prescribed as "IFR only". These maneuvers are required only for pilots with an instrument rating. They are included so that instrument rated pilots many practice key IFR maneuvers with unfamiliar avionics under the supervision of an instructor. Pilots who are instrument rated, but who elect not to perform the IFR maneuvers, or pilots who are not IFR rated, receive a "VFR" endorsement in their logbook when training is satisfactorily completed. This indicates that only the VFR part of the integrated flight navigation system instruction was completed. The presence or absence of this endorsement does not legally affect the pilot's instrument privileges in any airplane.

STANDARDS

In every airplane system there are limitations based on two factors:

1. The absolute capability of the equipment to perform a particular function and;
2. The individual pilot's ability to use that equipment.

Effective training and experience can enable safe operation of an airplane within these limitations. Some airplane systems are more complex and require a higher level of skill and interpretation. Pilot skills and knowledge vary with a pilot's total flight time, time-in-type, and recent flight training or experience. Pilots, therefore, must be trained to recognize their personal limitations as well as the airplane's limitations.

Throughout the ground school and flight curriculum, emphasis should be placed on operating within airplane and pilot limitations. Risk management and decision-making skills (also referred to as Single Pilot Resource Management (SRM)) should be consistently integrated into each scenario. A discussion of limitations, as they apply to the pilot's experience level, and with reference to potential problem areas, will enhance the decision process. Integrated Flight Navigation Systems Training Guides should include discussions of avionic system limitations, flight characteristics of the specific airplane, and how these items apply to a particular pilot.

GROUND TRAINING

The ground-based segments of the syllabus are an integral part of the SBT course and should be mastered prior to the in-flight training experience. The pilot-in-training (PT) should demonstrate, through written and oral review, the knowledge to safely operate the specific airplane, using the POH or Approved Airplane Flight Manual and airplane checklists. All immediate-action emergency procedures must be committed to memory. The CFI will discuss each incorrect response with the pilot to ensure complete understanding. The instructor must integrate SRM concepts and techniques in each of these discussions.

FLIGHT TRAINING

Each flight-training lesson consists of a highly scripted scenario. These scenarios increase in complexity as the student progresses through the course. The instructor and student should use the scenario as a "lesson plan." The intent is for the student to study the lesson script, prepare a scenario plan, and brief it as part of the preflight preparation.

It is vitally important that the pilot learn to "manage" the aircraft in the automated mode, as well as fly the aircraft by hand. Good SRM demands that the pilot be able to rely on the autopilot and automated navigation systems during times of high cockpit task loads. Instructors must ensure that emphasis is given to both automated and manual flight modes as described in each scenario.

The pilot-in-training should demonstrate the necessary skill and experience required for the specific airplane. Operations must be accomplished within the tolerances specified in the Practical Test Standards appropriate to the pilot's airmen certificate.

In addition, a pilot who holds an instrument rating must demonstrate competency in the instrument maneuvers and procedures identified in the flight syllabus within the tolerances specified in the Instrument Rating Practical Test Standards. If a pilot chooses not to demonstrate competency in instrument flight in the specific airplane, the pilot's logbook endorsement will indicate "VFR only". An IFR rated pilot with a "VFR only" logbook endorsement for Integrated Flight Navigation Systems Training may remove the endorsement at a later date by completing the designated IFR maneuvers and training. The presence of absence of this endorsement does not legally affect the pilot's instrument privileges in any airplane.

When the PT demonstrates skills and knowledge to the "Perform" or "Manage/Decide" level of proficiency and the instructor determines the PT is competent in those operations, they need not be repeated on subsequent training flights.

LESSON 1
MASTER SYLLABUS – INTEGRATED FLIGHT NAVIGATION SYSTEMS

OBJECTIVE

The Pilot in Training (PT) will demonstrate a basic knowledge and proficiency while operating avionics and equipments. Emphasis during this flight should be placed on the correct interpretation of PFD indications, setting appropriate bugs and indications on the PFD, setting route, range, and other navigation, terrain, traffic, and weather displays on the MFD as appropriate, setting and using the GPS navigation equipment, and monitoring the system status at all times. This is based on the assumption the PT is proficient in the airplane being flown and is expected to execute all normal and emergency procedures necessary for the flight even though they may not be listed below.

SCENARIO 1

Preflight

The PT will plan a short VFR flight of about one hour or less in duration, to include a full stop landing an airport other than the departure airport, and return to the airport of origin.

The PT will describe his/her approach to management of the specific risks involved in this flight. The Instructor will provide the necessary guidance to insure that the plan provides for all the scenario activities and sub-activities listed for this lesson. The PT is evaluated on the ability to plan a comprehensive flight with conscious attention to all the required scenario activities.

The PT will perform all preflight procedures, engine start-up, avionics set-up, taxi and before-takeoff procedures for each leg of the scenario. This will include GPS flight plan programming for the flight as well as MFD and PFD setup and an effective pre-takeoff briefing.

These Preflight activities will be accomplished prior to takeoff for each leg of the flight

Leg 1 (Outbound flight)
The PT will perform a normal takeoff and departure to a safe altitude. Aircraft avionics functions will all be practiced during cruise, descent and normal landing phase of the flight. Emphasis should be on the correct interpretation of the PFD and MFD. The PT should practice basic programming of the navigation functions, communication functions, and The PT will perform a normal descent and pattern transition followed by a normal approach and landing to a full stop. Experience has shown that this first leg should be kept very simple to allow the pilot to get more comfortable with the new ways information is displayed and the basic functions of the equipment. If the airplane is equipped with an autopilot, basic autopilot functions can be used to allow the PT to concentrate on the PFD/MFD displays.

Leg 2 (Return flight)
A different route will be programmed into the GPS flight plan for the return trip and an actual or simulated crosswind takeoff will be performed. After the aircraft is established in cruise the flight will continue in the manual mode with continued practice of aircraft avionics. Airspeed and configuration changes are practiced during cruise. At some point on the return trip the flight will proceed to a designated "practice" area to accomplish steep turns, slow flight, the stall recognition and recovery series, and unusual attitude recovery. The purpose of this is to allow the PT to gain experience in the correct interpretation of the PFD and MFD during these maneuvers.

The PT will use the avionics to proceed to the destination and will perform a visual approach and unplanned go-around prior to making the final landing.

Post-flight

The PT will perform all aircraft shutdown and securing procedures.

PREREQUISITES

Completion of training provider pre-training packet corrected to 100%.

Completion of a Quiz normal operating procedures, aircraft systems, and avionics corrected to 100%

PILOT IN TRAINING PREPARATION

Review the following:

a. Normal operating procedures in the POH
b. A worksheet on avionics systems and procedures
c. Airport information for departure and destination airports.
d. Route of flight information for both trips.
e. Aircraft and avionics systems display and procedures.

