

**LOUISIANA TECH UNIVERSITY
DEPARTMENT OF PROFESSIONAL AVIATION
PART 141 FLIGHT SCHOOL**



**INSTRUMENT RATING
CERTIFICATION COURSE
GROUND AND FLIGHT TRAINING MANUAL**

October 15, 2008



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October 15, 2008

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19	10/15/08	51	10/15/08	81	10/15/08	113	10/15/08
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TRAINING FACILITIES

Training, facilities, locations

1. Description of size: Refer to the drawing page
2. Maximum number of students: Refer to the drawing page
3. Type training aids: Refer to the drawing page
4. Flight Training Device (FTD): FRASCA level 6 located in Davison Hall, room 110 (statement of qualification- renewed annually)
5. Airports at which training flights originate: Ruston Regional Airport
 - a. Description of facilities: Located at Ruston Regional Airport, building contains numerous training rooms.
 - b. Pilot briefing areas: Located in Louisiana Tech Operations building and consist of open bays, private rooms, and large class rooms.
6. Minimum qualifications and ratings fro each instructor assigned:
 - * Instrument Ground Instructor Certificate
7. Airports: Ruston Regional Airport
8. Aircraft: Cessna 172R/172S airplanes will be used for all flight training in this course. These aircraft will meet the requirements of FAR Part 141.39. Radio equipment will consist of at least one 360 channel transceiver and at least on VOR and NDB navigational receiver and a 4096 code transponder with mode C capability. Each airplane is equipped for day and night VFR and IFR flying as specified in FAR Part 91.205.
Chief Instructor for 240, 241, 242, and 243: Dr, Charles R. Heck, Jr.

FLIGHT INSTRUCTOR QUALIFICATIONS

QUALIFICATIONS OF INSTRUCTORS, EVALUATORS, AND OTHER PERSONNEL

CHIEF INSTRUCTOR – Minimum Qualifications (Part 141.35)

1. The Chief Instructor will be responsible for all instructor and student training.
2. Will maintain the qualifications identified in Part 141.35 (a) through (e).
3. Will supervise all Assistant Chief Instructors; Check Instructors; Flight Instructors; and, be a member of the MOI Team.

ASSISTANT CHIEF INSTRUCTOR(S) – Minimum Qualifications (Part 141.36)

1. The Assistant Chief Instructors will conduct all final stage checks for student training.
2. Will maintain the qualifications identified in Part 141.36 as appropriate to the level of qualification identified by the Chief Instructor and Flight Director.
3. Will be Check Instructors and a member of the MOI Team.

CHECK INSTRUCTORS – Minimum Qualifications (Part 141.37)

1. The Check Instructors will conduct course tests except for the final stage check.
2. Will maintain the qualifications identified in Part 141.36 as appropriate to the level of qualification identified by the Chief Instructor and Flight Director.

FLIGHT INSTRUCTORS – Minimum Qualifications (Part 141.33)

1. The Flight Instructors will conduct student flight training as authorized.
2. Will maintain the qualifications identified in Part 141.33 as appropriate to the level of qualification identified by the Chief Instructor and Flight Director.

GROUND INSTRUCTORS – Minimum Qualifications (Part 141.33)

1. Will maintain the qualifications identified in Part 141.33 as appropriate to the level of qualification identified by the Chief Instructor and Flight Director.

**LOUISIANA TECH UNIVERSITY
RUSTON, LOUISIANA, U.S.A.
INSTRUMENT RATING
FLIGHT SCHOOL INFORMATION**

TRAINING AIRCRAFT

Cessna 172R
Cessna 172S

FLIGHT TRAINING DEVICE

Frasca Cessna 172S Level 6 FTD

COURSEWARE

Instrument Rating Practical Test Standards
AC 00-6 Aviation Weather
AC 00-45 Aviation Weather Services
AC 61-23/FAA-H-8083-25 Pilot's Handbook of Aeronautical Knowledge
AC 61-65 Certification: Pilots and Flight Instructors
AC 61-84 Role of Preflight Preparation
AC 90-48 Pilots' Role in Collision Avoidance
AC 120-51 Crew Resource Management Training
AC 60-28 English Language Skill Standards Required by 14 CFR Parts 61, 63, and 65
AC 61-134 General Aviation Controlled Flight into Terrain Awareness
AC 90-94 Guidelines for Using Global Positioning System Equipment for IFR En Route and Terminal Operations and for Non-Precision Instrument Approaches in the U.S.
National Airspace System
FAA-H-8083-3 Airplane Flying Handbook
FAA-H-8083-15 Instrument Flying Handbook
Federal Aviation Regulations
Aeronautical Information Manual
Airport Facility Directory
Notices to Airmen
"Guided Flight Discovery" – Instrument/Commercial. Jeppesen Sanderson, Inc.
Cessna 172S Checklist
Louisiana Tech University Standard Operating Procedures Manual
Cessna 172S Pilot's Operating Handbook
FAA-Approved Airplane Flight Manual
Louisiana Tech University Standardization Procedures
Applicable Navigation Charts

PREFACE

This Training Course Outline (TCO) is published solely for the use of The Department of Professional Aviation, Louisiana Tech University. The Department of Professional Aviation is owned and operated in the name of:

Louisiana Tech University
Department of Professional Aviation
P.O. Box 3181 T.S.
Ruston, Louisiana 71272

Standardization within the Louisiana Tech Department of Professional Aviation is achieved by the use of Training Course Outlines (TCO). It is mandatory that students enrolled in Louisiana Tech Professional Aviation flight courses, possess a personal copy of the TCO appropriate for the course. Instructors are required to use the TCO as a guide for their ground and flight instruction. This assures that all required items are covered and that the training program has continuity based upon a building block approach. A primary responsibility of the Department Head and the Chief Instructor is to ensure that the TCOs are relevant, current, and comply with the requirements mandated by the Federal Aviation Administration.

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INSTRUCTION TIME SUMMARY

TRAINING STAGE	DUAL	XC	ORAL	FTD	GROUND
GROUND STAGE ONE					37.5
GROUND STAGE TWO					37.5
					25.0
FLIGHT STAGE ONE	5.0		5.5	3.0	
FLIGHT STAGE TWO	5.0		7.0	4.0	
FLIGHT STAGE THREE	6.0	2.0	9.9	4.0	
FLIGHT STAGE FOUR	<u>5.0</u>	<u> </u>	<u>5.9</u>	<u>3.0</u>	
TOTAL FOR RATING	21.0	2.0	28.3	14.0	<u>100.0</u>

GROUND TRAINING COURSE REQUIREMENTS AND OBJECTIVES

ENROLLMENT PREREQUISITES: Students enrolling in the Instrument Rating ground classes need only meet the requirements to enroll as a regular student at Louisiana Tech University. Professional Aviation Majors must have completed Professional Aviation 102 as a prerequisite for the course, and meet Part 141; Appendix C criteria.

GROUND TRAINING COURSE OBJECTIVE: The student will develop the knowledge specified by the FAA Instrument Rating Practical Test Standards.

GROUND TRAINING COURSE COMPLETION STANDARDS: The ground-training course will be completed when the student pilot demonstrates instructional knowledge that meets or exceeds those standards outlined in the Instrument Rating Practical Test Standards.

GROUND TRAINING CURRICULUM: Ground school for the Instrument Rating student is accomplished by enrollment in the following Professional Aviation courses at Louisiana Tech University: PRAV 239 (Stage I Ground), PRAV 240 (Stage II Ground), and PRAV 241 (Stage III Ground). Completion of these courses will result in the award of 8 college semester credit hours.

GROUND TRAINING TEXTBOOKS: The ground-training course is structured by Aviation Weather, Peter F. Lester, Jeppesen Sanderson for PRAV 239, Guided Flight Discovery - Instrument Pilot, Jeppesen Sanderson, Inc for PRAV 240 & 241, and The Pilots Manual: Instrument Flying, Trevor Thom, Aviation Supplies & Academics, Inc. Ground training lessons generally follow the sequence and content of these textbooks. Other required reference materials are the FAR/AIM and the Instrument Rating Practical Test Standards.

TRAINING RECORDS:

The Department will establish and maintain current and accurate records of the participation of each student enrolled in the University aviation program. These records will include as a minimum the date the student was enrolled, a chronological log of the student's course attendance, the subjects, and flight operations covered in the student's training, and the names and grades of any tests taken by the student. Additionally, a record will be maintained on the date the student graduated, terminated training, or transferred to another school. Whenever a student graduates, terminates training, or transfers to another school, the student's record will be certified to that effect by the chief instructor. The University will retain each student record for at least 1 year from the date that the student either graduates from the course to which the record pertains, terminates enrollment in the course to which the record pertains, or transfers to another school. The University will make a copy of these records available to the student upon request.

PROFESSIONAL AVIATION 239 STAGE ONE GROUND TRAINING ADVANCED AVIATION WEATHER

OBJECTIVES: The course objective is to provide students an understanding of the elements and causes of weather phenomena, and give them the ability to procure and interpret aviation weather products. Students must understand the types of aviation weather hazards, how to recognize these hazards and know realistic means to avoid or minimize these hazards. The course is developed to prepare students to meet all of the knowledge requirements and pass the FAA written examination at the Commercial, Instrument, and Certified Flight Instructor levels.

REFERENCES:

1. The Department of Professional Aviation Training Course Outline for the Instrument Rating Course.
2. Aviation Weather. Peter F. Lester, Current Edition, Jeppesen Sanderson, Inc.

COMPLETION STANDARDS: The student must be able to recognize critical weather situations on the ground and in-flight. He/she must be able to procure, analyze, and use aeronautical weather reports and forecasts both on the ground and in-flight. He/she is expected to be able to correctly answer the applicable FAA written examination weather questions.

INDEX AND COURSE SUMMARY

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TOTAL HOURS - STAGE ONE	37.5	

LESSON 1: (1 hr) COURSE INTRODUCTION

OBJECTIVES: The objective is to inform the student of the class procedures, requirements, objectives and references. This lesson introduces the student to the definition of weather and the basic structure of the atmosphere.

CONTENT:

1. Course introduction
 - A. The Training Course Outline
 - B. Attendance policy
 - C. Classroom procedures and study recommendations.
 - D. Text books required and/or suggested
 - E. Tests and grading procedures
2. Weather defined
3. Monitoring the atmosphere
4. Atmospheric composition
5. Atmospheric properties
 - A. Temperature
 - B. Density
 - C. Pressure
6. The atmospheric vertical structure
 - A. Troposphere
 - B. Stratosphere
 - C. Mesosphere
 - D. Thermosphere
7. Other layers
 - A. Ozone
 - B. Ionosphere

COMPLETION STANDARDS: The student should clearly understand the expectations and requirements for this course. He/she should have knowledge of the basic structure of the atmosphere as a basis for understanding the individual elements that affect weather development.

LESSON 2: (1.5 hrs) ATMOSPHERIC ENERGY AND TEMPERATURE

OBJECTIVES: Since every physical process of weather is accompanied by or is the result of a heat exchange. This lesson focuses on defining temperature, how heat is transferred, and how temperature is described.

CONTENT:

1. Temperature definitions
 - A. Kinetic energy
 - B. Heat
 - C. Temperature
 - D. Latent heat
 - E. Sensible heat
 - F. Specific heat
2. Energy transfer
 - A. Solar radiation
 - B. Absorption
 - C. Conduction
 - D. Convection
 - E. Advection
 - F. Compression
 - G. Expansion
3. Temperature inversion
4. Heat exchanges and weather
5. Expressing Temperature
6. The International Standard Atmosphere (ISA)
7. Determining temperatures aloft
8. Determining the approximate freezing level

COMPLETION STANDARDS: The student should understand the process of temperature exchange and how it affects the development of weather. The student's understanding will be determined by his/her performance on the FAA computer knowledge examinations for the Commercial Pilot Certificate, the Instrument Rating, and the Flight Instructor Certification. He/she should be able to answer the questions in this area based upon analytical knowledge.

LESSON 3: (1.5 hrs) PRESSURE ALTITUDE AND DENSITY ALTITUDE

OBJECTIVES: This lesson describes how atmospheric pressure affects the development of weather. The student should gain an understanding of how atmospheric pressure is measured, how it is plotted, and how pressure patterns are used to analyze and forecast weather.

CONTENT:

1. Atmospheric pressure defined
2. Factors that affect pressure
 - A. Temperature
 - B. Convection
3. Density altitude
4. The gas law
5. Pressure measurements
 - A. Mercurial barometer
 - B. Aneroid barometer.
6. The Standard atmosphere
7. Charting atmospheric pressure
 - A. Lows
 - B. Highs
 - C. Ridges
 - D. Troughs
 - E. Cols
8. Pressure patterns aloft

COMPLETION STANDARDS: The student should have an understanding and appreciation for the influence of atmospheric pressure patterns on the development of weather. The student's understanding will be determined by his/her performance on the FAA computer knowledge examinations for the Commercial Pilot Certificate, the Instrument Rating, and the Flight Instructor Certification. He/she should be able to answer the questions in this area based upon analytical knowledge.

LESSON 4: (1.5 hrs) WIND

OBJECTIVES: This lesson focuses on the development of large scale and local winds. The student is instructed on the causes of wind, the factors that affect wind, and the development of local wind patterns.

CONTENT:

1. Wind terminology
2. Atmospheric circulation systems
3. Scales of circulation
 - A. Macro scale
 - B. Synoptic scale
 - C. Mesoscale
 - D. Micro scale
4. The global circulation model
5. Factors that affect wind
 - A. Pressure gradient force
 - B. Coriolis force
 - C. Geotropic balance
 - D. Centripetal and centrifugal forces
 - E. Friction
6. The gradient or resultant wind
7. Some practical considerations
8. Local winds
 - A. Land and sea breezes
 - B. Anabatic or upslope winds
 - C. Mountain valley winds
 - D. Katabolic winds
 - E. Chinook winds
 - F. Desert winds
 - G. Texan Northerlies
 - H. Northeasters
 - I. Heat island circulation

COMPLETION STANDARDS: The student is expected to have a basic understanding of the causes of wind and the factors that affect its development. He/she should have a realistic appreciation of how large scale and local winds can influence flight planning. The student's understanding will be determined by his/her performance on the FAA computer knowledge examinations for the Commercial Pilot Certificate, the Instrument Rating, and the Flight Instructor Certification. He/she should be able to answer the questions in this area based upon analytical knowledge.

LESSON 5: (1.5 hrs) VERTICAL MOTION AND STABILITY

OBJECTIVES: Because of its influence on the development of weather, an understanding of atmospheric stability is a necessary link in understanding basic meteorology. The objectives are to instruct the student on the causes of vertical atmospheric stability, the adiabatic process, how stability is measured, and the characteristics of a stable and unstable atmosphere.