BRIEFING ITEMS

A. INITIAL INTRODUCTION:

PTs should have a clear understanding of the Pilot in Command concept and how command is transferred. This should include a detailed pre-takeoff briefing procedure and format.

B. SINGLE PILOT RESOURCE MANAGEMENT (SRM)

a. Basic pre-flight and in-flight decision-making and risk management.

C. SAFETY

The following safety items should be briefed to all PTs

a. Mid-air collision avoidance procedures
b. Taxi procedures

Scenario One

(note: these activities will be completed as part of the training scenario and are not intended to be a list of training tasks to be completed in numerical order)

Desired Pilot in Training (PT) Scenario Outcomes – The object of scenario-based training is a change in the thought processes, habits, and behaviors of the PT during the planning and execution of the scenario. Since the training is "student-centered," the success of the training is measured in the following desired PT performances:

(I) Learner-Centered Grading involves both maneuver and single-pilot resource management (SRM) grading.

(i) Maneuver Grades (Tasks)

• Explain -- at the completion of the scenario the PT will be able to describe the scenario activity and understand the underlying concepts, principles, and procedures that comprise the activity. *Significant instructor effort will be required to successfully execute the maneuver.*

• Practice -- at the completion of the scenario the student will be able to plan and execute the scenario. *Coaching, instruction, and/or assistance from the CFI will correct deviations and errors identified by the CFI.*

• Perform -- at the completion of the scenario, the PT will be able to perform the activity without assistance from the CFI. *Errors and deviations will be identified and corrected by the PT in an expeditious manner. At no time will the successful completion of the activity be in doubt.* ("Perform" will be used to signify that the PT is satisfactorily demonstrating proficiency in traditional piloting and systems operation skills)

• Not Observed -- Any event not accomplished or required

(ii) Single Pilot Resource Management (SRM) Grades

• Explain -- the student can verbally identify, describe, and understand the risks inherent in the flight scenario. *The student will need to be prompted to identify risks and make decisions.*

• Practice -- the student is able to identify, understand, and apply SRM principles to the actual flight situation. *Coaching, instruction, and/or assistance from the CFI will quickly correct minor deviations and errors identified by the CFI. The student will be an active decision maker.*

• Manage/Decide -- the student can correctly gather the most important data available both within and outside the cockpit, identify possible courses of action, evaluate the risk inherent in each course of action, and make the appropriate decision. *Instructor intervention is not required for the safe completion of the flight.*

• Not Observed -- Any event not accomplished or required.

(II) Grading will be conducted independently by the student and the instructor, then compared during the post flight critique.

Scenario One

Scenario Activities	Scenario Sub Activities	Desired PT Scenario Outcome
Flight Planning	1. Scenario Planning 2. Preflight SRM Briefing 3. Decision making and risk management 4. GPS Navigation system availability 5. GPS Navigation system status 6. Currency of Data Card 7. Change Data Card	1. Explain/Practice 2. Explain 3. Describe 4. Explain 5. Explain 6. Explain 7. Practice
Engine Start and Taxi Procedures	1. System Initialization and self-tests 2. Avionics setup 3. Program Intended Route into GPS and Verify for Accuracy. 4. SRM/Situational Awareness During Taxi- (using ADS-B if installed)	1. Explain/Practice 2. Explain/Practice 3. Practice 4. Explain/Practice
Before Takeoff Checks	1. Set PFD Bugs and Settings for Takeoff and Departure 2. Set MFD Ranges and Display Settings as Appropriate for Departure (Traffic and Weather if installed) 3. Aircraft Automation Set for Departure (if autopilot installed) 4. Aeronautical Decision Making and Risk management	1. Practice 2. Practice 3. Explain/Practice 4. Explain
Takeoff and Climb	1. Normal Takeoff and Climb 2. Crosswind Takeoff and Climb 3. Situational Awareness 4. ADM and Risk Management 5. Monitor and Change PFD and MFD Settings as Appropriate During Enroute Climb	1. Practice 2. Practice 3. Explain/Practice 4. Describe 5. Explain/Practice
Cruise Procedures	1. Navigation programming 2. MFD Display Settings, Traffic, Terrain, Weather. 3. Task Management, SA, and ADM	1. Practice 2. Practice 3. Decide
Control Performance Instrument /Visual Crosscheck **Note: All items will be accomplished enroute during the scenario**	1. Straight and level 2. Normal Turns 3. Climbing and Descending Turns 4. Steep Turns	1. Practice 2. Practice 3. Practice 4. Practice

Low Speed Envelope **Note 1: Slow Flight and Stall Recovery may be accomplished enroute or in a practice area** **Note 2: Emphasis will be placed on PFD and MFD interpretation during all maneuvers.**	1. Configuration Changes and Slow Flight 2. Recovery from Power Off Stalls 3. Recovery from Power On Stalls 4. Stall prevention, SA, TM, and ADM	1. Practice 2. Practice 3. Practice 4. Explain
GPS Operation and Programming	VFR a. Direct-To b. Nearest c. Airport Information d. Change Flight Plan	Practice
Autopilot Programming, Modes and Annunciators (if installed)	1. Vertical Speed and Altitude Hold 2. Navigation Modes 3. Flight Director/PFD Interface	1. Practice 2. Explain 3. Explain/Practice
Descent Planning and Execution	1. Automation Management 2. VNAV Planning (if installed) 3. Navigation programming 4. Arrival Planning using MFD Navigation, Airport, Traffic, Weather, and Terrain Displays 5. PFD Bugs andIndications Set for Arrival 6. Communications	1. Explain/Practice 2. Explain/Practice 3. Practice 4. Explain/Practice 5. Practice 6. Practice
Landing	1. Before landing procedures 2. Normal Landing 3. Crosswind landing 4. Go-Around 5. ADM and SA 6. Airport/Runway Situational Awareness (Using ADS-B if installed)	1. Practice 2. Practice 3. Practice 4. Practice 5. Explain 6. Explain/Practice
Aircraft Shutdown and Securing procedure	1. Aircraft Shutdown and Securing Checklist 2. Aircraft Tie down	1. Practice 2. Practice

LESSON 2
MASTER SYLLABUS – INTEGRATED FLIGHT NAVIGATION SYSTEMS

OBJECTIVE

The PT will practice skills introduced in Lesson 1 and will practice IFR operations using the IFNS. Emphasis during this flight should be placed on the correct interpretation of PFD indications, setting appropriate bugs and indications on the PFD, setting route, range, and other navigation, terrain, traffic, and weather displays on the MFD as appropriate, setting and using the GPS navigation equipment, and monitoring the system status at all times during IFR operations. This is based on the assumption that the pilot is proficient in IFR procedures and in the airplane being flown and is expected to execute all normal and emergency procedures necessary for the flight even though they may not be listed below.