CONTENT:

1. Stability defined
2. Causes of vertical motions
 - A. Convergence/divergence
 - B. Orographic lifting
 - C. Frontal uplift
 - D. Convective currents
 - E. Mechanical turbulence
 - F. Wave motions
3. Atmospheric stability
4. The adiabatic process
5. The conditions of atmospheric stability
6. Measuring atmospheric stability
7. The lifted index
8. Characteristics of stable and unstable air

COMPLETION STANDARDS: The student should have an understanding of how atmospheric stability influences the development of weather. He should understand how stability affects conditions that often develop into severe flight conditions. The student's understanding will be determined by his/her performance on the FAA computer knowledge examinations for the Commercial Pilot Certificate, the Instrument Rating, and the Flight Instructor Certification. He/she should be able to answer the questions in this area based upon analytical knowledge.

LESSON 6: (1.5 hrs) ATMOSPHERIC MOISTURE

OBJECTIVES: An appreciation of how moisture in the atmosphere influences weather is absolutely essential to being able to understand basic meteorology. This lesson is intended to teach the changes of state of moisture and how this influences the development and intensity of weather. The student should understand how humidity and dew point are important elements in flight planning. This lesson is also intended to provide a basis for recognizing in-flight aviation weather and understanding the affect of visible moisture on flight safety.

CONTENT:

1. The states of moisture
2. Moisture state changes
 - A. Evaporation
 - B. Melting
 - C. Sublimation
 - D. Condensation
 - E. Freezing
 - F. Deposition
 - G. Transpiration
3. The changes of state and latent and sensible heat
4. Vapor pressure
5. Relative humidity
6. Dew point temperature
7. Cloud formation
 - A. Cloud base determination
 - B. Types of clouds
8. High altitude cloud formation
9. Condensation trails
10. Precipitation process
11. Types of precipitation
12. The hydrologic cycle

COMPLETION STANDARDS: The student is expected to know the states of moisture and how its change of state influences the type and intensity of aviation weather. The student's understanding will be determined by his/her performance on the FAA computer knowledge examinations for the Commercial Pilot Certificate, the Instrument Rating, and the Flight Instructor Certification. He/she should be able to answer the questions in this area based upon analytical knowledge.

LESSON 7: (1.5 hrs) TEST AND EVALUATION

OBJECTIVES: This test complies with the University requirement to provide the students with an evaluation and notification of standing prior to the course drop period. Additionally, it provides an incentive as well as an opportunity for the student to assimilate the information learned during the first six lessons.

CONTENT:

The examination shall, as a minimum, consist of at least 50 FAA written examination type multiple-choice questions. The period after the exam will include time to review and evaluate the student's performance on this examination.

COMPLETION STANDARDS: Grading is based on the traditional scale where 90% to 100% equals an "A", 80% to 89% equals a "B", 70% to 79% equals a "C", 60% to 69% equals a "D", and below 60% is a failure.

LESSON 8: (2 hrs) AIR MASSES, FRONTS, AND HURRICANES

OBJECTIVES: The understanding of air mass weather is one of the final elements in an understanding of basic meteorology. The student will be introduced to frontal weather and how to plan a flight to avoid or minimize the hazards associated with different types of Air Mass Fronts.

CONTENT:

1. Air mass defined
2. Air mass source regions
3. Significant air masses in the United States
4. Air mass modification
5. The polar front
6. Frontal waves
7. Frontolysis and frontogenesis
8. Frontal classifications and definition
 - A. Cold front
 - B. Warm front
 - C. Stationary front
 - D. Occluded front
 - E. Dry line front
9. Frontal discontinuities
10. Fronts and flight planning
11. Hurricanes

COMPLETION STANDARDS: The student is expected to have a working knowledge of the types of in-flight weather associated with frontal zones and be able to apply this knowledge in planning a flight. The student's understanding will be determined by his/her performance on the FAA computer knowledge examinations for the Commercial Pilot Certificate, the Instrument Rating, and the Flight Instructor Certification. He/she should be able to answer the questions in this area based upon analytical knowledge.

LESSON 9: (2 hrs) THUNDERSTORMS

OBJECTIVES: Because of the severe impact of thunderstorms on aviation safety, it is essential that the student be given pragmatic instruction on thunderstorm development, the in-flight hazards associated with thunderstorms, and some practical considerations on how to avoid or minimize these hazards.

CONTENT:

1. Factors for development
2. Stages of development
 - A. Cumulus
 - B. Mature
 - C. Dissipating
3. Thunderstorm types
 - A. Air mass thunderstorms
 - B. Multicell thunderstorms
 - C. Supercell thunderstorms
 - D. Frontal or steady state thunderstorms
 - E. Mesoscale convective complexes
 - F. Squall lines
4. Thunderstorm hazards
 - A. Turbulence
 - B. Gust fronts
 - C. Roll clouds
 - D. Hail
 - E. Icing
 - F. Lightning
 - G. Static electricity
 - H. Altimetry
 - I. Water ingestion
5. Tips when encountering thunderstorms
6. Weather radar

COMPLETION STANDARDS: The student must have a practical knowledge of the hazards associated with thunderstorms and how to avoid or minimize these hazards. The student's understanding will be determined by his/her performance on the FAA computer knowledge examinations for the Commercial Pilot Certificate, the Instrument Rating, and the Flight Instructor Certification. He/she should be able to answer the questions in this area based upon analytical knowledge.

LESSON 10: (1.5 hrs) WIND SHEAR/TURBULENCE

OBJECTIVES: This lesson describes the various types of in-flight turbulence, the causes and recognition of weather conditions conducive to turbulence. The objective is for the student to have an understanding of how turbulence affects flight safety and comfort, why and where to predict turbulent conditions, and how to avoid and minimize the effects of turbulence.

CONTENT:

1. Wind shear defined
2. Wind shear and airplane performance
3. Recognizing turbulence
4. Turbulence reporting criteria
5. Turbulence causes and types
 - A. Low level turbulence
 - B. Mechanical turbulence
 - C. Thermal turbulence
 - D. Turbulent eddies
 - E. Convective turbulence
 - F. Frontal windshear
 - G. Inversion wind shear
 - H. Wake turbulence
6. Turbulence in or near thunderstorms
7. Microburst turbulence
8. Clear air turbulence characteristics
9. The tropopause and the jet stream
 - A. The jet stream defined
 - B. The jet stream core
 - C. Seasonal variations
 - D. The jet stream and turbulence
10. Mountain wave turbulence
11. Flying in turbulence
12. Condensation trails

COMPLETION STANDARDS: The student should have a practical knowledge of the recognition of conditions conducive to turbulence and how to avoid or minimize the hazards of the different types of atmospheric turbulence. The student's understanding will be determined by his/her performance on the FAA computer knowledge examinations for the Commercial Pilot Certificate, the Instrument Rating, and the Flight Instructor Certification. He/she should be able to answer the questions in this area based upon analytical knowledge.

LESSON 11: (1.5 hrs) ICING

OBJECTIVES: The objective is to instruct the student on the conditions that are conducive to airplane icing, the types of airplane icing, and the means to avoid or minimize the in-flight hazards associated with icing.

CONTENT:

1. The FARs in regard to icing
2. Ice on the ground
 - A. Dew and frost formation
 - B. Freezing rain
 - C. Sleet
 - D. Snow and ice removal
3. Structural ice in flight
4. Structural ice formation
5. Types of structural icing
 - A. Rime
 - B. Clear
 - C. Mixed
6. Tail plane icing
7. Structural icing and cloud types
 - A. Rain and drizzle
 - B. Cumulus type clouds
 - C. Stratiform clouds
8. Icing criteria
9. Icing effects
 - A. Frost
 - B. Snow
 - C. Carburetor icing
 - D. Induction icing
 - E. Pitot icing
10. Inadvertent flight into icing conditions
11. Deicing and anti-icing

COMPLETION STANDARDS: The student must have a practical knowledge of the conditions for icing and how to avoid or minimize the hazards of airplane icing both on the ground and in flight. The student's understanding will be determined by his/her performance on the FAA computer knowledge examinations for the Commercial Pilot Certificate, the Instrument Rating, and the Flight Instructor Certification. He/she should be able to answer the questions in this area based upon analytical knowledge.

LESSON 12: (2 hrs) INSTRUMENT METEOROLOGICAL CONDITIONS

OBJECTIVES: This lesson is intended to form the basis for understanding and interpreting weather information. The student will be instructed on ceiling and visibility definitions and reporting. This lesson also includes the development of obstructions to vision and how to predict the conditions conducive for the development of these in-flight hazards.

CONTENT:

1. Ceiling defined
2. Ceiling reporting
3. Flight limitations based upon the ceiling
4. Visibility defined
5. Visibility reporting
6. Flight limitations based upon visibility
7. Obstructions to vision in general
8. Fog
 - A. Formation
 - B. Types
 - C. Some rules in dealing with fog conditions
9. Smog
10. Haze
11. Smoke
12. Blowing dust

COMPLETION STANDARDS: The student is expected to know how to interpret ceiling and visibility criteria. He/she should know the different types of visibility obstructions and how to anticipate conditions for their development. The student's understanding will be determined by his/her performance on the FAA computer knowledge examinations for the Commercial Pilot Certificate, the Instrument Rating, and the Flight Instructor Certification. He/she should be able to answer the questions in this area based upon analytical knowledge.

LESSON 13: (1.5 hrs) ADDITIONAL WEATHER HAZARDS

OBJECTIVES: This lesson wraps up the basic meteorology portion of the weather course by discussing some of the additional and miscellaneous hazards associated with aviation weather.

CONTENT:

1. Tornados
2. Volcanic ash
 - A. Volcanic ash hazards
 - B. Ash cloud behavior
 - C. Reports and warnings
3. Miscellaneous Hazards
 - A. The ionosphere
 - B. Stratospheric ozone
 - C. Whiteouts
 - D. Low level inversions
 - E. Runway conditions
4. Cold weather operations

COMPLETION STANDARDS: The student should have a knowledge and appreciation of these aviation in-flight hazards and some practical knowledge of the means to recognize and avoid or minimize their effects. The student's understanding will be determined by his/her performance on the FAA computer knowledge examinations for the Commercial Pilot Certificate, the Instrument Rating, and the Flight Instructor Certification. He/she should be able to answer the questions in this area based upon analytical knowledge.

LESSON 14: (1.5 hrs) TEST AND EVALUATION

OBJECTIVES: This test provides an incentive and the opportunity for the student to summarize the information learned during the lessons eight through thirteen.

CONTENT:

The examination shall, as a minimum, consist of at least 50 FAA written examination type multiple-choice questions. The period after the exam will include time to review and evaluate the student's performance on this examination.

COMPLETION STANDARDS: Grading is based on the traditional scale where 90% to 100% equals an "A", 80% to 89% equals a "B", 70% to 79% equals a "C", 60% to 69% equals a "D", and below 60% is a failure.

LESSON 15: (1.5 hrs) AIRBORNE WEATHER RADAR

OBJECTIVES: This lesson introduces the basic radar principles of RADAR and the major aspects of operating a typical airborne receiver. The student is expected to understand the limitations of RADAR and how to gain the optimum performance of a RADAR receiver.

CONTENT:

1. Fundamentals of RADAR
2. Antenna tilt management
3. Operating Principles
4. Operation Rough Rider

COMPLETION STANDARDS: At the completion of this lesson, the student should have gained an understanding of RADAR principles, basic operational procedures, and have an appreciation for the limitations of RADAR in avoiding severe weather conditions.

LESSON 16: (1.5 hr) AIRBORNE WEATHER RADAR

OBJECTIVES: This lesson continues with the introduction to the basic radar principles of RADAR and the major aspects of operating a typical airborne receiver. The student is expected to understand the limitations of RADAR and how to gain the optimum performance of a RADAR receiver.

CONTENT:

1. Avoidance distances
2. RADAR gain control
3. Weather Accidents
4. RADAR professionalism

COMPLETION STANDARDS: At the completion of this lesson, the student should have gained an understanding of RADAR principles, basic operational procedures, and have an appreciation for the limitations of RADAR in avoiding severe weather conditions.

LESSON 17: (1.5 hrs) AVIATION WEATHER SOURCES

OBJECTIVES: This lesson introduces the student to the numerous sources of aviation weather information, both on the ground and in flight. The student will be instructed on the professional ways to obtain and assimilate a weather briefing.

CONTENT:

1. The aviation weather forecasting process
 - A. Compiling weather data
 - B. Forecasting methods
 - C. Forecasting accuracy and limitations
2. Weather information sources
 - A. The National Weather Service
 - B. FAA weather services
 - C. In-flight weather information
 - D. Alternative weather sources
 - E. Automated weather observation systems
3. The FAA weather information and services
 - A. Pilots Automatic Telephone Weather Answering Service (PATWAS)
 - B. Telephone Information Briefing (TIBS)
 - C. The FAA weather briefing format
 - a. Outlook
 - b. Standard
 - c. Abbreviated
4. In-flight advisories
 - A. Transcribed Weather Broadcast (TWEB)
 - B. Automatic Terminal Information Service (ATIS)
 - C. Enroute Advisory Service (Flight Watch)
 - D. Hazardous In-flight Weather Advisory Service
 - a. Severe Weather Forecast Alert
 - b. Convective SIGMET
 - c. SIGMET
 - d. AIRMET
5. Other sources
 - A. DUAT Weather Briefings
 - B. Commercial services

COMPLETION STANDARDS: The student must be able to procure and understand an aviation weather briefing and know how to obtain weather information while airborne. He/she must know how to obtain, and the significance of, in-flight weather hazard advisories. The student's understanding will be determined by his/her performance on the FAA computer knowledge examinations for the Commercial Pilot Certificate, the Instrument Rating, and the Flight Instructor Certification. He/she should be able to answer the questions in this area based upon analytical knowledge.

LESSON 18: (2.5 hrs) WEATHER REPORTS

OBJECTIVES: This phase of instruction introduces the student to the different types of aviation weather reports.

CONTENT:

1. Basic terms in weather reporting and forecasting
2. Airdrome Actual Weather (METAR AND SPECI)
3. Freezing Level Data (RADAT)
4. Pilot reports
5. The NOTAM System
6. Automated systems
 - A. Automated Surface Observing System (ASOS)
 - B. Automated Weather Observation Systems (AWOS)
 - C. Automatic Observing Station (AUTOB)
7. Radar Weather Report (RAREP)

COMPLETION STANDARDS: The student is expected to be able to interpret and understand the significance of these aviation weather reports. The student's understanding will be determined by his/her performance on the FAA computer knowledge examinations for the Commercial Pilot Certificate, the Instrument Rating, and the Flight Instructor Certification. He/she should be able to answer the questions in this area based upon analytical knowledge.

LESSON 19: (2 hrs) WEATHER CHARTS

OBJECTIVES: This phase of instruction introduces the student to the different types of aviation weather charts.

CONTENT:

1. Surface Analysis Chart
2. Weather Depiction Chart
3. Radar Summary Chart
4. Composite Moisture Stability Chart
5. Constant Pressure Analysis Chart
6. Observed Winds and Temperature Aloft Chart
7. Tropopause Data Chart

COMPLETION STANDARDS: The student is expected to be able to interpret and understand the significance of these aviation weather charts. The student's understanding will be determined by his/her performance on the FAA computer knowledge examinations for the Commercial Pilot Certificate, the Instrument Rating, and the Flight Instructor Certification. He/she should be able to answer the questions in this area based upon analytical knowledge.

LESSON 20: (2.5 hrs) WEATHER FORECASTS

OBJECTIVES: This phase of instruction introduces the student to the different types of aviation weather forecasts.

CONTENT:

1. Area Forecast
2. Airdrome Forecast
3. Wind and Temperature Aloft
4. Low Level Prognostic
5. High Level Prognostic
6. Tropopause Height/Vertical Wind Shear
7. Severe Weather Outlook
8. Convective Outlook

COMPLETION STANDARDS: The student is expected to be able to interpret and understand the significance of these aviation weather forecasts. The student's understanding will be determined by his/her performance on the FAA computer knowledge examinations for the Commercial Pilot Certificate, the Instrument Rating, and the Flight Instructor Certification. He/she should be able to answer the questions in this area based upon analytical knowledge.

LESSON 21: (2.0 hrs) AVIATION WEATHER HAZARDS AND WEATHER SAFETY

OBJECTIVES: This lesson is intended to be a recap of the various types of aviation weather hazards and to provide time for a discussion of the realistic means for avoiding and minimizing these hazards. Statistics based of recent information will be discussed to emphasize the impact of weather on aviation safety.

CONTENT:

1. Cold weather operations
2. Turbulence
 - A. Clear air turbulence
 - B. Thermal and mechanical turbulence:
 - C. Mountain wave turbulence
 - D. Microbursts
 - E. Vortex wake turbulence:
 - F. Low level wind shear:
3. Thunderstorms
4. Icing
5. Hydroplaning

COMPLETION STANDARDS: The student is expected to have matured through this course of study with an appreciation of the various elements of aviation weather, how to recognize the different weather phenomena, and how to minimize the hazards associated with weather. He/she is expected to be able to procure weather information in an efficient and professional manner and be able to interpret and understand the essentials of aviation the weather reporting products. The student must be able to recognize critical weather situations on the ground and in flight.

LESSON 22: (2.0 hr) FINAL TEST AND EVALUATION

OBJECTIVES: This test provides an incentive and the opportunity for the student to summarize the information learned during the course and determine if he/she is prepared to take the FAA computer knowledge examinations for the Commercial Pilot Certificate, the Instrument Rating, and the Flight Instructor Certification.

CONTENT:

The examination shall, as a minimum, consist of at least 50 FAA written examination type multiple-choice questions.

COMPLETION STANDARDS: Grading is based on the traditional scale where 90% to 100% equals an "A", 80% to 89% equals a "B", 70% to 79% equals a "C", 60% to 69% equals a "D", and below 60% is a failure. Professional Aviation Majors must receive a minimum grade of "C" for this course. Failure to do so requires that the course be repeated.

**PROFESSIONAL AVIATION 240
STAGE TWO GROUND TRAINING; PART 1
AIRCRAFT INSTRUMENTS AND NAVIGATIONAL AIDS**

OBJECTIVES: This is the first half of a two-part course. The objective of Instrument Ground School Stage Two is to teach basic elements of instrument flight; to include the airplane flight instruments and navigation equipment, the ground based navigation facilities and aids, and basic attitude instrument flying. This course is intended to focus on "How things work". The second half, Stage Two, will focus on FAA regulatory requirements, IFR procedures and techniques, and the practical application for an IFR flight.

REFERENCES:

1. The Department of Professional Aviation Training Course Outline for the Instrument Rating Course.
2. Guided Flight Discovery - Instrument Pilot. Current Edition, Jeppesen Sanderson, Inc.
3. The FAR/AIM
4. Instrument Flying Handbook
5. Instrument Rating Practical Test Standards
6. Aeronautical Decision Making for Instrument Pilots

COMPLETION STANDARDS: The student should complete this stage with a working knowledge of the principles and operation of the airplane flight instruments and the ground based equipment and facilities that are required for instrument flight. The student's understanding will be determined by intermediate and final written examinations given during this ground training course and by the student's performance on the FAA Instrument Rating Written Examination. The stage is complete when the student passes the final written exam with a minimum score of 70% reconciled to 100%. Professional aviation majors must receive a minimum overall grade of 70% or the course must be repeated.

INDEX AND COURSE SUMMARY

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TOTAL HOURS - STAGE TWO	37.5	

LESSON 1: (2 hrs) INSTRUMENT TRAINING AND OPPORTUNITIES

OBJECTIVES: The objective is to inform the student of the class procedures, requirements, objectives, and study references. This lesson is intended to encourage the student to achieve the instrument rating as well as inform them of the regulatory requirements for the rating. The lesson also informs the student on the requirements for maintaining currency, record requirements, airplane documentation, and airplane instrumentation requirements.

CONTENT:

1. Far (applicable) for IFR flight operations
2. (AIMS) Aeronautical Information Manual
3. Instrument Flight
4. Why an Instrument Rating
5. Currency

COMPLETION STANDARDS: The student should commence acquiring the required reference material for the course. He/she should be knowledgeable of the requirements for an instrument rating and the airplane documentation and equipment requirements.

LESSON 2: (2 hrs) ADVANCED HUMAN FACTORS (SAFE OPERATIONS – ADM)

OBJECTIVES: This lesson provides the student with advanced concepts of aeronautical decision-making.

CONTENT:

1. Aeronautical Decision Making
2. Crew Resource Management
3. The Decision-Making Process
4. Pilot-In-Command Responsibility (Decision making and judgment – ADM)
5. Communication
6. Resource Use
7. Workload Management (Crew Resource Management)
8. Situational Awareness
9. Aviation Physiology
10. Safe Instrument Operations

COMPLETION STANDARDS: This lesson is complete when the student demonstrates knowledge of the advanced concepts of aeronautical decision-making. He/she should be able to recognize the hazardous attitudes and know the possible antidotes. The student should be able to comprehend the significant psychological and environmental factors that influence behavior and know the means to avoid or minimize the risks associated with these factors.

LESSON 3: (1 hr) FLIGHT INSTRUMENT SYSTEMS

OBJECTIVES: The objective is to instruct the student on the operating principles, displays, limitations, and preflight checks of all of the aircraft flight instruments.

CONTENT:

1. Gyroscopic Flight Instruments
2. Instrument Checks
3. Magnetic Compass
4. Pitot-Static Instruments

COMPLETION STANDARDS: The student must be knowledgeable of the basic operating principles of the airplane flight instruments.

LESSON 4: (2 hrs) ATTITUDE INSTRUMENT FLYING

OBJECTIVES: This series of lessons cover basic attitude instrument flying. The objective is to prepare the student for the flight and simulator lessons on basic attitude instrument flying.

CONTENT:

1. Fundamental Skills
2. Attitude Instrument Flying Concepts
3. Basic Flight Maneuvers
4. Coping with Instrument Failure

COMPLETION STANDARDS: Students are required to know the basic instrument cross check techniques for both the primary and supporting and the control and performance concepts for attitude instrument flying.

LESSON 5: (2 hrs) ATTITUDE INSTRUMENT FLYING

OBJECTIVES: This series of lessons cover basic attitude instrument flying. The objective is to prepare the student for the flight and simulator lessons on basic attitude instrument flying.

CONTENT:

1. Partial Panel Flying
2. Unusual Attitude Recovery
3. Stalls
4. Control and Performance Concept

COMPLETION STANDARDS: Students are required to know the basic instrument cross check techniques for both the primary and supporting and the control and performance concepts for attitude instrument flying.

LESSON 6: (2 hrs) INSTRUMENT NAVIGATION

OBJECTIVES: This lesson focuses on the principles of operation and the use of the VOR, ADF, DME, RNAV, FMS, INS, and GPS.

CONTENT:

1. VOR Navigation
2. ADF Navigation
3. Distance Measuring Equipment
4. Operational Considerations
5. Area Navigation
6. Flight Management System
7. Inertial Navigation System
8. Global Positioning System

COMPLETION STANDARDS: The student should complete this lesson with an understanding of the operation and use of the VOR, ADF, DME, RNAV, FMS, INS, and GPS systems.

LESSON 7: (2 hr) AIRPORTS, AIRSPACE, AND FLIGHT INFORMATION

OBJECTIVES: The objective of this lesson is to instruct the student on airport facilities, markings, and lighting along with runway incursion avoidance procedures.

CONTENT:

1. The Airport Environment
2. Runway Incursion Avoidance

COMPLETION STANDARDS: The student is expected to be knowledgeable on the types and interpretation of airport facilities that support instrument flight operations and runway incursion procedures.

LESSON 8: (1 hr) AIRPORTS, AIRSPACE, AND FLIGHT INFORMATION

OBJECTIVES: The objective of this lesson is to instruct the student on the different types of airspaces and flight information needed to make a safe IFR flight.

CONTENT:

1. Airspace
2. Flight Information

COMPLETION STANDARDS: The student is expected to be knowledgeable on the types of airspaces, and the flight information required to make safe IFR flights.

LESSON 9: (2 hrs) AIR TRAFFIC CONTROL SYSTEM

OBJECTIVES: The objective is to teach the basic operating principles of radar and the airplane transponder. Additionally, the student will be introduced to the different types of ATC facilities.

CONTENT:

1. Air Route Traffic Control Center
2. Terminal Facilities

COMPLETION STANDARDS: The student should complete this lesson with an understanding of the basic operating principles of radar and the transponder, along with the different types of ATC facilities.

LESSON 10: (1 hr) ATC CLEARANCES

OBJECTIVES: The objective of this lesson is to teach the student about ATC clearances including their responsibility, how to read back clearances, and how to use short hand in receiving clearances.

CONTENT:

1. Pilot Responsibilities
2. IFR Flight Plan and ATC Clearance
3. Clearance Readback
4. Clearance Shorthand

COMPLETION STANDARDS: The student should have an understanding of ATC clearances, their responsibility, how to read back clearances, and the use of short hand.

LESSON 11: (1 hr) MID-TERM TEST AND EVALUATION

OBJECTIVES: This test complies with the university requirement to provide the students with an evaluation and notification of standing prior to the course drop period. Additionally, it provides an incentive as well as an opportunity for the student to assimilate the material covered in the first ten lessons.

CONTENT:

The examination shall, as a minimum, consist of at least 50 FAA written examination type multiple-choice questions.

COMPLETION STANDARDS: Grading is based on the traditional scale where 90% to 100% equals an "A", 80% to 89% equals a "B", 70% to 79% equals a "C", 60% to 69% equals a "D", and below 60% is a failure.

LESSON 12: (1 hr) DEPARTURE CHARTS AND PROCEDURES

OBJECTIVES: The objective is to guide the student through the typical IFR flight from taxi through the instrument departure.

CONTENT:

1. Obtaining Charts
2. Departure Standards
3. Instrument Departure Procedures
4. Takeoff Minimums
5. Departure Options
6. Selecting a Departure Method

COMPLETION STANDARDS: The student is expected to accomplish, file, copy, and read back an IFR clearance. He/she must be able to perform the elements of the initial phase of an IFR flight through the takeoff and departure. This includes being able to interpret departure procedure charts and communicate properly with the controlling agencies.

LESSON 13: (1 hr) ENROUTE CHARTS AND PROCEDURES

OBJECTIVES: The objective is to instruct the student on the elements of an IFR flight from level off to the feeder or initial approach fix. Emphasis is on IFR communication/navigation, en route instrument flight regulatory requirements, and IFR terminology.

CONTENT:

1. Enroute Charts
2. Area Charts
3. Enroute Radar Procedures
4. IFR Cruising Altitudes
5. Descending from the Enroute Segment

COMPLETION STANDARDS: The student must be able to perform the elements required during the en route phase of an IFR flight, to include navigation and communication procedures. He/she must be able to interpret the IFR en route charts and use the correct radio terminology.

LESSON 14: (2 hrs) HOLDING

OBJECTIVES: The objective of this lesson is to provide the student with knowledge of holding procedures including holding pattern entries and ATC communications.

CONTENT:

1. The Standard Holding Pattern
2. Holding Pattern Entries
3. ATC Holding Instructions

COMPLETION STANDARDS: This lesson will be completed when the student demonstrates knowledge of holding patterns, holding entries, and holding instructions.

LESSON 15: (1.5 hrs) ARRIVAL CHARTS AND PROCEDURES

OBJECTIVES: The objective of this lesson is to instruct the student on IFR arrival procedures.

CONTENT:

1. Standard Terminal Arrival Route
2. Interpreting the STAR
3. Preparing for the Arrival

COMPLETION STANDARDS: This lesson will be complete when the student has knowledge of IFR arrival procedures.

LESSON 16: (2 hrs) APPROACH CHARTS

OBJECTIVES: The objective of this lesson is to instruct the student on instrument approach charts.

CONTENT:

1. Approach Segments
2. Chart Layout

COMPLETION STANDARDS: This lesson will be complete when the student has knowledge of instrument approach charts.

LESSON 17: (2 hrs) APPROACH CHARTS

OBJECTIVES: The objective of this lesson is to provide further instruction on the approach charts including the different kinds of formats.

CONTENT:

1. Airport Chart
2. Approach Chart Format Changes

COMPLETION STANDARDS: This lesson will be completed when the student has knowledge of the approach charts and the different formats of approach charts.

LESSON 18: (2 hrs) APPROACH PROCEDURES

OBJECTIVES: The objective is to instruct the student on the elements of an instrument approach using both precision and non-precision procedures. The primary focus of this lesson is the interpretation of instrument approach procedure charts and the flight procedures from the final approach fix to a landing or missed approach.

CONTENT:

1. Preparing for the Approach
2. Executing the Approach
3. Missed Approach Procedures
4. Visual and Contact Approaches

COMPLETION STANDARDS: The student must be able to perform all of the elements required during the final approach phase of an IFR flight. He/she must be familiar with the procedures for both precision and non-precision instrument approaches and be able to correctly interpret the instrument approach charts for these approaches.

LESSON 19: (2 hrs) VOR AND NDB APPROACHES

OBJECTIVES: This lesson focuses on the principles and operation of the VOR and NDB airborne and ground equipment. The primary objective is to instruct the student on how to operate the airplane receiver, use the VOR and NDB for IFR navigation, and test the equipment for correct indications.