Note: If the PT is not instrument rated, then this lesson may be omitted.

SCENARIO 2

Preflight

The PT will plan an IFR flight, actual or simulated, of a minimum of one hour in duration, to include a full stop landing at an airport other than the departure airport, and return to the airport of origin.

The PT will describe his/her approach to management of the specific risks involved in this flight. The Instructor will provide the necessary guidance to insure that the plan provides for all the scenario activities and sub-activities listed for this lesson. The PT is evaluated on the ability to plan a comprehensive flight with conscious attention to all the required scenario activities.

The PT will perform all preflight procedures, engine start-up, avionics set-up, taxi and before-takeoff procedures for each leg of the scenario. This will include GPS flight plan programming for the flight as well as MFD and PFD setup and an effective pre-takeoff briefing.

These Preflight activities will be accomplished prior to takeoff for each leg of the flight

Leg 1 (Outbound flight from first point of departure)
The PT will perform a normal takeoff and IFR departure to the enroute phase of flight. Aircraft avionics functions will be practiced during cruise, IFR arrival and l landing phases of flight. Emphasis should be on the correct interpretation of the PFD and MFD. The PT should practice basic programming of the navigation functions, communication functions, and the PT will perform a instrument approach, with a missed approach, and return for a full stop landing. If the airplane is equipped with an autopilot, functions can be used to allow the PT to concentrate on the PFD/MFD displays.

Leg 2 (Outbound from first airport of landing)

A different route will be programmed into the GPS flight plan for the return trip. The PT will practice an IFR departure and transition to the enroute phase of flight. After the aircraft is established in cruise the flight will continue in the manual mode (if the autopilot was used on Leg 1).

At some point on the return trip the flight will proceed to a designated "practice" area to accomplish steep turns, slow flight, the stall recognition and recovery series, and unusual attitude recovery. The purpose of this is to allow the PT to gain experience in the correct interpretation of the PFD and MFD during these maneuvers. It is recommended these maneuvers be conducted in simulated IFR conditions in which the instructor has adequate visual references to insure the safety of flight.

The PT will get a clearance to hold at a fix, execute a holding entry and at least one turn in holding, and execute a approach to a full stop landing.

NOTE: The PT should execute both non-precision and precision approaches sometime during Lessons 2 and 3 it at all possible. This is not required if the PT is not instrument rated. If the location where the training is being conducted is not close enough to an airport with a precision approach that it can be reached in a reasonable time, then the instructor should take extra time to insure the PT understands how to use the equipment to conduct a precision approach.

Postflight

The PT will perform all aircraft shutdown and securing procedures.
Instructor will provide feedback and planning data for the next flight.

PREREQUISITES

Completion of training provider pre-training packet corrected to 100%.

Completion of a Quiz normal operating procedures, aircraft systems, and avionics corrected to 100%

PILOT IN TRAINING PREPARATION

Review the following:

a. Normal operating procedures in the POH
b. A worksheet on avionics systems and procedures
c. Airport information for departure and destination airports.
d. Route of flight information for both trips.
e. Aircraft and avionics systems display and procedures.

BRIEFING ITEMS

A. INITIAL INTRODUCTION:

PTs should have a clear understanding of the Pilot in Command concept and how command is transferred. This should include a detailed pre-takeoff briefing procedure and format.

B. SINGLE PILOT RESOURCE MANAGEMENT (SRM)

b. Basic pre-flight and in-flight decision-making and risk management.

C. SAFETY

The following safety items should be briefed to all PTs

c. Mid-air collision avoidance procedures

d. Taxi procedures

Scenario Two

(note: these activities will be completed as part of the training scenario and are not intended to be a list of training tasks to be completed in numerical order)

Desired Pilot in Training (PT) Scenario Outcomes – The object of scenario-based training is a change in the thought processes, habits, and behaviors of the PT during the planning and execution of the scenario. Since the training is "student-centered," the success of the training is measured in the following desired PT performances:

(I) Learner-Centered Grading involves both maneuver and single-pilot resource management (SRM) grading.

(i) Maneuver Grades (Tasks)

• Explain -- at the completion of the scenario the PT will be able to describe the scenario activity and understand the underlying concepts, principles, and procedures that comprise the activity. *Significant instructor effort will be required to successfully execute the maneuver.*

• Practice -- at the completion of the scenario the student will be able to plan and execute the scenario. *Coaching, instruction, and/or assistance from the CFI will correct deviations and errors identified by the CFI.*

• Perform -- at the completion of the scenario, the PT will be able to perform the activity without assistance from the CFI. *Errors and deviations will be identified and corrected by the PT in an expeditious manner. At no time will the successful completion of the activity be in doubt.* ("Perform" will be used to signify that the PT is satisfactorily demonstrating proficiency in traditional piloting and systems operation skills)

• Not Observed -- Any event not accomplished or required

(ii) Single Pilot Resource Management (SRM) Grades

• Explain -- the student can verbally identify, describe, and understand the risks inherent in the flight scenario. *The student will need to be prompted to identify risks and make decisions.*

• Practice -- the student is able to identify, understand, and apply SRM principles to the actual flight situation. *Coaching, instruction, and/or assistance from the CFI will quickly correct minor deviations and errors identified by the CFI. The student will be an active decision maker.*

• Manage/Decide -- the student can correctly gather the most important data available both within and outside the cockpit, identify possible courses of action, evaluate the risk inherent in each course of action, and make the appropriate decision. *Instructor intervention is not required for the safe completion of the flight.*

• Not Observed -- Any event not accomplished or required.

(II) Grading will be conducted independently by the student and the instructor, then compared during the post flight critique.