CONTENT:

1. VOR Approaches
2. NDB Approaches

COMPLETION STANDARDS: The student must demonstrate, during flight and simulator lessons, the ability to operate the airplane VOR and NDB equipment and be able to navigate using the equipment for IFR flight.

LESSON 20: (2 hrs) ILS APPROACHES

OBJECTIVES: The objective is to instruct the student on the equipment principles of operation, and to know the components of the ILS system as well as how inoperative components affect ILS approach minimums. The student will be instructed on the categories and types of ILS ground equipment.

CONTENT:

1. ILS Categories and Minimums
2. ILS Components
3. Flying the ILS
4. Straight-In ILS Approach
5. ILS Approach with a Course Reversal
6. ILS/DME Approach
7. Radar Vectors to ILS Final
8. ILS Approaches to Parallel Runways
9. Simultaneous Converging Instrument Approach
10. Localizer Approach
11. Localizer Back Course Approach
12. LDA, SDF, and MLS Approaches

COMPLETION STANDARDS: The student must know the operation and limitations of the ILS. He/she must demonstrate, during flight and simulator lessons, the ability to operate the airplane, the ILS equipment, and be able to navigate using ILS for an IFR instrument approach.

LESSON 21: (2 hrs) RNAV APPROACHES

OBJECTIVES: The objective is to introduce the student to the more advanced and sophisticated navigation equipment.

CONTENT:

1. Approach Design
2. GPS Approaches
3. Lateral Navigation/Vertical Navigation
4. GPS Equipment Requirements
5. The Navigation Database
6. Special GPS Navigation Considerations
7. GPS Overlay Approach
8. GPS Stand Alone Approach
9. Radar Vectors to a GPS Approach
10. VOR/DME RNAV

COMPLETION STANDARDS: The student should complete this lesson with an understanding of the basic principles of operation, advantages and limitations of RNAV and GPS systems.

LESSON 22: (1 hr) COMPREHENSIVE REVIEW

OBJECTIVES: This period provides time to recap the information covered during the course and to assist the student in preparing for the final stage exam.

CONTENT:

The instructor will walk the students through the lesson outlines as presented during the course and review the major areas for each lesson.

COMPLETION STANDARDS: The student is expected to complete this lesson with knowledge of the course expectations and desired learning outcomes. He/she should be prepared to accomplish a home review in preparation for the final stage exam.

LESSON 23: (1 hr) FINAL EXAM

OBJECTIVES: This test provides an incentive and opportunity for the student to summarize and absorb the information learned during the course. The student's performance on this test will be used as a basis for determining eligibility to take the FAA computer knowledge examination for the Instrument Rating.

CONTENT:

The examination shall at a minimum, consist of at least 50 FAA computer knowledge examination type multiple-choice questions.

COMPLETION STANDARDS: Grading for the course is based on the traditional scale where 90% to 100% equals an "A", 80% to 89% equals a "B", 70% to 79% equals a "C", 60% to 69% equals a "D" and below 60% is a failure. Professional Aviation Majors must receive a minimum grade of "C" for this course. Failure to do so requires that the course be repeated.

**PROFESSIONAL AVIATION 241
STAGE TWO GROUND TRAINING; PART 2
FEDERAL AVIATION REGULATIONS AND PUBLICATIONS
PERTINENT TO INSTRUMENT FLIGHT, IFR DEPARTURES, IFR
ENROUTE, IFR APPROACHES**

OBJECTIVES: This is the second half of a two-stage instrument ground training course. The first stage (PA 240) emphasized, "How things work". This stage emphasizes "application". It focuses on FAA regulations and publications pertinent to IFR flight operations, advanced techniques and procedures for IFR flights, how to cope with equipment failures and in-flight emergencies while on an IFR flight. The student will be instructed on all of the elements of planning and executing an IFR flight.

REFERENCES:

1. The Department of Professional Aviation Training Course Outline for the Instrument Rating Course.
2. Guided Flight Discovery - Instrument Pilot. Current Edition, Jeppesen Sanderson, Inc.
3. The FAR/AIM
4. E6B Computer
5. Instrument Flying Handbook
6. Instrument Rating Practical Test Standards
7. Aeronautical Decision Making for Instrument Pilots

COMPLETION STANDARDS: The student must understand how to plan and execute an IFR flight. This includes compliance with IFR regulations and procedures, chart interpretation and instrument navigation. The student's understanding will be evaluated by intermediate and final written examinations given during this ground training course, by their performance during airplane and simulator flights, and by their score on the FAA Instrument Rating Computer Knowledge Examination. The stage is complete when the student passes the final computer knowledge exam with a minimum score of 70% reconciled to 100%. Professional aviation majors must receive a minimum overall grade of 70% or the course must be repeated.

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IFR DECISION MAKING	2.0	66
IFR FLIGHT PLANNING	2.0	67
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INSTRUMENT PILOT WRITTEN EXAM	<u>2.0</u>	69
TOTAL HOURS - STAGE THREE	25.0	

LESSON 1: (2 hrs) WEATHER FACTORS

OBJECTIVES: The objective of this lesson is to provide the student with knowledge of weather factors.

CONTENT:

1. The Atmosphere
2. Atmospheric Circulation
3. Moisture, Precipitation, and Stability
4. Airmass
5. Fronts
6. High Altitude Weather

COMPLETION STANDARDS: This lesson will be completed when the student has an understanding of the weather factors covered in this lesson.

LESSON 2: (2 hrs) WEATHER HAZARDS

OBJECTIVES: The objective of this lesson is to introduce the weather hazards covered in this lesson to the student.

CONTENT:

1. Thunderstorms
2. Turbulence
3. Wind Shear
4. Low Visibility

COMPLETION STANDARDS: This lesson will be completed when the student has an understanding of the weather hazards covered in this lesson.

LESSON 3: (2 hrs) WEATHER HAZARDS

OBJECTIVES: The objective of this lesson is to introduce other weather hazards to the student.

CONTENT:

1. Volcanic Ash
2. Icing
3. Hydroplaning
4. Cold Weather Operations

COMPLETION STANDARDS: This lesson will be completed when the student has an understanding of all of the weather hazards covered in this lesson.

LESSON 4: (2 hrs) PRINTED REPORTS AND FORECASTS

OBJECTIVES: The objective of this lesson is to brief the student on the types of printed weather reports and forecasts and how to interpret them.

CONTENT:

1. Printed Weather Reports
2. Printed Weather Forecasts
3. Severe Weather Reports and Forecasts

COMPLETION STANDARDS: This lesson will be completed when the student has knowledge of printed weather reports and forecasts.

LESSON 5: (2 hrs) GRAPHIC WEATHER PRODUCTS

OBJECTIVES: The objective of this lesson is to brief the student on the types of graphic reports and forecasts and how to interpret them.

CONTENT:

1. Graphic Reports
2. Graphic Forecasts

COMPLETION STANDARDS: This lesson will be completed when the student has knowledge of graphic reports and forecasts.

LESSON 6: (2 hrs) SOURCES OF WEATHER INFORMATION

OBJECTIVES: The objective of this lesson is to brief the student on the sources of weather information and weather services available.

CONTENT:

1. Preflight Weather Sources
2. In-Flight Weather Sources
3. Weather Radar Services
4. Automated Surface Weather Reporting Systems
5. Airborne Weather Equipment

COMPLETION STANDARDS: This lesson will be completed when the student has knowledge of the sources of weather information as well as the weather services available.

LESSON 7: (2 hrs) MID-TERM REVIEW

OBJECTIVES: The objectives of this lesson are to review all material covered during this course and prepare the student for the mid-term exam.

CONTENT: The instructor will walk the students through the lesson outlines as presented during the course and review the major areas for each lesson.

COMPLETION STANDARDS: The student is expected to complete this lesson with sufficient knowledge of the material covered up to this point in the course to be able to pass the mid-term exam.

LESSON 8: (1 hr) MID-TERM TEST AND EVALUATION

OBJECTIVES: This test complies with the university requirement to provide the students with an evaluation and notification of standing prior to the course drop period. Additionally, it provides an incentive as well as an opportunity for the student to assimilate the material covered in the first ten lessons.

CONTENT:

The examination shall, as a minimum, consist of at least 50 FAA computer knowledge examination type multiple-choice questions.

COMPLETION STANDARDS: Grading is based on the traditional scale where 90% to 100% equals an "A", 80% to 89% equals a "B", 70% to 79% equals a "C", 60% to 69% equals a "D", and below 60% is a failure.

LESSON 9: (2 hrs) IFR EMERGENCIES

OBJECTIVES: The objective of this lesson is to brief the student on IFR emergency procedures.

CONTENT:

1. Declaring an Emergency
2. Emergency Approach Procedures

COMPLETION STANDARDS: This lesson will be completed when the student has knowledge of IFR emergency procedures.

LESSON 10: (2 hrs) IFR DECISION MAKING

OBJECTIVES: The objective of this lesson is to discuss and explain the decision making process used during instrument flight.

CONTENT:

1. Applying the Decision-Making Process
2. Pilot-In-Command Responsibility
3. Communication
4. Resource Use
5. Workload Management
6. Situational Awareness
7. The Application of the Decision-Making Process

COMPLETION STANDARDS: This lesson will be completed when the student has knowledge of the decision making process for instrument flight.

LESSON 11: (2 hrs) IFR FLIGHT PLANNING

OBJECTIVES: The objective of this lesson is to introduce to the student how to plan for an IFR flight.

CONTENT:

1. Flight Overview
2. Flight Planning
3. Completing the Navigational Log
4. Filing the Flight Plan
5. Closing the IFR Flight Plan

COMPLETION STANDARDS: This lesson will be completed when the student has knowledge relating to IFR flight planning and demonstrates ability to plan an IFR flight correctly and accurately.

LESSON 12: (1 hr) COMPREHENSIVE REVIEW

OBJECTIVES: This lesson serves as a final review of the Instrument Rating Ground Training Course. The objective is to assist the student in preparing for the FAA Instrument Computer Knowledge Examination. The lesson uses an exam preparation guide as a reference because of the convenience of having the FAA data, charts, and forms in a single reference.

CONTENT:

1. E6B Computer problems for the instrument rating
 - A. Time and distance
 - B. Wind problems
 - C. Calibrated/true airspeed computations
2. The flight clearance equipment code
3. IFR communications
4. VOR receiver check
5. The Airport/Facility Directory
6. VOR service volumes
7. Airport operating hours
8. Low altitude enroute charts
9. VOR navigation
 - A. RMI indicator
 - B. The OBS
 - C. The HSI
10. Departure Procedures (DPs)
 - A. Determining DP climb rates
 - B. Corresponding enroute chart references for the DP
11. Standard Terminal Arrival Routes (STARs)
 - A. Determining the starting point
 - B. STAR communication information
12. Instrument approach procedures
 - A. RNAV and LORAL waypoints
 - B. RNAV with vertical guidance
13. The DME ARC approach
14. Computing the rate of descent for the approach
15. Minimum Descent Altitude (MDA)
16. The missed approach
17. Touchdown zone elevations
18. The ILS approach
 - A. Communications capability
 - B. Marker beacon indications
 - C. Approach lighting

COMPLETION STANDARDS: The student's understanding will be determined by the final written examination given during this ground-training course.

LESSON 13: (1 hr) FINAL EXAM

OBJECTIVES: The Instrument Pilot Ground School is completed with the successful accomplishment of the FAA Instrument Rating Computer Knowledge Examination.

CONTENT:

The examination will be administered as scheduled in the Professional Aviation computer lab. Students must register and pay the test fee at the department as scheduled by their course instructor.

COMPLETION STANDARDS: Grading for the course is based on the traditional scale where 90% to 100% equals an "A", 80% to 89% equals a "B", 70% to 79% equals a "C", 60% to 69% equals a "D" and below 60% is a failure. Students scoring less than 70% must have additional instruction before being certified to take the FAA instrument rating written. Professional Aviation Majors must receive a minimum grade of "C" for this course. Failure to do so requires that the course be repeated.

FLIGHT TRAINING COURSE OUTLINE

REQUIREMENTS AND OBJECTIVES

ENROLLMENT PREREQUISITES: Students enrolling in the Instrument Pilot Certification flight classes need to have at least a First Class Medical Certificate, possess a Private Pilot Certificate, completion or concurrent enrollment in the Instrument Pilot ground classes, and meet the requirements to enroll as a regular student at Louisiana Tech University.

FLIGHT TRAINING COURSE OBJECTIVE: The student will obtain the knowledge, skill, and aeronautical experience necessary to meet the requirements for a instrument pilot rating with an airplane category.

FLIGHT TRAINING COURSE COMPLETION STANDARDS: The student must demonstrate through written tests, flight tests, and show through appropriate records that he meets the knowledge, skill, and experience requirements necessary to obtain an instrument pilot rating with an airplane category.

FLIGHT TRAINING CURRICULUM: Flight school for the Instrument Pilot student is accomplished by enrollment in the following Professional Aviation courses at Louisiana Tech University. Stages I and II correlate to PA 242, and Stages III and IV correlate to PA 243. Completion of these courses will result in 2 college semester hours of credit.

GRADES: After each lesson, the instructor will assign grades using the following scale. When any grade below an “A” is assigned, the instructor must include amplifying comments on the grade form.

- | | |
|----------------------|---|
| A. Exceeds Standards | The student usually (50 percent of the time) exceeds FAA Practical Test Standards (PTS) |
| B. Meets Standards | The student meets FAA Practical Test Standards (PTS). |
| C. Below Standards | The student usually (50 percent of the time) meets FAA Practical Test Standards (PTS). |
| F. Failure | The safety of the flight is in question, and the instructor must take control of the aircraft. Also, the maneuver is incomplete or not completed correctly. |

Note: Grades of A or B delineate satisfactory performance in accordance with FAA Practical Test Standards. Grades C and F delineate unsatisfactory performance in accordance with FAA Practical Test Standards.

**PROFESSIONAL AVIATION 242
STAGE ONE FLIGHT TRAINING
BASIC ATTITUDE INSTRUMENT FLYING**

OBJECTIVES: The objective at Stage One is to teach the student the techniques of basic attitude instrument flying. During this stage, emphasis is placed on the basic flight maneuvers that include straight and level flight, turns, constant airspeed climbs and descents, rate climbs and descents, steep turns, airspeed and configuration changes, recovery from unusual attitudes, and flight using partial panel.

REFERENCES:

1. The Department of Professional Aviation Training Course Outline for the Instrument Rating Course
2. The FAR/AIM
3. Instrument Flying Handbook
4. Instrument Rating Practical Test Standards

COMPLETION STANDARDS: At the completion of Stage One, the student should have reached the proficiency level to be able to perform the basic instrument maneuvers within the perimeters prescribed in the FAA Instrument Rating Practical Test Standards.

INDEX AND COURSE SUMMARY

LESSON	DUAL	PIC	FTD	ORAL	PAGE
1. INTRO TO ATTITUDE INSTRUMENT FLYING				1.0	72
2. FULL PANEL ATTITUDE INSTRUMENT FLYING			1.0	0.5	73
3. FULL PANEL ATTITUDE INSTRUMENT FLYING	1.0			0.2	74
4. FULL PANEL ATTITUDE INSTRUMENT FLYING	1.0			0.2	75
5. PARTIAL PANEL INSTRUMENT FLYING				1.0	76
6. PARTIAL PANEL INSTRUMENT FLYING			1.0	0.5	77
7. PARTIAL PANEL INSTRUMENT FLYING	1.0			0.2	78
8. PARTIAL PANEL INSTRUMENT FLYING	1.0			0.2	79
9. FULL/PARTIAL PANEL INSTRUMENT FLYING			0.5	0.2	80
10. STAGE REVIEW			0.5	0.5	81
11. BASIC ATTITUDES STAGE CHECK	<u>1.0</u>			<u>1.0</u>	82
TOTAL HOURS - STAGE ONE	5.0	0.0	3.0	5.5	

LESSON 1: (1 hr ORAL) INTRODUCTION TO ATTITUDE INSTRUMENT FLYING

OBJECTIVES: This is an introductory briefing on basic attitude instrument flying. The student is expected to gain an understanding of proper instrument interpretation, the instrument scan, pitch, bank, and power coordination and trim technique.

CONTENT:

1. Introduction to the Tech Instrument Training Syllabus
2. The instrument flight training objectives and standards
3. The textbooks, reference material, publications, and equipment requirements for the flight training stages
4. Aircraft indoctrination and instrument preflight
5. Introduction to attitude instrument flying
6. Normal takeoff
7. Instrument scan
8. Straight and level flight
9. Pitch and power coordination
10. Use of trim.
11. Constant airspeed climbs and descents
12. Constant rate climbs and descents
13. Changing airspeed
14. Constant bank turns
15. Constant rate turns
16. Climbing turns
17. Descending turns
18. Turns to specific headings

COMPLETION STANDARDS: The student should have a thorough understanding of the flight training course expectations and procedures. He/she should have gained a foundation for the basics of attitude instrument flying sufficient to progress on to productive flights in the simulator and the airplane.

**LESSON 2: (1 hr FTD) FULL PANEL ATTITUDE INSTRUMENT FLYING
PRE/POSTFLIGHT BRIEFING (0.5 HOURS)**

OBJECTIVES: This is an initial simulator instrument flight using full panel. The lesson provides the student the opportunity to practice basic attitude instrument flying skills.

CONTENT:

1. Instrument cockpit check
2. Straight and level flight
3. Pitch and power coordination
4. Use of trim.
5. Constant airspeed climbs and descents
6. Climbing turns
7. Turns to specific headings
8. Changing airspeed
9. Constant rate turns
10. Descending turns

COMPLETION STANDARDS: The student is expected to demonstrate an understanding of proper instrument interpretation, the instrument scan, pitch, bank, and power coordination and trim technique. He/she is expected to be able to maintain altitude within 150 feet, headings within 15 degrees and maintain climb and descent speeds within 10 knots.

LESSON 3: (1.0 hr DUAL) FULL PANEL INSTRUMENT FLYING PRE/POSTFLIGHT BRIEFING (0.2 HOURS)

OBJECTIVE: This is an initial airplane instrument flight and provides the student the opportunity to practice basic attitude instrument flying. The lesson profile is essentially the same as Lesson Two.

CONTENT:

1. Aircraft preflight
2. Instrument cockpit check
3. Normal takeoff
4. Straight and level flight
5. Pitch and power coordination
6. Use of trim
7. Constant airspeed climbs and descents
8. Climbing turns
9. Turns to specific headings
10. Changing airspeed
11. Constant rate turns
12. Descending turns
13. Collision avoidance
14. Cloud clearances
15. Taxiing
16. Use of checklists
17. Situational awareness

COMPLETION STANDARDS: The student is expected to demonstrate an understanding of proper instrument interpretation, the instrument scan, pitch, bank, and power coordination and trim technique. He/she is expected to be able to maintain altitude within 200 feet, headings within 20 degrees, specified bank angle within 15 degrees and maintain airspeeds within 15 knots.

LESSON 4: (1 hr DUAL) FULL PANEL INSTRUMENT FLYING PRE/POSTFLIGHT BRIEFING (0.2 HOURS)

OBJECTIVES: This lesson is an opportunity for the student to practice and improve proficiency in basic instrument flying assisted by the designated flight instructor. The instructor will evaluate the performance on each maneuver based on practical test standards and indicate areas for future practice.

CONTENT:

1. Airplane preflight
2. Instrument cockpit check
3. Normal takeoff
4. Straight and level flight
5. Turns
6. Constant airspeed/climbs and descents
7. Constant rate climbs and descents
8. Steep turns
9. Airspeed and configuration changes
10. Recovery from unusual attitudes.
11. Wake turbulence avoidance
12. Collision avoidance
13. Cloud clearances
14. Taxiing
15. Use of checklists
16. Situational awareness
17. Traffic pattern operations
18. Landing

COMPLETION STANDARDS: At this point, the student should be able to accomplish most of the basic maneuvers unassisted and within the FAA Practical Test Standards. The instructor should identify deviations from the standards as items to practice during the next lesson.

LESSON 5: (1 hr ORAL) PARTIAL PANEL INSTRUMENT FLYING

OBJECTIVES: This lesson introduces the student to partial panel instrument procedures.

CONTENT:

The instructor will brief the student on the following:

1. Partial panel attitude instrument flying
2. Calibration of the turn coordinator
3. Timed turns using the magnetic compass
4. Steep turns with partial panel
6. Recovery from unusual attitudes
7. Maintenance and inspection requirements for IFR flight

COMPLETION STANDARDS: The student should gain an understanding of the problems, procedures, and techniques associated with partial panel instrument flying.

**LESSON 6: (1 hr FTD) PARTIAL PANEL INSTRUMENT FLYING
PRE/POSTFLIGHT BRIEFING (0.5 HOURS)**

OBJECTIVES: This is an initial FTD instrument flight using partial panel and provides the student the opportunity to practice basic attitude instrument flying.

CONTENT:

1. Instrument takeoff full panel
2. Straight and level flight partial panel
3. Turns partial panel
4. Timed turns partial panel
5. Turns using the magnetic compass
6. Constant airspeed climbs and descents partial panel
7. Rate climbs and descents partial panel
8. Steep turns partial panel
9. Airspeed and configuration changes partial panel
10. Recovery from unusual attitudes partial panel
11. Control of the aircraft in gusty wind conditions

COMPLETION STANDARDS: Using partial panel, the student should be able to maintain altitude within 150 feet, headings within 15 degrees, and airspeeds within 10 knots.

**LESSON 7: (1 hr DUAL) PARTIAL PANEL INSTRUMENT FLYING
PRE/POSTFLIGHT BRIEFING (0.2 HOURS)**

OBJECTIVES: This is an initial airplane flight using partial panel and provides the student the opportunity to practice basic attitude instrument flying.

CONTENT:

1. Aircraft preflight
2. Instrument takeoff full panel
3. Straight and level flight partial panel
4. Turns partial panel
5. Timed turns partial panel
6. Turns using the magnetic compass
7. Constant airspeed climbs and descents partial panel
8. Rate climbs and descents partial panel
9. Steep turns partial panel
10. Airspeed and configuration changes partial panel
11. Recovery from unusual attitude partial panel
12. Emergency procedures
13. Wake turbulence avoidance
14. Control of the aircraft in gusty wind conditions
15. Taxiing
16. Use of checklists
17. Situational awareness
18. Traffic pattern operations
19. Landing

COMPLETION STANDARDS: Using partial panel, the student should be able to maintain altitude within 150 feet, headings within 15 degrees, and airspeeds within 10 knots.

LESSON 8: (1 hr DUAL) PARTIAL PANEL INSTRUMENT FLYING PRE/POSTFLIGHT BRIEFING (0.2 HOURS)

OBJECTIVES: This is a practice lesson to provide the opportunity to practice and become proficient with partial panel instrument flying. The instructor should measure performance based upon the FAA practical Test Standards and inform the student of those maneuvers that should be practiced on the next lesson.

CONTENT:

1. Aircraft preflight
2. Instrument takeoff full panel
3. Straight and level flight partial panel
4. Turns partial panel
5. Timed turns partial panel
6. Turns using the magnetic compass.
7. Constant airspeed climbs and descents partial panel
8. Rate climbs and descents partial panel
9. Steep turns partial panel
10. Airspeed and configuration changes partial panel
11. Recovery from unusual attitude partial panel
12. Emergency procedures
13. Use of checklists
14. Landing

COMPLETION STANDARDS:

1. Straight and Level Flight: Maintain heading within 10 degrees, maintain altitude within 100 feet, and airspeed within 10 knots.
2. Change of Airspeed: Maintain heading within 10 degrees, angle of bank within 5 degrees when turning, maintain altitude within 100 feet, and airspeed within 10 knots.
3. Constant Airspeed Climbs and Descents: Maintains airspeed within 10 knots, heading within 10 degrees, and if turning, bank within 5 degrees of the specified bank angle.
4. Rate Climbs and Descents: maintain specified rate of climb and descent within 100 feet per minute, airspeed within 10 knots, heading within 10 degrees and if turning, bank within 5 degrees of specified bank angle.
5. Steep Turns: Maintains the specified angle of bank for 180 or 360 degrees, maintains altitude within 100 feet, airspeed within 10 knots, maintains bank within 5 degrees of specified bank angle and rolls out within 10 degrees of specified heading.
6. Timed Turns: Establishes indicated standard rate turns, applies clock correctly to calibration. Changes miniature airplane position to produce standard rate turn, makes timed turns to compass headings while maintaining altitude within 100 feet, airspeed within 10 knots and bank angle within 5 degrees of specified, and rolls out on a heading within 10 degrees.
7. Unusual Attitudes: Uses proper cross check and interpretation to return the airplane to level flight.

LESSON 9: (0.5hr FTD) FULL/PARTIAL PANEL ATTITUDE INSTRUMENT FLYING PRE/POSTFLIGHT BRIEFING (0.2 HOURS)

OBJECTIVES: This is a practice lesson to provide the opportunity to practice and become proficient with partial panel instrument flying. The instructor should measure performance based upon the FAA practical Test Standards and inform the student of those maneuvers that should be practiced on the next lesson.

CONTENT:

1. Aircraft preflight
2. Instrument takeoff full panel
3. Straight and level flight partial panel
4. Turns partial panel
5. Timed turns partial panel
6. Turns using the magnetic compass.
7. Constant airspeed climbs and descents partial panel
8. Rate climbs and descents partial panel
9. Steep turns partial panel
10. Airspeed and configuration changes partial panel
11. Recovery from unusual attitude partial panel
12. Emergency procedures
13. Use of checklists
14. Landing

COMPLETION STANDARDS:

1. Straight and Level Flight: Maintain heading within 10 degrees, maintain altitude within 100 feet, and airspeed within 10 knots.
2. Change of Airspeed: Maintain heading within 10 degrees, angle of bank within 5 degrees when turning, maintain altitude within 100 feet, and airspeed within 10 knots.
3. Constant Airspeed Climbs and Descents: Maintains airspeed within 10 knots, heading within 10 degrees, and if turning, bank within 5 degrees of the specified bank angle.
4. Rate Climbs and Descents: maintain specified rate of climb and descent within 100 feet per minute, airspeed within 10 knots, heading within 10 degrees and if turning, bank within 5 degrees of specified bank angle.
5. Steep Turns: Maintains the specified angle of bank for 180 or 360 degrees, maintains altitude within 100 feet, airspeed within 10 knots, maintains bank within 5 degrees of specified bank angle and rolls out within 10 degrees of specified heading.
6. Timed Turns: Establishes indicated standard rate turns, applies clock correctly to calibration. Changes miniature airplane position to produce standard rate turn, makes timed turns to compass headings while maintaining altitude within 100 feet, airspeed within 10 knots and bank angle within 5 degrees of specified, and rolls out on a heading within 10 degrees.
7. Unusual Attitudes: Uses proper cross check and interpretation to return the airplane to level flight.

LESSON 10: (0.5 hr FTD) STAGE REVIEW **PRE/POSTFLIGHT BRIEFING (0.5 HOURS)**

OBJECTIVES: This lesson is intended to give the designated instructor the opportunity to evaluate the student's progress and determine eligibility for the final stage check. The instructor should measure performance based upon the FAA practical Test Standards and identify those areas that require additional practice.

CONTENT:

1. Straight and level flight partial panel
2. Turns partial panel
3. Timed turns partial panel
4. Turns using the magnetic compass partial panel
5. Constant airspeed climbs and descents partial panel
6. Rate climbs and descents partial panel
7. Steep turns partial panel
8. Airspeed and configuration changes partial panel
9. Recovery from unusual attitudes partial panel
10. Emergency procedures

COMPLETION STANDARDS:

1. Straight and Level Flight: Maintain heading within 10 degrees, maintain altitude within 100 feet, and airspeed within 10 knots.
2. Change of Airspeed: Maintain heading within 10°, angle of bank within 5° when turning, maintain altitude within 100 feet, and airspeed within 10 knots.
3. Constant Airspeed Climbs and Descents: Maintains airspeed within 10 knots, heading within 10°, and if turning, bank within 5° of the specified bank angle.
4. Rate Climbs and Descents: maintain specified rate of climb and descent within 100 feet per minute, airspeed within 10 knots, heading within 10 degrees and if turning, bank within 5 ° of specified bank angle.
5. Steep Turns: Maintains the specified angle of bank for 180° or 360°, maintains altitude within 100 feet, airspeed within 10 knots, maintains bank within 5° of specified bank angle and rolls out within 10 degrees of specified heading.
6. Timed Turns: Establishes indicated standard rate turns, applies clock correctly to calibration. Changes miniature airplane position to produce standard rate turn, makes timed turns to compass headings while maintaining altitude within 100 feet, airspeed within 10 knots and bank angle within 5 degrees of specified, and rolls out on a heading within 10 degrees.
7. Unusual Attitudes: Uses proper cross check and interpretation to return the airplane to level flight.

LESSON 11: (1 hr ORAL/1 hr DUAL) BASIC ATTITUDES STAGE CHECK

OBJECTIVES: This lesson is an evaluation of the student's proficiency in controlling the airplane solely by reference to instruments and knowledge of basic flight instruments' operation and limitation.