Scenario Two

Scenario Activities	Scenario Sub Activities	Desired PT Scenario Outcome
Flight Planning	1. Scenario Planning 2. Preflight SRM Briefing 3. Decision making and risk management 4. GPS Navigation system availability 5. GPS Navigation system status 6. Currency of Data Card 7. Change Data Card	1. Explain/Practice 2. Practice 3. Explain/Practice 4. Manage/Decide 5. Manage/Decide 6. Practice/Perform 7. Practice/Perform
Engine Start and Taxi Procedures	1. System Initialization and self-tests 2. Avionics Setup 3. Program Intended Route into GPS and verify for Accuracy 4. SRM/Situational Awareness during taxi (using ADS-B if installed)	1. Practice/Perform 2. Practice/Perform 3. Practice/Perform 4. Practice/Perform
Before Takeoff Checks	1. Set PFD Bugs and Settings for Takeoff and Departure 2. Set MFD Ranges and Display Settings as Appropriate for Departure (Traffic and Weather if installed) 3. Aircraft Automation Set for Departure (if autopilot installed) 4. Aeronautical Decision Making and Risk management	1. Practice/Perform 2. Practice/Perform 3. Explain/Practice 4. Explain/Practice
IFR Departure	1. Normal Takeoff and Climb 2. IFR Departure Procedures 3. Situational Awareness 4. ADM and Risk Management 5. Monitor and Change PRD and MFD Settings as Appropriate During Departure and Transition to IFR Enroute	1. Perform 2. Practice/Perform 3. Practice/Perform 4. Practice/Perform 5. Explain/Practice
Cruise Procedures	1. IFR Navigation programming 2. MFD Display Settings, Traffic, Terrain, Weather 3. Task Management, SA, and ADM	1. Practice/Perform 2. Practice/Perform 3. Explain
Basic Attitude Instrument Maneuvers **Note: All items will be accomplished under simulated IFR conditions while the instructor maintains adequate visual references.**	1. Normal Turns 2. Climbing and Descending Turns 3. Steep Turns 4. Stall Recognition and Recovery 5. Unusual Attitude Recognition and Recovery	1. Practice/Perform 2. Practice/Perform 3. Practice/Perform 4. Practice/Perform 5. Practice/Perform

IFR GPS Operation and Programming	IFR a. Direct-To b. Nearest c. Airport Information d. Change Flight Plan e. Instrument approaches f. Holding g. Missed Approach Procedures	Practice/Perform
Autopilot Programming, Modes and Annunciations (If autopilot installed)	1. Vertical Speed and Altitude Hold 2. Navigation Modes 3. Flight Director/PFD Interface	1. Practice/Perform 2. Practice/Perform 3. Practice/Perform
Descent Planning and Execution	1. Automation Management 2. VNAV Planning (if installed) 3. Navigation programming 4. IFR Arrival Planning using MFD Navigation, Airport, Traffic, Weather, and Terrain Displays 5. PFD Bugs and Indications Set for Arrival 6. Communications 7. Instrument Approach 8. Missed Approach Procedures	1. Explain/Practice 2. Explain/Practice 3. Practice/Perform 4. Explain/Practice 5. Practice/Perform 6. Practice/Perform 7. Practice/Perform 8. Practice/Perform
Landing	1. Before landing procedures 2. Normal Landing 3. ADM and SA 4. IFR Landing Transition 5. Airport/Runway SA (using ADS-B if installed)	1. Practice/Perform 2. Practice/Perform 3. Practice/Perform 4. Practice/Perform 5. Explain/Practice
Aircraft Shutdown and Securing procedure	1. Aircraft Shutdown and Securing Checklist 2. 2. Aircraft Tie down	1. Practice/Perform 2. Perform

LESSON 3
MASTER SYLLABUS – INTEGRATED FLIGHT NAVIGATION SYSTEMS

OBJECTIVE

The Pilot in Training (PT) will practice the use of emergency, abnormal, alternative, or backup display functions of the IFNS. This includes the use of backup PFD functions after simulating a failure of the PFD, backup displays of the MFD, and the use of the backup instruments both VFR and IFR operations. Emphasis during this flight should be placed on the using the correct display functions to provide backup displays of aircraft attitude, altitude, heading, and airspeed as well as navigation functions assuming failures of the PFD, MFD, or both. This is based on the assumption the PT is proficient in the airplane being flown and is expected to execute all normal and emergency procedures not associated with the IFNS necessary for the flight even though they may not be listed below.

> NOTE: The term "backup displays" means using alternative means of displaying the information normally displayed by the PFD or MFD in the event of a partial or complete failure of the PFD or MFD displays. The operating manual for the specific type of equipment should be consulted for the correct methods of displaying information in the event of a failure of the primary display. This may include the use of analog instruments as installed as a means of providing this information.
>
> NOTE: If the PT is not instrument rated, then the IFR operations listed in this flight can be omitted. If the PT can demonstrate the ability to perform at the "Manage/Decide" and "Perform" levels of proficiency, then that maneuver or operation can be considered completed during this flight.

SCENARIO 3

Preflight

The PT will plan a short flight, VFR and IFR combined, of about one hour or less in duration, to include an instrument approach to full stop landing an airport other than the departure airport, and return to the airport of origin. The instrument approach should be one that has not been performed or practiced by the PT on Lesson 2.

The PT will describe and explain the use of emergency and abnormal procedures using the alternative and/or backup display functions of the IFNS during IFR and VFR operations.

The PT will perform all preflight procedures, engine start-up, avionics set-up, taxi and before-takeoff procedures for each leg of the scenario. This will include GPS flight plan programming for the flight as well as MFD and PFD setup and an effective pre-takeoff briefing.

These Preflight activities will be accomplished prior to takeoff for each leg of the flight

Leg 1 (Outbound flight)
The PT will perform a normal takeoff and IFR departure. At some point after departure, the instructor will simulate a failure of the PFD. The PT is expected to use the appropriate alternative display functions available to regain attitude, altitude, heading and airspeed information. The instructor will simulate a failure of the MFD and the PT should practice navigation using the appropriate alternative display. Each type of equipment will have unique methods of alternative displays of flight and navigation information and these methods should be practiced by the PT. The PT should also practice basic attitude flying using the backup instruments and/or displays. The PT will perform an instrument approach using these alternative, abnormal, or backup displays. If the airplane is equipped with an autopilot, it may be used to allow the PT to concentrate on the PFD/MFD displays.

Leg 2 (Outbound from first airport of landing)
A different VFR route will be programmed into the GPS flight plan for the return trip. After the aircraft is established in cruise, the PT will practice programming route changes and the use of alternative, abnormal, and or backup displays to fly the new route back to the airport of origin.

The PT will use the avionics to proceed to the destination, plan and perform a visual approach to a full stop landing.

Post flight

The PT will perform all aircraft and shutdown and securing procedures.

PREREQUISITES

Completion of training provider pre-training packet corrected to 100%.

Completion of a Quiz normal operating procedures, aircraft systems, and avionics corrected to 100%

PILOT IN TRAINING PREPARATION

Review the following:

a. Normal operating procedures in the POH
b. A worksheet on avionics systems and procedures
c. Airport information for departure and destination airports.
d. Route of flight information for both trips.
e. Aircraft and avionics systems display and procedures.

BRIEFING ITEMS

A. INITIAL INTRODUCTION:

PTs should have a clear understanding of the Pilot in Command concept and how command is transferred. This should include a detailed pre-takeoff briefing procedure and format.

B. SINGLE PILOT RESOURCE MANAGEMENT (SRM)

c. Basic pre-flight and in-flight decision-making and risk management.