CONTENT:

1. Preflight inspection
2. Instrument takeoff full panel
3. Straight and level flight partial panel
4. Constant airspeed climbs and descents partial panel
5. Rate climbs and descents partial panel
6. Turns using partial panel
7. Timed turns partial panel
8. Turns using the magnetic compass partial panel
9. Airspeed and configuration changes partial panel
10. Steep turns partial panel
11. Recovery from unusual attitude partial panel

COMPLETION STANDARDS:

1. Straight and Level Flight: Maintain heading within 10 degrees, maintain altitude within 100 feet, and airspeed within 10 knots.
2. Change of Airspeed: Maintain heading within 10 degrees, angle of bank within 5 degrees when turning, maintain altitude within 100 feet, and airspeed within 10 knots.
3. Constant Airspeed Climbs and Descents: Maintains airspeed within 10 knots, heading within 10 degrees, and if turning, bank within 5 degrees of the specified bank angle.
4. Rate Climbs and Descents: maintain specified rate of climb and descent within 100 feet per minute, airspeed within 10 knots, heading within 10 degrees and if turning, bank within 5 degrees of specified bank angle.
5. Steep Turns: Maintains the specified angle of bank for 180 or 360 degrees, maintains altitude within 100 feet, airspeed within 10 knots, maintains bank within 5 degrees of specified bank angle and rolls out within 10 degrees of specified heading.
6. Timed Turns: Establishes indicated standard rate turns, applies clock correctly to calibration. Changes miniature airplane position to produce standard rate turn, makes timed turns to compass headings while maintaining altitude within 100 feet, airspeed within 10 knots and bank angle within 5 degrees of specified, and rolls out on a heading within 10 degrees.
7. Unusual Attitudes: Uses proper cross check and interpretation to return the airplane to level flight.

**PROFESSIONAL AVIATION 242
STAGE TWO FLIGHT TRAINING
IFR NAVIGATION AND COMMUNICATIONS**

OBJECTIVES: The objective is for the student to gain the knowledge and skill requirements for IFR navigation. Emphasis during this stage is on IFR navigation by use of VOR and ADF. This stage also included instruction on time, speed, and distance determinations, holding patterns, the procedures for communication with Air Traffic Control, and compliance with ATC instructions.

REFERENCES:

1. The Department of Professional Aviation Training Course Outline for the Instrument Rating Course.
2. Instrument Flying Handbook
3. Instrument Rating Practical Test Standards
4. The FAR/AIM

COMPLETION STANDARDS: The student will complete this stage when he/she has satisfactorily completed the stage examination within the standards prescribed in the Instrument Rating Practical Test Standards.

INDEX AND COURSE SUMMARY

LESSON	DUAL	PIC	FTD	ORAL	PAGE
1. NAVIGATION USING VOR/GPS				1.0	84
2. NAVIGATION USING VOR/GPS			1.0	0.5	86
3. NAVIGATION USING ADF				1.0	87
4. NAVIGATION USING ADF	1.0			0.5	88
5. NAVIAGATION USING VOR/GPS/ADF	1.0			0.2	89
6. VOR/ADF/GPS HOLDING PATTERNS				1.0	90
7. VOR/ADF/GPS HOLDING PATTERNS			1.0	0.5	91
8. VOR/ADF/GPS HOLDING PATTERNS			0.5	0.2	92
9. VOR/ADF/GPS HOLDING PATTERNS			0.5	0.2	93
10. VOR/ADF/GPS HOLDING PATTERNS	1.0			0.2	94
11. VOR/ADF/GPS HOLDING PATTERNS	1.0			0.2	95
12. STAGE REVIEW	1.0			0.5	96
13. NAV/COM STAGE CHECK	—	—	<u>1.0</u>	<u>1.0</u>	97
TOTAL HOURS - STAGE TWO	5.0	0.0	4.0	7.0	

LESSON 1: (1.0 hr ORAL) INSTRUMENT NAVIGATION USING VOR/GPS

OBJECTIVES: The objective is to instruct those elements of an instrument flight that the student should practice in the simulator and airplane during the first part of this stage. The object is to allow the most productive use of airplane and simulator time.

CONTENT:

1. VOR:
 - A. Identification
 - B. Orientation
 - C. Tracking
 - D. Course interception
 - E. Time and distance computations
 - F. VOR accuracy tests
2. GPS:
 - A. How the GPS works
 - B. How to program the GPS
3. Publications pertinent to instrument flight:
 - A. Federal Aviation Regulations
 - B. The Instrument Flying Handbook
 - C. IFR en-route charts
 - D. Sectional charts
 - E. Airport/Facility Directory
 - F. The AIM
4. ATC procedures
 - A. The completion and use of ATC clearances
 - B. Copying and read back of clearances
 - C. ATC Communication procedures
 - D. Departure procedures
 - E. Position reporting
5. Aeronautical decision-making
 - A. Introduction to aeronautical decision-making
 - B. Decision making concepts
 - C. Balancing rest with flying
 - D. The attitude inventory for instrument pilots
 - E. Practice in identifying hazardous attitudes
 - F. Positive responses for hazardous attitudes
 - G. Understanding social influences in aeronautical decision making
 - H. Identifying and reducing stress
 - I. Applying the decision making concepts
6. Cockpit resource management
 - A. Background for CRM training
 - B. Basic CRM concepts
 - C. CRM Training methods
 - D. Decision making
 - E. Relation vs. task

- F. Communication
- G. Effective leadership
- H. Stress management

COMPLETION STANDARDS: The student should have gained sufficient knowledge to progress to productive lessons in the simulator and airplane.

LESSON 2: (1 hr FTD) INSTRUMENT NAVIGATION USING VOR/GPS PRE/POSTFLIGHT BRIEFING (0.5 HOURS)

OBJECTIVES: This simulator lesson provides an opportunity for the student to commence developing the necessary skills for instrument flight navigation. The primary focus is on the use of VOR for orientation and to teach the techniques and procedures for intercepting and tracking on a VOR radial. The student will also be introduced to the procedures involved in flying on an IFR clearance.

CONTENT:

1. Clearance copying
2. Clearance compliance
3. VOR equipment operation
4. VOR orientation
5. VOR tracking
6. VOR intercepts (inbound and outbound)
7. Procedure turns on a VOR radial
8. Checking the VOR for accuracy
9. Using the GPS
10. ATC communication procedures

COMPLETION STANDARDS: The student must be able to tune and identify the VOR facility, recognize inoperative or unusable stations, maintain orientation, understand the procedures for intercepting radials inbound and outbound at predetermined angles, while maintaining aircraft control within practical test standards for the instrument rating.

LESSON 3: (1 hr ORAL) INSTRUMENT NAVIGATION USING ADF

OBJECTIVES: This lesson introduces the ADF and the associated facilities for use in IFR navigation. The objective is to instruct those items that will be practiced on the next simulator and airplane lessons in order to make the most efficient use of the flight time.

CONTENT:

1. ADF
 - A. Identification
 - B. Orientation
 - C. Bearings
 - D. Tracking and homing
 - E. Time and distance computations
2. Compass locators
 - A. Identification
 - B. Limited use for navigation
3. Instrument publications
 - A. Enroute charts
 - B. Airport/Facility Directory
 - C. Sectional charts

COMPLETION STANDARDS: The student should gain sufficient knowledge to be able to accomplish the next simulator and flight lessons with only minimum coaching by the instructor.

**LESSON 4: (1 hr DUAL) INSTRUMENT NAVIGATION USING ADF
PRE/POSTFLIGHT BRIEFING (0.5 HOURS)**

OBJECTIVES: This dual lesson provides an opportunity for the student to commence developing the necessary skills for instrument navigation using ADF. The primary focus is on maintaining orientation and learning the techniques and procedures for intercepting and tracking NDB bearings.

CONTENT:

1. ADF orientation
2. ADF intercepts (inbound and outbound)
3. ADF tracking
4. ATC communication procedures
5. Clearance copying
6. Clearance compliance
7. Holding on an NDB
8. The NDB approach

COMPLETION STANDARDS: The student must be able to tune and identify an ADF station, recognize inoperative or unusable stations, maintain orientation, understand the procedures for intercepting bearings inbound and outbound at predetermined angles, while maintaining aircraft control within practical test standards for the instrument rating.

LESSON 5: (1 hr DUAL) INSTRUMENT NAVIGATION USING THE VOR/GPS/ADF PRE/POSTFLIGHT BRIEFING (0.2 HOURS)

OBJECTIVES: This lesson is an opportunity to practice VOR/GPS/ADF navigation in the airplane with the instructor pilot's assistance. The object is to practice those maneuvers covered in the previous simulator lessons.

CONTENT:

1. VOR/GPS/ADF orientation
2. VOR/GPS/ADF intercepts (inbound and outbound)
3. VOR/GPS/ADF tracking
4. Procedure turns
5. ATC communication procedures
6. Clearance copying
7. Clearance compliance
8. Weather check prior to takeoff
9. Use of charts

COMPLETION STANDARDS: The student should demonstrate aircraft control proficiency as prescribed by the Instrument Rating Practical Test Standards. The instrument maneuvers should be accomplished within Instrument Rating Practical Test Standard perimeters.

LESSON 6: (1 hr ORAL) HOLDING PATTERNS USING VOR, ADF, AND GPS

OBJECTIVES: This lesson is an instructor briefing on all of the elements of holding, including holding on a VOR, at intersections, over an NDB, and using the GPS. The objective is to be able to make the most efficient use of simulator and airplane lessons.

CONTENT:

The instructor will brief the student on:

1. The holding pattern
 - A. The purpose of holding
 - B. Holding pattern components
 - C. Standard and nonstandard holding patterns
 - D. Holding clearances
 - E. Holding pattern entries
 - a. Direct
 - b. Teardrop
 - c. Parallel
 - F. Wind corrections while holding
 - G. Radio communication procedures
 - H. Tracking in the holding pattern
 - I. Holding at intersections
 - J. Holding at marker beacons and compass locators
2. Aircraft configurations for instrument approaches.
3. Instrument approach publications
 - A. The Instrument Flying Handbook
 - B. The Airman Information Manual
 - C. Instrument Approach Procedures

COMPLETION STANDARDS: The student should display an understanding of the procedures involved in all phases of holding using the VOR, NDB, and GPS.

**LESSON 7: (1 hr FTD) HOLDING PATTERNS USING VOR, ADF, AND GPS
PRE/POSTFLIGHT BRIEFING (0.5 HOURS)**

OBJECTIVES: This lesson is an opportunity to practice in the simulator, the procedures taught during the previous lesson.

CONTENT:

1. Instrument preflight
2. Clearance copy/read back
3. Instrument departure
4. Setting up the navigation receivers
5. Orientation during the holding pattern entry
6. Holding on a VOR
7. Holding at VOR intersections
8. Holding on an NDB
9. Holding using the GPS
10. Standards for navigation accuracy
11. ATC communications/reports
12. Clearance compliance
15. Weather check prior to takeoff
16. Use of charts

COMPLETION STANDARDS: The student should display an understanding of the procedures involved in all phases of holding using the VOR, NDB, and GPS.

**LESSON 8: (0.5 hr FTD) HOLDING PATTERNS USING VOR, ADF, AND GPS
PRE/POSTFLIGHT BRIEFING (0.2 HOURS)**

OBJECTIVES: This lesson is an opportunity to practice in the simulator, the procedures taught during the previous lesson.

CONTENT:

1. Instrument preflight
2. Clearance copy/read back
3. Instrument departure
4. Setting up the navigation receivers
5. Orientation during the holding pattern entry
6. Holding on a VOR
7. Holding at VOR intersections
8. Holding on an NDB
9. Holding using the GPS
10. Standards for navigation accuracy
11. ATC communications/reports
12. Clearance compliance
15. Weather check prior to takeoff
16. Use of charts

COMPLETION STANDARDS: The student should display an understanding of the procedures involved in all phases of holding using the VOR, NDB, and GPS.

LESSON 9: (0.5 hr FTD) HOLDING PATTERNS USING VOR, ADF, AND GPS PRE/POSTFLIGHT BRIEFING (0.2 HOURS)

OBJECTIVES: This lesson is an opportunity to practice VOR/ADF/GPS navigation and holding pattern operations in the FTD. The object is to practice those maneuvers covered in the previous simulator lesson.

CONTENT:

1. Instrument preflight
2. Clearance copy/read back
3. Instrument departure
4. Setting up the navigation receivers
5. Orientation during the holding pattern entry
6. Holding on a VOR
7. Holding at VOR intersections
8. Holding on an NDB
9. Holding using the GPS
10. Standards for navigation accuracy
11. ATC communications/reports
12. Clearance compliance
13. The use of IFR en route charts
14. Traffic pattern entry at a controlled airport

COMPLETION STANDARDS: The student should display an understanding of the procedures involved in all phases of holding using the VOR, NDB, and GPS.

**LESSON 10: (1 hr DUAL) HOLDING PATTERNS USING VOR, ADF, AND GPS
PRE/POSTFLIGHT BRIEFING (0.2 HOURS)**

OBJECTIVES: This lesson is an opportunity to practice in the aircraft, the procedures taught during the previous lesson.

CONTENT:

1. Instrument preflight
2. Clearance copy/read back
3. Instrument departure
4. Setting up the navigation receivers
5. Orientation during the holding pattern entry
6. Holding on a VOR
7. Holding at VOR intersections
8. Holding on an NDB
9. Holding using the GPS
10. Standards for navigation accuracy
11. ATC communications/reports
12. Clearance compliance
15. Weather check prior to takeoff
16. Use of charts

COMPLETION STANDARDS: The student should display an understanding of the procedures involved in all phases of holding using the VOR, NDB, and GPS.

**LESSON 11: (1 hr DUAL) HOLDING PATTERNS USING VOR, ADF, AND GPS
PRE/POSTFLIGHT BRIEFING (0.2 HOURS)**

OBJECTIVES: This lesson is an opportunity to practice in the aircraft, the procedures taught during the previous lesson.

CONTENT:

1. Instrument preflight
2. Clearance copy/read back
3. Instrument departure
4. Setting up the navigation receivers
5. Orientation during the holding pattern entry
6. Holding on a VOR
7. Holding at VOR intersections
8. Holding on an NDB
9. Holding using the GPS
10. Standards for navigation accuracy
11. ATC communications/reports
12. Clearance compliance
15. Weather check prior to takeoff
16. Use of charts

COMPLETION STANDARDS: The student should display an understanding of the procedures involved in all phases of holding using the VOR, NDB, and GPS.

LESSON 12: (1 hr DUAL) REVIEW OF HOLDING PATTERNS USING VOR, ADF, AND GPS
PRE/POSTFLIGHT BRIEFING (0.5 HOURS)

OBJECTIVES: This lesson is an opportunity to practice VOR/ADF/GPS navigation and holding pattern operations in the airplane without the instructor pilot's assistance. The object is to review those maneuvers covered in the previous simulator lesson.

CONTENT:

1. Instrument preflight
2. Clearance copy/read back
3. Instrument departure
4. Setting up the navigation receivers
5. Orientation during the holding pattern entry
6. Holding on a VOR
7. Holding at VOR intersections
8. Holding on an NDB
9. Holding using the GPS
10. Standards for navigation accuracy
11. ATC communications/reports
12. Clearance compliance
13. The use of IFR en route charts
14. Traffic pattern entry at a controlled airport

COMPLETION STANDARDS: The student should display an understanding of the procedures involved in all phases of holding using the VOR, NDB, and GPS.

LESSON 13: (1.0 hr ORAL / 1.0 hr FTD) NAV/COM STAGE CHECK

OBJECTIVES: This lesson is an evaluation of the student's proficiency in controlling the airplane solely by reference to instruments, and to maintain orientation and navigate using VOR, ADF, and GPS. The objective is to determine if the student is prepared to progress to the next stage.

CONTENT: During this check, the following items will be evaluated.

1. Departure clearance
2. VOR course interception
3. ADF course interception
4. Localizer navigation
5. Holding on a VOR
6. Holding on an NDB
7. Holding at an intersection
8. Holding using the GPS
9. Standards for navigation accuracy
10. ATC communications
11. Clearances copy and read back
12. Clearance compliance
13. The use of instrument charts
14. Cockpit organization

COMPLETION STANDARDS: The student will complete this stage when he/she has satisfactorily completed the Stage examination within the guidelines prescribed in the Instrument Rating Practical Test Standards.

PROFESSIONAL AVIATION 243 STAGE THREE FLIGHT TRAINING INSTRUMENT APPROACH PROCEDURES

OBJECTIVES: The objective is for the student to become proficient in and have an understanding of VOR, ADF, GPS, and ILS instrument approach procedures. This includes knowledge of ATC communications, the types of instrument approaches, interpretation of the instrument approach procedure charts, and the techniques for flying the instrument approach.

REFERENCES:

1. The Department of Professional Aviation Training Course Outline for the Instrument Rating Course.
2. Instrument Flying Handbook
3. Instrument Rating Practical Test Standards
4. The FAR/AIM
5. E6B Computer
6. IFR Enroute Low Altitude Chart (L-17/L-18)
7. U.S. Terminal Approach Procedures (South Central)

COMPLETION STANDARDS: This stage requires a thorough knowledge of all the elements of the instrument approach phase of IFR flight. This must include the flying skills for flying the instrument approach to minimums, knowledge of the equipment and facilities, navigation procedures, regulatory requirements, interpreting charts and publications, procurement of weather information and flying a safe IFR instrument approach to minimums. The student will be evaluated on the final stage check on all of these elements in accordance with the applicable standards of the FAA Instrument Rating Practical Test Standards.

INDEX AND COURSE SUMMARY

LESSON	DUAL	PIC	FTD	ORAL	PAGE
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2. VOR/DME ARC APPROACHES			1.0	0.5	102
3. NDB APPROACHES				1.0	103
4. VOR AND NDB APPROACHES	1.5			0.2	104
5. GPS APPROACHES				1.0	105
6. GPS APPROACHES	1.5			0.2	106
7. LOCALIZER/ILS APPROACHES				1.0	107
8. LOCALIZER/ILS APPROACHES			1.0	0.5	108
9. LOCALIZER/ILS APPROACHES	1.5			0.2	109
10. STAGE REVIEW			1.0	0.2	110
11. STAGE REVIEW	1.5			0.2	111
12. APPROACHES STAGE CHECK	—	—	1.0	1.0	112
TOTAL HOURS - STAGE THREE	6.0	0.0	4.0	9.9	

LESSON 1: (2.0 hr ORAL) VOR APPROACHES

OBJECTIVES: The objective is to teach the elements of VOR approaches that the student will be practicing in subsequent simulator and airplane lessons. The objective is to allow the most efficient use of airplane and simulator time.

CONTENT:

1. Cross country planning procedures
 - A. Initial planning
 - B. Route selection
 - C. Flight information publications
 - D. The weather briefing
 - E. Alternate requirements
 - F. Altitude selection
 - G. Completing the navigation log
 - H. Filing a flight plan
 - I. The composite flight plan
 - J. Flying an IFR out-and-back cross country
2. Instrument Approach Procedure Charts
 - A. The elements of the approach chart
 - B. Radio frequencies
 - C. Plan view information
 - D. Profile view information
 - E. The minimum safe altitude circle
 - F. Approach minimums
 - G. Timing to missed approach
 - H. Airport diagram
 - I. Visual references at the DH or MDA
3. Instrument approaches
 - A. Precision versus non-precision approaches
 - B. Approach segments
 - C. Holding pattern
 - D. Determination of minimums
 - E. Straight in and circling approaches
 - F. Missed approach
 - G. Variations in the initial approach fix
 - H. Variations in the final approach fix
 - I. Procedure turns
 - J. DME arc
 - K. Radar vectors
 - L. The circling approach
 - M. Contact and visual approaches
 - N. Determining minimums for the approach
 - O. Aircraft configuration for instrument approaches
4. Other instrument flight publications
 - A. Pertinent FARs

- B. The AIM references
- C. The Airport/Facility Directory
- 5. The DME applications in the approach
- 6. Filing an IFR flight plan for a cross country

COMPLETION STANDARDS: The student should have gained sufficient knowledge to practice the instrument approaches in the simulator and airplane with minimum coaching from the instructor.

LESSON 2: (1 hr FTD) VOR/DME ARC APPROACHES **PRE/POSTFLIGHT BRIEFING (0.5 HOURS)**

OBJECTIVES: This flight lesson provides an opportunity for the student to commence developing the necessary skills for flying VOR/DME arc approaches. The primary focus is on interpretation of approach procedures and the techniques and procedures for flying the VOR approach to transition to precision, missed approach, or landing. The student must also understand the procedures for transitioning to a circling, visual, or contact approach.

CONTENT:

1. Weather for the flight
2. Takeoff minimums
3. Alternate requirements
4. Filing an IFR flight plan for a cross country
5. Instrument preflight
6. Cockpit organization
7. Clearance copy and read back
8. IFR departure
9. Orientation
10. Radio set up
11. Accuracy of navigation
12. ATC communications
13. Clearance copy and read back
14. Intersection holding
15. VOR approaches
16. VOR/DME arc approaches
17. Transition to landing
18. Missed approach procedure
19. Circling to land
 - A. The visual circling maneuver
 - B. The visual maneuvering area
 - C. The missed approach when circling
 - D. Approaches with only circling minimums
 - E. Airports without an IAP
20. Clearance compliance
21. Use of charts
22. Cockpit organization

COMPLETION STANDARDS: The student must be able to tune and identify the VOR facility, recognize inoperative or unusable stations, maintain orientation, understand the procedures for a VOR non-precision approach to transition to precision, missed approach, or landing. The student must also understand the procedures for transitioning to a circling, visual, or contact approach.

LESSON 3: (1 hr ORAL) NDB APPROACHES

OBJECTIVES: The objective is to teach the elements of NDB approaches that the student will be practicing in subsequent airplane and trainer lessons. The objective is to allow the most productive use of the airplane trainer time.

CONTENT:

1. Review instrument approach procedures
2. Review IFR flight planning
3. Review the use of the IFR clearance to include
 - A. Filing clearances at controlled and uncontrolled airports.
 - B. Clearance delivery procedures
 - C. Activating and closing the IFR clearance
 - D. Filing a clearance en route
 - E. Amending a clearance en route
 - F. Canceling a clearance en route
4. The composite flight plans
5. IFR emergencies to include
 - A. Loss of instruments
 - B. Engine failure
 - C. Communications failure
 - D. Airplane NAVAID failures
6. The ADF approach
 - A. Tuning and identification
 - B. Enroute navigation using the NDB
 - C. Intercepting and tracking on NDB bearings
 - D. Holding on an NDB
 - E. The NDB full approach to landing
7. Post-flight procedures

COMPLETION STANDARDS: The student should have gained sufficient knowledge to progress to productive lessons in the simulator and airplane.

LESSON 4: (1.5 hr DUAL) VOR AND NDB APPROACHES **PRE/POSTFLIGHT BRIEFING (0.2 HOURS)**

OBJECTIVES: This flight lesson provides an opportunity for the student to commence developing the necessary skills for flying instrument approaches using the VOR and ADF. The primary focus is on interpretation of approach procedures and the techniques and procedures for flying the VOR and NDB approach to transition to precision, missed approach, or landing. The student must also understand the procedures for transitioning to a circling, visual, or contact approach.

CONTENT:

1. IFR departure using NDB bearings
2. Orientation
3. Radio set up
5. ATC communications
6. Clearance copy and read back
7. Clearance compliance
8. Intersection holding
9. The ADF approach
10. The VOR approach
11. Transition to landing
12. Missed approach procedures
13. Partial panel
14. Use of charts
15. Cockpit organization
16. Emergency procedures
17. Circling approach
18. Contact approach
19. Visual approach.

COMPLETION STANDARDS: The student must be able to tune and identify the VOR and ADF facility, recognize inoperative or unusable stations, maintain orientation, understand the procedures for a VOR and NDB non-precision approach to transition to precision, missed approach, or landing. The student must also understand the procedures for transitioning to a circling, visual, or contact approach.

LESSON 5: (1 hr ORAL) GPS APPROACHES

OBJECTIVES: The objective is to teach the elements of GPS approaches that the student will be practicing in subsequent airplane and trainer lessons. The objective is to allow the most productive use of the airplane trainer time.

CONTENT:

1. Review instrument approach procedures
2. Review IFR flight planning
3. The GPS approach
 - A. Setting up the GPS
 - B. Enroute navigation using the GPS
 - C. Using the OBS feature of the GPS
 - D. Holding using the GPS
 - F. The GPS full approach to landing
4. Post-flight procedures

COMPLETION STANDARDS: The student should have gained sufficient knowledge to progress to productive lessons in the simulator and airplane.

LESSON 6: (1.5 hr DUAL) GPS APPROACHES **PRE/POSTFLIGHT BRIEFING (0.2 HOURS)**

OBJECTIVES: This simulator lesson provides an opportunity for the student to commence developing the necessary skills for flying instrument approaches using GPS. The primary focus is on interpretation of approach procedures and the techniques and procedures for flying the GPS approach. The student must also understand the procedures for transitioning to a circling, visual, or contact approach.

CONTENT:

1. IFR departure using GPS
2. ATC communications
3. Clearance copy and read back
4. Clearance compliance
5. The GPS approach
 - A. Setting up the GPS
 - B. Enroute navigation using the GPS
 - C. Using the OBS feature of the GPS
 - D. Holding using the GPS
 - F. The GPS full approach to landing
6. Transition to landing
7. Missed approach procedures
8. Partial panel
9. Use of charts
10. Cockpit organization
11. Emergency procedures
12. Circling approach
13. Contact approach
14. Visual approach.
15. Use of the autopilot

COMPLETION STANDARDS: The student must be able to set up the GPS, recognize, maintain orientation, and understand the procedures for a GPS non-precision approach, missed approach, and landing. The student must also understand the procedures for transitioning to a circling, visual, or contact approach.

LESSON 7: (1 hr ORAL) LOCALIZER AND ILS APPROACHES

OBJECTIVES: The objective is to teach the elements of an ILS precision approach that the student will be practicing in subsequent simulator and airplane lessons. The objective is to allow the most efficient use of airplane and simulator time.

CONTENT:

1. Review as necessary VOR, NDB, and GPS approaches
2. The ILS system
 - A. The localizer
 - B. Marker beacons
 - C. Compass locator
 - D. The glide slope
 - E. The precision versus non-precision approach
3. Transition from a non-precision approach
4. The airplane ILS equipment
5. The localizer approach and the full ILS approach
6. Flying the ILS approach
 - A. Intercepting the localizer
 - B. Intercepting the glide path
 - C. Aircraft configuration for the precision approach
 - D. Flying the localizer and glide path
 - E. The Decision Height (DH)
 - F. Transition to visual landing
 - G. The back course approach
7. Visual illusions on a weather approach
8. Approaches in a RADAR environment
 - A. ASR and PAR approaches
 - B. RADAR vectoring
9. Review Emergency procedures
 - A. Loss of ILS components during the approach
 - B. Loss of communications
 - C. Airplane malfunctions during the approach
 - D. Com/NAV equipment failure during the approach
 - E. Minimum and emergency fuel procedures

COMPLETION STANDARDS: The student should have gained sufficient knowledge to progress to productive lessons in the simulator and airplane and fly a precision approach with minimum coaching by the instructor.

LESSON 8: (1 hr FTD) LOCALIZER AND ILS APPROACHES PRE/POSTFLIGHT BRIEFING (0.5 HOURS)

OBJECTIVES: This simulator lesson provides an opportunity for the student to commence developing the necessary skills for flying ILS precision approaches. The primary focus is on interpretation of approach procedures and executing the approach in a precise and smooth manner. The student must understand the techniques for transitioning to land and for executing the missed approach.

CONTENT:

1. Review as necessary VOR, NDB, and GPS approaches
2. Clearance copy and read back
3. Clearance compliance
4. Use of charts
5. Cockpit organization
6. ATC communications
7. Complex IFR departure
8. Holding
9. The non-precision approach (VOR, NDB, GPS)
10. Transition to the precision approach
11. The airplane ILS equipment and setup for an approach
12. The localizer approach
13. The full ILS approach
14. Flying the ILS approach
 - A. Intercepting the localizer
 - B. Intercepting the glide path
 - C. Aircraft configuration for the precision approach
 - D. Flying the localizer and glide path
 - E. The Decision Height (DH)
 - F. Transition to visual landing
 - G. The back course approach
15. Visual illusions on a weather approach
16. Approaches in a RADAR environment
 - A. ASR and PAR approaches
 - B. RADAR vectoring
17. Practice Emergency procedures
 - A. Loss of ILS components during the approach
 - B. Loss of communications
 - C. Airplane malfunctions during the approach
 - D. Com/NAV equipment failure during the approach
 - E. Minimum and emergency fuel procedures
18. Partial panel review

COMPLETION STANDARDS: The student must demonstrate the ability to accomplish the objectives of this lesson at a competent level of proficiency.

**LESSON 9: (1.5 hr DUAL) LOCALIZER AND ILS APPROACHES
PRE/POSTFLIGHT BRIEFING (0.2 HOURS)**

OBJECTIVES: This flight lesson provides an opportunity for the student to commence developing the necessary skills for flying ILS precision approaches. The primary focus is on interpretation of approach procedures and executing the approach in a precise and smooth manner. The student must understand the techniques for transitioning to land and for executing the missed approach.