C. SAFETY

The following safety items should be briefed to all PTs

e. Mid-air collision avoidance procedures
f. Taxi procedures

Scenario Three

(note: these activities will be completed as part of the training scenario and are not intended to be a list of training tasks to be completed in numerical order)

Desired Pilot in Training (PT) Scenario Outcomes – The object of scenario-based training is a change in the thought processes, habits, and behaviors of the PT during the planning and execution of the scenario. Since the training is "student-centered," the success of the training is measured in the following desired PT performances:

(I) Learner-Centered Grading involves both maneuver and single-pilot resource management (SRM) grading.

(i) Maneuver Grades (Tasks)

• Explain -- at the completion of the scenario the PT will be able to describe the scenario activity and understand the underlying concepts, principles, and procedures that comprise the activity. *Significant instructor effort will be required to successfully execute the maneuver.*

• Practice -- at the completion of the scenario the student will be able to plan and execute the scenario. *Coaching, instruction, and/or assistance from the CFI will correct deviations and errors identified by the CFI.*

• Perform -- at the completion of the scenario, the PT will be able to perform the activity without assistance from the CFI. *Errors and deviations will be identified and corrected by the PT in an expeditious manner. At no time will the successful completion of the activity be in doubt.* ("Perform" will be used to signify that the PT is satisfactorily demonstrating proficiency in traditional piloting and systems operation skills)

• Not Observed -- Any event not accomplished or required

(ii) Single Pilot Resource Management (SRM) Grades

• Explain -- the student can verbally identify, describe, and understand the risks inherent in the flight scenario. *The student will need to be prompted to identify risks and make decisions.*

• Practice -- the student is able to identify, understand, and apply SRM principles to the actual flight situation. *Coaching, instruction, and/or assistance from the CFI will quickly correct minor deviations and errors identified by the CFI. The student will be an active decision maker.*

• Manage/Decide -- the student can correctly gather the most important data available both within and outside the cockpit, identify possible courses of action, evaluate the risk inherent in each course of action, and make the appropriate decision. *Instructor intervention is not required for the safe completion of the flight.*

• Not Observed -- Any event not accomplished or required.

(II) Grading will be conducted independently by the student and the instructor, then compared during the post flight critique.

Scenario Three

Scenario Activities	Scenario Sub Activities	Desired PT Scenario Outcome
Flight Planning	1. Scenario Planning 2. Preflight SRM Briefing 3. Decision making and risk management 4. GPS Navigation system availability 5. GPS Navigation system status 6. Currency of Data Card 7. Change Data Card	1. Perform 2. Perform 3. Perform 4. Manage/Decide 5. Manage/Decide 6. Perform 7. Perform
Engine Start and Taxi Procedures	1. System Initialization and self-tests 2. Avionics Setup 3. Program Intended Route into GPS and verify for Accuracy 4. SRM/Situational Awareness during taxi (using ADS-B if installed)	1. Perform 2. Perform 3. Perform 4. Perform
Before Takeoff Checks	1. Set PFD Bugs and Settings for Takeoff and Departure 2. Set MFD Ranges and Display Settings as Appropriate for Departure (Traffic and Weather if installed) 3. Aircraft Automation Set for Departure (if autopilot installed) 4. Aeronautical Decision Making and Risk management	1. Perform 2. Perform 3. Explain/Perform 4. Explain
Takeoff and Climb	1. Normal Takeoff and Climb 2. Situational Awareness 3. ADM and Risk Management 4. Monitor and Change PRD and MFD Settings as Appropriate During Enroute Climb or IFR and VFR Departures.	1. Perform 2. Perform 3. Describe 4. Explain/Perform
Cruise Procedures	IFR and VFR Enroute Operations Using Backup Displays	Practice/Perform
Avionics Interface	1. Identification of Data/Power sources 2. Identification of PFD Failure Modes 3. Aircraft Automation management	1. Explain/Practice 2. Explain/Practice 3. Explain/Practice

Attitude Instrument Flying using Backup Displays**. NOTE: These items can be practiced and evaluated during normal phases of flight.**	1. Straight and level 2. Normal Turns 3. Climbing and Descending Turns	1. Practice/Perform 2. Practice/Perform 3. Practice/Perform
Descent Planning and Execution using Backup Displays	1. Automation Management 2. VNAV Planning (if installed) 3. Navigation programming 4. Arrival Planning using MFD Navigation, Airport, Traffic, Weather, and Terrain Displays 5. PFD Bugs and Indications Set for Arrival 6. Communications 7. Instrument Approach 8. VFR Arrival	1. Perform 2. Explain/Perform 3. Perform 4. Explain/Perform 5. Practice/Perform 6. Practice/Perform 7. Practice/Perform 8. Practice/Perform
Landing	1. Before landing procedures 2. Normal Landing 3. ADM and SA 4. Airport/Runway SA (using ADS-B if installed)	1. Practice/Perform 2. Perform 3. Explain/Perform 4. Explain
Aircraft Shutdown and Securing procedure	1. 1. Aircraft Shutdown and Securing Checklist 2. 2. Aircraft Tie down	1. Perform 2. Perform

LESSON 4
MASTER SYLLABUS – INTEGRATED FLIGHT NAVIGATION SYSTEMS

OBJECTIVE

The Pilot in Training (PT) will demonstrate to the "Perform" and "Manage/Decide" levels of proficiency all tasks not demonstrated to that level during the previous lessons while operating the IFNS in VFR and IFR operations.

SCENARIO 1

Preflight

The PT will plan a short flight, VFR and IFR combined, of about one hour or less in duration, to include a full stop landing an airport other than the departure airport, and return to the airport of origin.

The PT will describe his/her approach to management of the specific risks involved in this flight. The Instructor will provide the necessary guidance to insure that the plan provides for all the scenario activities and sub-activities listed for this lesson. The PT is evaluated on the ability to plan a comprehensive flight with conscious attention to all the required scenario activities.

The PT will perform all preflight procedures, engine start-up, avionics set-up, taxi and before-takeoff procedures for each leg of the scenario. This will include GPS flight plan programming for the flight as well as MFD and PFD setup and an effective pre-takeoff briefing.

These Preflight activities will be accomplished prior to takeoff for each leg of the flight

Leg 1 (Outbound flight)
The PT will perform a normal takeoff and departure to a safe altitude. Aircraft avionics functions will be practiced during cruise, descent, and normal landing phase of flight. Emphasis should be on the correct interpretation of the PFD and MFD. The PT should practice basic programming of the navigation functions, communication functions. The PT will perform an instrument approach, with a missed approach, and return for a full stop landing. If the airplane is equipped with an autopilot, functions can be used to allow the PT to concentrate on the PFD/MFD displays.

Leg 2 (Outbound from first airport of landing)
A different route will be programmed into the GPS flight plan for the return trip and an actual or simulated crosswind takeoff will be performed. After the aircraft is established in cruise the flight will continue in the manual mode with continued practice of aircraft avionics. Airspeed and configuration changes are practiced during cruise. At some point on the return trip the flight will proceed to a designated "practice" area to accomplish steep turns, slow flight, the stall recognition and recovery series, and unusual

attitude recovery. The purpose of this is to allow the PT to gain experience in the correct interpretation of the PFD and MFD during these maneuvers.

The PT will use the avionics to proceed to the destination and will perform a visual approach and unplanned go-around prior to making the final landing.

Post flight

The PT will perform all aircraft and shutdown and securing procedures.

PREREQUISITES

Completion of training provider pre-training packet corrected to 100%.

Completion of a Quiz normal operating procedures, aircraft systems, and avionics corrected to 100%

PILOT IN TRAINING PREPARATION

Review the following:

a. Normal operating procedures in the POH
b. A worksheet on avionics systems and procedures
c. Airport information for departure and destination airports.
d. Route of flight information for both trips.
e. Aircraft and avionics systems display and procedures.

BRIEFING ITEMS

A. INITIAL INTRODUCTION:

PTs should have a clear understanding of the Pilot in Command concept and how command is transferred. This should include a detailed pre-takeoff briefing procedure and format.

B. SINGLE PILOT RESOURCE MANAGEMENT (SRM)

d. Basic pre-flight and in-flight decision-making and risk management.

C. SAFETY

The following safety items should be briefed to all PTs

g. Mid-air collision avoidance procedures
h. Taxi procedures

Scenario Four

(note: these activities will be completed as part of the training scenario and are not intended to be a list of training tasks to be completed in numerical order)

Desired Pilot in Training (PT) Scenario Outcomes – The object of scenario-based training is a change in the thought processes, habits, and behaviors of the PT during the planning and execution of the scenario. Since the training is "student-centered," the success of the training is measured in the following desired PT performances:

(I) Learner-Centered Grading involves both maneuver and single-pilot resource management (SRM) grading.

(i) Maneuver Grades (Tasks)

• Explain -- at the completion of the scenario the PT will be able to describe the scenario activity and understand the underlying concepts, principles, and procedures that comprise the activity. *Significant instructor effort will be required to successfully execute the maneuver.*

• Practice -- at the completion of the scenario the student will be able to plan and execute the scenario. *Coaching, instruction, and/or assistance from the CFI will correct deviations and errors identified by the CFI.*

• Perform -- at the completion of the scenario, the PT will be able to perform the activity without assistance from the CFI. *Errors and deviations will be identified and corrected by the PT in an expeditious manner. At no time will the successful completion of the activity be in doubt.* ("Perform" will be used to signify that the PT is satisfactorily demonstrating proficiency in traditional piloting and systems operation skills)

• Not Observed -- Any event not accomplished or required

(ii) Single Pilot Resource Management (SRM) Grades

• Explain -- the student can verbally identify, describe, and understand the risks inherent in the flight scenario. *The student will need to be prompted to identify risks and make decisions.*

• Practice -- the student is able to identify, understand, and apply SRM principles to the actual flight situation. *Coaching, instruction, and/or assistance from the CFI will quickly correct minor deviations and errors identified by the CFI. The student will be an active decision maker.*

• Manage/Decide -- the student can correctly gather the most important data available both within and outside the cockpit, identify possible courses of action, evaluate the risk inherent in each course of action, and make the appropriate decision. *Instructor intervention is not required for the safe completion of the flight.*

• Not Observed -- Any event not accomplished or required.

(II) Grading will be conducted independently by the student and the instructor, then compared during the post flight critique.

Scenario Four

Scenario Activities	Scenario Sub Activities	Desired PT Scenario Outcome
Flight Planning	1. Scenario Planning 2. Preflight SRM Briefing 3. Decision making and risk management 4. GPS Navigation system availability 5. GPS Navigation system status 6. Currency of Data Card 7. Change Data Card	1. Perform 2. Perform 3. Manage/Decide 4. Perform 5. Perform 6. Perform 7. Perform
Engine Start and Taxi Procedures	1. System Initialization and self tests 2. Avionics setup 3. Program Intended Route into GPS and check for Accuracy 4. SRM/Situational Awareness during taxi (using ADS-B if installed)	1. Perform 2. Manage/Decide 3. Perform 4. Perform
Before Takeoff Checks	1. Set PFD Bugs and Settings for Takeoff and Departure 2. Set MFD Ranges and Display Settings as Appropriate for Departure (Traffic and weather if installed) 3. Aircraft Automation Set for Departure (if autopilot installed) 4. Aeronautical Decision Making and Risk management	1. Perform 2. Perform 3. Perform 4. Manage/Decide
Takeoff and Climb	1. Normal Takeoff and Climb 2. IFR Departure Procedures 3. Crosswind Takeoff and Climb 4. Situational Awareness 5. ADM and Risk Management 6. Monitor and Change PFD and MFD settings as Appropriate During Enroute Climb	1. Perform 2. Perform 3. Perform 4. Manage/Decide 5. Manage/Decide 6. Perform
Cruise Procedures	1. Navigation programming 2. MFD Display Settings, Traffic, Terrain, Weather 3. Task Management, SA, and ADM 4. IFR and VFR Enroute Operations Using Backup Display	1. Perform 2. Perform 3. Manage/Decide 4. Perform
Control Performance Instrument /Visual Crosscheck **Note: All items will be accomplished enroute during the scenario**	1. Straight and level 2. Normal Turns 3. Climbing and Descending Turns 4. Steep Turns	1. Perform 2. Perform 3. Perform 4. Perform

Low Speed Envelope **Note 1: Slow Flight and Stall Recovery may be accomplished enroute or in a practice area** **Note 2: Emphasis will be placed on stall prevention and recovery**	1. Configuration Changes and Slow Flight 2. Recovery from Power Off Stalls 3. Recovery from Power On Stalls 4. Stall prevention, SA, TM, and ADM	1. Perform 2. Perform 3. Perform 4. Manage/Decide
GPS Operation and Programming	1. VFR (non instrument rated PT) a. Direct-To b. Nearest c. Airport Information d. Flight Plan 2. IFR (instrument rated PT) a. Direct-To b. Nearest c. Airport Information d. Approach Select e. Change Flight Plan f. Holding g. Missed Approach Procedures	1. Perform 2. Perform
Autopilot Programming, Modes and Annunciations	1. Vertical Speed and Altitude Hold 2. Navigation Modes 3. Flight Director/PFD Interface	1. Perform 2. Perform 3. Perform
Avionics Interface	1. Identification of Data/Power sources 2. Identification of PFD Failure Modes 3. Aircraft Automation management	1. Perform 2. Perform 3. Perform
Descent Planning and Execution	1. Automation Management 2. VNAV Planning (if installed) 3. Navigation programming 4. Arrival Planning using MFD Navigation, Airport, Traffic, Weather, and Terrain Displays 5. PFD Bugs an Indications Set for Arrival 6. Communication 7. Instrument Approach 8. VFR Arrival 9. Missed Approach Procedures	1. Perform 2. Perform 3. Perform 4. Explain/Perform 5. Perform 6. Perform 7. Perform 8. Perform 9. Perform