CONTENT:

1. Weather for the flight
2. Takeoff minimums
3. Alternate requirements
4. Filing an IFR flight plan for a cross country
5. Instrument preflight
6. Cockpit organization
7. Clearance copy and read back
8. IFR departure
9. Localizer approach
10. ILS approach
11. Missed approach procedures
12. ATC communications
13. Use of charts
14. Emergency procedures
15. Partial panel review

COMPLETION STANDARDS: The student must demonstrate the ability to accomplish the objectives of this lesson at a competent level of proficiency.

LESSON 10: (1.5 hr FTD) STAGE REVIEW
PRE/POSTFLIGHT BRIEFING (0.2 HOURS)

OBJECTIVES: To determine if the student is prepared for the final stage check. This lesson focuses primarily on flying the precision approach.

CONTENT:

1. VOR
 - A. Orientation
 - B. Interception
 - C. Tracking
2. ADF
 - A. Orientation
 - B. Interception
 - C. Tracking
3. GPS
 - A. Setting up
 - B. En route navigation
 - C. Using the OBS feature
4. VOR holding
5. ADF holding
6. GPS holding
7. Arrival procedures
 - A. Approach procedure charts
 - B. VOR approach
 - C. NDB approach
 - D. GPS approach
 - E. ILS approach
 - F. Missed approach
 - G. Circle to land
 - H. Landing from a straight in
8. Simulated emergencies
 - A. Loss of communication
 - B. Instrument failure
 - C. Equipment failure
 - D. Engine malfunction
 - E. System failure
9. Partial panel flight

COMPLETION STANDARDS: The designated instructor must be satisfied that the student has accomplished all of the required training requirements and has achieved the proficiency level required to pass the final stage check flight.

LESSON 11: (1.5 hr DUAL) STAGE REVIEW
PRE/POSTFLIGHT BRIEFING (0.2 HOURS)

OBJECTIVES: To determine if the student is prepared for the final stage check. This lesson focuses primarily on flying the precision approach.

CONTENT:

1. VOR
 - A. Orientation
 - B. Interception
 - C. Tracking
2. ADF
 - A. Orientation
 - B. Interception
 - C. Tracking
3. GPS
 - A. Setting up
 - B. En route navigation
 - C. Using the OBS feature
4. VOR holding
5. ADF holding
6. GPS holding
7. Arrival procedures
 - A. Approach procedure charts
 - B. VOR approach
 - C. NDB approach
 - D. GPS approach
 - E. ILS approach
 - F. Missed approach
 - G. Circle to land
 - H. Landing from a straight in
8. Simulated emergencies
 - A. Loss of communication
 - B. Instrument failure
 - C. Equipment failure
 - D. Engine malfunction
 - E. System failure
9. Partial panel flight

COMPLETION STANDARDS: The designated instructor must be satisfied that the student has accomplished all of the required training requirements and has achieved the proficiency level required to pass the final stage check flight.

LESSON 12: (1.0 ORAL / 1.0 hr FTD) APPROACHES STAGE CHECK

OBJECTIVES: The objective is to evaluate the student's knowledge of instrument navigation using VOR, NDB, GPS, and ILS. The student will also be evaluated on flying skills, judgment, cockpit management, and the ability to handle emergency situations typically associated with IFR flight.

CONTENT:

1. VOR
 - A. Orientation
 - B. Interception
 - C. Tracking
2. ADF
 - A. Orientation
 - B. Interception
 - C. Tracking
3. GPS
 - A. Setting up
 - B. En route navigation
 - C. Using the OBS feature
4. VOR holding
5. ADF holding
6. GPS holding
7. Arrival procedures
 - A. Approach procedure charts
 - B. VOR approach
 - C. NDB approach
 - D. GPS approach
 - E. ILS approach
 - F. Missed approach
 - G. Circle to land
 - H. Landing from a straight in
8. Simulated emergencies
 - A. Loss of communication
 - B. Instrument failure
 - C. Equipment failure
 - D. Engine malfunction
 - E. System failure
9. Partial panel flight

COMPLETION STANDARDS: The student should demonstrate instrument pilot proficiency, as prescribed by the FAA Instrument Rating Practical Test Standards.

**PROFESSIONAL AVIATION 243
STAGE FOUR FLIGHT TRAINING
IFR CROSS COUNTRY**

OBJECTIVES: The objective is for the student to become proficient in cross-country operations under IFR. This includes knowledge of ATC clearances, VOR/ADF navigation, and precision and non-precision approaches using VOR, NDB, GPS, DME, ILS, and RADAR. The student is expected to know the pertinent FAA regulations and be able to interpret the appropriate charts and publications.

REFERENCES:

1. The Department of Professional Aviation Training Course Outline for the Instrument Rating Course.
2. Instrument Flying Handbook
3. Instrument Rating Practical Test Standards
4. The FAR/AIM
5. E6B Computer
6. IFR Enroute Low Altitude Chart (L-17/L-18)
7. U.S. Terminal Approach Procedures (South Central)

COMPLETION STANDARDS: The IFR cross country phase of flight training encompasses all of the elements of instrument flying to include basic instrument flying skills, knowledge of instrument flight equipment and facilities, navigation procedures, regulatory requirements, flying departures and approaches to minimums, interpreting charts and publications, procurement of weather information, and flying a safe IFR navigation flight. This stage is complete when the student has completed all of the requirements for an instrument rating. Completion standards will be in accordance with the FAA Instrument Rating Practical Test Standards.

INDEX AND COURSE SUMMARY

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2. CROSS COUNTRY PROCEDURES	2.0	2.0		0.5	115
3. INSTRUMENT COURSE REVIEW				1.0	116
4. INSTRUMENT COURSE REVIEW			1.5	0.5	117
5. INSTRUMENT COURSE REVIEW			1.5	0.2	118
6. INSTRUMENT COURSE REVIEW	1.5			0.2	119
7. FINAL INSTRUMENT STAGE CHECK	<u>1.5</u>			<u>1.5</u>	120
TOTAL HOURS - STAGE FOUR	5.0	2.0	3.0	5.9	

LESSON 1: (2.0 hr ORAL): CROSS COUNTRY PROCEDURES

OBJECTIVES: This lesson provides time for the designated flight instructor to brief all of the elements of IFR navigation operations. The objective is to prepare the student for the final phase of the instrument flight training, which is primarily PIC cross-country flights. The instructor must be satisfied that the student possesses the knowledge, skills, judgment, and responsibility to progress to the PIC cross-country phase of training. The instructor and student will develop a plan for the sequence and authorized routes for the PIC cross-counties.

CONTENT:

1. IFR cross-country flight planning
 - A. Weather procurement and analysis
 - B. Route selection
 - C. Chart selection
 - D. Completion of the flight log
 - E. Alternate requirements and selection
 - F. Fuel requirements
 - G. Flight plan completion
2. Aircraft performance calculations
 - A. Weight and balance
 - B. Performance charts
3. Legal IFR
 - A. Airplane certificates
 - B. Documents
 - C. Airworthiness
 - D. Inspections
 - E. Equipment
 - F. Altimeter and static system checks
 - G. VOR receiver checks
 - H. Transponder check
 - I. Pilot certification
 - J. Recency of experience
 - K. Safety observer qualifications
4. Publications for IFR operations
5. IFR emergency procedures
6. Airplane servicing requirements and procedures
7. Review Department Training and Safety Policies

COMPLETION STANDARDS: The student should have gained sufficient knowledge to progress to productive lessons in the simulator and airplane.

LESSON 2: (2.0 hr DUAL) CROSS COUNTRY PROCEDURES PRE/POSTFLIGHT BRIEFING (0.5 HOURS)

OBJECTIVES: This lesson must be flown into a high density Radar environment, for a distance of at least 250 NM along airways or ATC directed routing. At least one segment of the flight must be a straight-line distance of 100 NM between airports. The flight should include at least three different instrument approaches at each airport.

CONTENT:

1. IFR cross-country planning
 - A. Weather procurement
 - B. Airplane performance
 - C. Systems related to IFR flight
 - D. Cockpit management
 - E. Filing an IFR clearance
2. Departure procedures
 - A. Clearance copy and read back
 - B. Flying the instrument departure
3. IFR en-route procedures
 - A. Clearance compliance
 - B. Cockpit management
 - C. Use of charts
4. Instrument approaches
 - A. NDB
 - B. VOR
 - C. ILS
 - D. ASR
5. Missed approach procedures
6. Transition to landing
7. Partial panel non-precision
8. Emergency procedures
9. ATC communications
10. Cockpit organization
11. Clearance compliance

COMPLETION STANDARDS: At the completion of this flight, the student should have a thorough understanding of IFR cross country procedures. Performance will be evaluated on how well the student commands the airplane and how accurately he/she complies with the flight plan and ATC clearances. The instructor must be satisfied that the student is competent to progress to the next level of cross-country flying.

LESSON 3: (1.0 hr ORAL) IFR CROSS COUNTRY INSTRUCTOR REVIEW

OBJECTIVES: The primary objective is for the designated instructor to have an opportunity to completely evaluate, by questions and discussion, the student's level of knowledge and maturity. This gives the instructor the opportunity to evaluate the student's performance and make a determination of the student's competency for passing the final instrument training stage check.

CONTENT:

1. IFR cross-country planning
 - A. Weather procurement
 - B. Airplane performance
 - C. Systems related to IFR flight
 - D. Cockpit management
 - E. Filing an IFR clearance
2. Departure procedures
 - A. Clearance copy and read back
 - B. Flying the instrument departure
3. IFR en route procedures
 - A. Clearance compliance
 - B. Cockpit management
 - C. Use of charts
4. Instrument approaches
 - A. NDB
 - B. VOR
 - C. ILS
 - D. GPS
5. Missed approach procedures
6. Transition to landing
7. Partial panel non-precision
8. Emergency procedures
9. ATC communications
10. Cockpit organization
11. Clearance compliance

COMPLETION STANDARDS: The instructor should have identified those areas that require additional training. The student should have received an in-depth critique and is expected to expend his/her study efforts in areas for improvement prior to the next simulator lesson.

LESSON 4: (1.5 hr FTD) IFR CROSS COUNTRY INSTRUCTOR REVIEW PRE/POSTFLIGHT BRIEFING (0.5 HOURS)

OBJECTIVES: This lesson is intended to provide time for the designated instructor to evaluate the student's level of proficiency on all elements of IFR cross country flight. The instructor should focus attention to those areas where the student needs additional training to attain the Instrument Practical Test Standards.

CONTENT:

1. IFR cross-country planning
 - A. Weather procurement
 - B. Airplane performance
 - C. Systems related to IFR flight
 - D. Cockpit management
 - E. Filing an IFR clearance
2. Departure procedures
 - A. Clearance copy and read back
 - B. Flying the instrument departure
3. IFR en route procedures
 - A. Clearance compliance
 - B. Cockpit management
 - C. Use of charts
 - D. ATC communications
 - E. Accuracy of navigation
4. Instrument approaches
 - A. Holding patterns NDB/VOR
 - B. NDB approach
 - C. VOR approach
 - D. DME ARC approach
 - D. ILS Approach
 - E. GPS Approach
5. Missed approach procedures
6. Transition to landing
7. Circle to land
8. Partial panel non-precision approach
9. Emergency procedures
10. ATC communications

COMPLETION STANDARDS: At this point, the student should be able to perform all required elements of the instrument training course at practical test standards. The instructor will provide a comprehensive critique of the student's performance and suggest areas for future practice.

**LESSON 5: (1.5 hr FTD) IFR CROSS COUNTRY INSTRUCTOR REVIEW
PRE/POSTFLIGHT BRIEFING (0.2 HOURS)**

OBJECTIVES: This lesson is intended to provide time for the designated instructor to evaluate the student's level of proficiency on all elements of IFR cross country flight. The instructor should focus attention to those areas where the student needs additional training to attain the Instrument Practical Test Standards.

CONTENT:

1. Clearance copy/read back
2. Clearance compliance
3. Departure procedures
4. Holding patterns
5. Instrument approaches
6. Approach from holding
7. DME arc
8. Transition to landing
9. Missed approach procedures
10. Emergency procedures
11. Partial panel
12. Orientation
13. Radio set up
14. Accuracy of navigation
15. ATC communications

COMPLETION STANDARDS: At this point, the student should be able to perform all required elements of the instrument training course at practical test standards. The instructor will provide a comprehensive critique of the student's performance and suggest areas for future practice.

**LESSON 6: (1.5 hr DUAL) IFR CROSS COUNTRY INSTRUCTOR REVIEW
PRE/POSTFLIGHT BRIEFING (0.2 HOURS)**

OBJECTIVES: This lesson is intended to provide time for the designated instructor to evaluate the student's level of proficiency on all elements of IFR cross country flight. The instructor should focus attention to those areas where the student needs additional training to attain the Instrument Practical Test Standards.

CONTENT:

1. Clearance copy/read back
2. Clearance compliance
3. Departure procedures
4. Holding patterns
5. Instrument approaches
6. Approach from holding
7. DME arc
8. Transition to landing
9. Missed approach procedures
10. Emergency procedures
11. Partial panel
12. Orientation
13. Radio set up
14. Accuracy of navigation
15. ATC communications

COMPLETION STANDARDS: At this point, the student should be able to perform all required elements of the instrument training course at practical test standards. The instructor will provide a comprehensive critique of the student's performance and suggest areas for future practice.

LESSON 7: (1.5 ORAL / 1.5 hr DUAL) FINAL INSTRUMENT STAGE CHECK

OBJECTIVES: The objective is to evaluate the student's knowledge of instrument navigation using VOR, NDB, GPS, and ILS. The student will also be evaluated on flying skills, judgment, cockpit management, and the ability to handle emergency situations typically associated with IFR flight.

CONTENT:

1. Preflight procedures
2. Instrument takeoff/departure
3. En route procedures
4. Intersection holding
5. ILS approach
6. VOR approach
7. NDB approach
8. GPS approach
9. Approach from holding
10. DME arc
11. Transition to landing
12. Missed approach procedures
13. Orientation
14. Radio set up
15. Accuracy of navigation
16. ATC communications
17. Clearance copy/read back
18. Clearance compliance
19. Use of charts
20. Cockpit organization
21. Emergency procedures
22. Partial panel

COMPLETION STANDARDS: Completion of this flight examination requires that the student demonstrates a complete understanding of IFR operations and that he/she has satisfied the designated flight examiner the competency, maturity, and judgment necessary to operate safely as a pilot-in-command during IFR operations. The student must perform all IFR procedures at the proficiency level prescribed by the Instrument Rating Practical Test Standards. Students successfully completing this examination will be granted the Instrument Rating Course Graduation Certificate for Single-Engine Airplane.