Landing	1. Before landing procedures 2. IFR Landing Transition 3. Normal Landing 4. Crosswind landing 5. Balked landing and Go-Around 6. ADM and SA 7. Airport/Runway SA (using ADS-B if installed)	1. Perform 2. Perform 3. Perform 4. Perform 5. Perform 6. Manage/decide 7. Perform
Aircraft Shutdown and Securing procedure	1. Aircraft Shutdown and Securing Checklist 2. Aircraft Tie down	1. Perform 2. Perform

Single Pilot Resource Management (SRM)		
Unit Objective – Demonstrates safe and efficient operations by adequately managing all available resources.		
Performance	Conditions	Standards
The training task is:	The training is conducted during:	The pilot in training will:
1. Preflight SRM Briefing	Note: All tasks under SRM will be embedded into the curriculum and the training will occur selectively during all phases of training. SRM will be graded as it occurs during the training scenario syllabus.	Be aware of all factors such as traffic, weather, fuel state, aircraft mechanical condition, and pilot fatigue level have an impact on the successful completion of the training scenario.
2. Risk Management (RM) and Aeronautical Decision Making (ADM)		Consistently make informed decisions in a timely manner based on the task at hand and a thorough knowledge and use of all available resources.

Flight Planning		
Unit Objective – Develop thorough and successful preflight habit patterns for flight planning, performance, weight and balance, and normal and emergency single pilot resource management		
Performance	Conditions	Standards
The training task is:	The training is conducted during:	The pilot in training will:
1. Planning Scenario	Preflight planning	a. Review the required elements of the appropriate flight training scenario b. Decide on the optimum route and sequence of events to accomplish all required tasks c. Obtain all required charts and documents d. Obtain and analyze an FAA approved weather briefing appropriate to the scenario to be flown e. File a flight plan (VFR/IFR) for the scenario to be flown
2. Preflight SRM Briefing	Preflight planning	a. Orally review in specific terms all aspects of the flight scenario b. Identify possible emergency and abnormal procedures relevant to the scenario and describe successful SRM strategies to deal with them.

3. Decision Making and Risk Management	a. Pre-Arrival e Learning b. Classroom Training c. All phases of flight planning and flight	a. Make sound decisions based on a logical analysis of factual information, aircraft capability, and pilot experience and skill b. Continuously critique the success of the flight scenario c. Adjust the training scenario to maintain flight safety at all times.
4. GPS Navigation System Availability	a. Pre-Arrival e Learning b. Classroom Training c. All phases of flight planning and flight	Check for the availability of the GPS system through the use of the available indications on the system
5. GPS Navigation System Status		Check for the status of the GPS navigation system using available indications
6. Currency of Data Card		Become familiar with the limitations of the data card in relation to date
7. Change Data Card		Be aware of the necessity to have a current data card

Engine Start and Taxi Procedures		
Unit Objective – Aircraft familiarization, checklists, cockpit procedures and PFD/GPS/MFD and autopilot operation.		
Performance	Conditions	Standards
The training task is:	The training is conducted during:	The pilot in training will:
1. System Initialization and Self Tests	a. Pre-flight briefing b. Actual aircraft pre-flight	a. Conduct a system initialization check according to the POH
2. Avionics Setup	a. Pre-arrival b. Pre-flight briefing	a. Perform PFD/AHRS initialization b. Perform autopilot pre-flight checks c. Program all the GPS and MFD according to the POH for the specific training scenario to be flown.
3. Program Intended Route	a. Pre-flight briefing b. b. During any changes made to the route by ATC or other means	Program the intended route into the GPS database
4. SRM/Situational Awareness During Taxi	Taxing on airport grounds	a. Aware of all surroundings while taxing on airport grounds. b. ADS-B may be used for assistance if installed

Takeoff and Climb		
Unit Objective – demonstrate the proper takeoff procedures for the TAA		
Performance	Conditions	Standards
The training task is:	The training is conducted during:	The pilot in training will:
1. Normal takeoff	In-Flight from lineup on the runway through flap reduction	Perform a normal takeoff within the PTS.
2. Crosswind takeoff		Perform a crosswind takeoff within the PTS.
3. IFR Departure Procedures		Perform IFR departure procedures within the PTS.
4. Monitor and Change PFD and MFD Settings		Monitor PFD and perform any necessary changes
5. Situational Awareness		a. Identify traffic, systems failures, and other developing situations that might prompt the performance of an aborted takeoff. b. Verbalize and prioritize those situations present during any given takeoff
6. Aeronautical Decision Making/Risk management		Decide to continue or abort any given takeoff based on the actual situation or a simulated scenario created by the instructor.

Cruise procedures		
Unit Objective – demonstrate the proper cruise procedures for the equipment		
Performance	Conditions	Standards
The training task is:	The training is conducted during:	The pilot in training will:
1. Navigation Programming	In Cruise Flight	Program flight plan changes into the GPS.
2. Multi Function Display Normal Operation Setup Pages Navigation Modes Traffic Mode Weather Modes		Demonstrate proper use of the avionics interface during normal operations including setup, navigation, traffic, weather, and checklist.

3. Task Management, Situational Awareness, and Decision making		a. Identify all traffic, hazardous terrain, and potentially hazardous situation as they occur by reference to visual clearing and the MFD (if available and optioned) b. Perform all required in-cockpit tasks in such a manner that visual clearing is not impacted negatively c. Make timely decisions based on information obtained, visually, by radio, or by aircraft automation equipment
4. IFR and VFR Enroute Operations		

Control Performance Instrument/Visual crosscheck		
Unit Objective – demonstrate the proper use of flight controls and Visual or PFD derived cues to perform basic flight maneuvers in the TAA		
Performance	Conditions	Standards
The training task is:	The training is conducted during:	The pilot in training will:
1. Straight and level 2. Normal Turns 3. Climbing and Descending Turns 4. Steep Turns (45 degree)	a. Pre-Flight briefing b. In Flight	a. Perform the maneuver by sole reference to the window within the PTS. b. Perform the maneuver by sole reference to the PFD within the PTS. c. Establishes airspeed and altitude within the PTS.

Low Speed Envelope		
Unit Objective – recognize the onset of low speed flight regimes and demonstrate the proper use of flight controls and Visual or PFD derived cues to perform basic low speed flight maneuvers in the TAA		
Performance	Conditions	Standards
The training task is:	The training is conducted during:	The pilot in training will:
1. Configuration changes	a. Pre-Flight briefing b. In Flight	Demonstrate slow flight within the PTS standard with the flaps in all possible flap positions and detents
2. Slow Flight		Demonstrate slow flight within the PTS standard with the flaps in all possible flap positions and detents

3. Recovery From Power –Off and Power -On Stalls		a. Demonstrate a recovery from a planned Power-Off or Power-On Stall with minimum altitude loss. b. Demonstrate a recovery from an instructor induced Power-On/Power-Off stall with minimum altitude loss.
4. Stall Prevention, Situational Awareness, Task management, and Decision Making		that might lead to an inadvertent stall and cockpit indications that would warn of an impending stall b. Demonstrate pilot actions to avert the stall prior to its occurrence

GPS Operation and Programming		
Unit Objective – demonstrate proficiency with the GPS		
Performance	Conditions	Standards
The training task is:	The training is conducted during:	The pilot in training will:
1. VFR: Direct-To Function Nearest Function Airport Information Function Flight Plan Function	In-flight	Demonstrate proficiency using the GPS including the Direct-To, Nearest, and Airport Information functions
2. IFR: Direct-To Function Nearest Function DP/STAR/Approach Function Flight Plan Function – Integration with…	a. Pre-flight b. In-flight	a. Demonstrate proficiency using the GPS including the Direct-To, Nearest, Airport Information, DP/STAR/Approach functions b. Demonstrate proficiency flight planning the GPS and flying the flight plan

Autopilot Programming, Modes, and Annunciators		
Unit Objective – demonstrate proper use of the autopilot.		
Performance	Conditions	Standards
The training task is:	The training is conducted during:	The pilot in training will:
1. Vertical Speed and Altitude Hold	n-flight	Demonstrate proper use of the vertical speed and altitude hold
2. Navigation Modes	n-flight	Demonstrate proper use of the navigation modes of the autopilot
3. Flight Director/PFD Interface	n-flight	Demonstrate proper use of the flight director/PFD interfaces

Automated Avionics Interface		
Unit Objective – demonstrate proficiency interfacing the avionics for flight operations		
Performance	Conditions	Standards
The training task is:	The training is conducted during:	The pilot in training will:
1. Identification of Data/Power Sources a. Air Data failure b. AHRS failure c. Generator/battery failure	a. Pre-Arrival E learning b. Classroom c. Pre-flight d. In-flight	a. Understand data/power source failure modes that affect operation of the PFD. b. Identify specific failures and their associated cues.
2. Identification of PFD Failure Modes and corrective actions a. Invalid Sensor Data b. Invalid Heading c. Crosscheck Monitor d. Recoverable Attitude e. Invalid Attitude and Heading f. Complete/partial Electrical Power failure		Perform the appropriate corrective action for each malfunction.
3. Aircraft Automation Management		a. Understand and be able to correctly describe the interface between all the installed avionics systems in the aircraft b. Demonstrate proficiency operating the Avionics installed on the aircraft as an integrated system

Descent Planning and Execution		
Unit Objective – demonstrate the proper descent procedures for the TAA		
Performance	Conditions	Standards
The training task is:	The training is conducted during:	The pilot in training will:
1. Automation management	a. Pre-Fight briefing b. Descent planning during the cruise leg and the descent itself from cruise altitude until just prior to flap extension for landing	a. Decide which automated features will be used during the descent and program then prior to beginning the descent b. Monitor and update the automated features during the descent
2. Vertical Navigation (VNAV) Planning		Use the descent features of the GPS and the map features of the MFD to plan a fuel efficient descent that avoids known obstacles and terrain
3. Navigation Programming		Program the entire descent (VFR) and program and activate the desired approach and go-around (IFR)
4. Arrival Using MFD/PFD Navigation		a. Perform a descent using information available in the MFD, such as airport information, weather, traffic, and terrain info. b. Conduct an instrument approach c. Set PFD bugs to indicate arrival settings

Instrument Approach Procedures		
Unit Objective – demonstrate IFR procedure proficient in the TAA using the installed equipment.		
Performance	Conditions	Standards
The training task is:	The training is conducted during:	The pilot in training will:
1. Instrument Approach	a. Pre-arrival – eLearning b. Pre-Flight Briefing c. In-Flight	Perform the approach within the PTS standards
2. Missed Approach		Perform the missed approach within the PTS standards
3. Holding		Demonstrate Instrument Holding to PTS Standards
4. Task Management and Decision making		Demonstrate proper planning and prioritization of time between avionics programming and execution of IFR procedures
5. Situational Awareness		Demonstrate proper use of the MFD and HIS to maintain situational awareness during IFR procedures

Landings		
Unit Objective – demonstrate landing procedures in the TAA.		
Performance	Conditions	Standards
The training task is:	The training is conducted during:	The pilot in training will:
1. Before landing procedures	a. Pre-arrival – "eLearning" b. Preflight Briefing c. In flight d. (VFR) flap extension to turning off the runway or return to pattern altitude in the event of a go-around e. (IFR) from 1,000 feet (stabilized approach until turning off the runway or climb to missed approach altitude	Perform all pre-landing checklist items correctly and in sequence
2. IFR Landing Transition (Autopilot to manual and manual to Manual)		a. Demonstrate the proper transition from instrument reference to visual reference b. Demonstrate the proper procedures for autopilot disengagement and transition to landing
3. Normal landing		Perform a normal full flap landing within the PTS standard .
4. Crosswind landing		Perform a crosswind landing within the PTS standard
5. Balked landing and Go-Around		a. Make a timely decision to go-around either in flight or after initial touchdown if the landing cannot be accomplished safely b. Perform the balked landing procedure within the PTS standards
6. Decision Making and Situational Awareness		a. Demonstrate awareness of all potential weather, traffic, and airfield factors that might impact the approach and landing b. Make timely decisions to mitigate risks and ensure a successful approach and landing
7. Airport/Runway SA (using ADS-B if installed)		Be aware of all surroundings while taxing on airport grounds. ADS-B may be used for assistance if installed

Aircraft Shutdown and Securing procedures		
Unit Objective – demonstrate proficiency shutting down and securing the TAA		
Performance	Conditions	Standards
The training task is:	The training is conducted during:	The pilot in training will:
1. Aircraft Shutdown & Securing Checklist	Postflight	Demonstrate proficiency properly concluding a flight including engine shutdown and securing
2. Aircraft Tiedown		Demonstrate proficiency properly concluding a flight including aircraft storage