AVI 231

Commercial Pilot III
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COURSE OUTLINE

AVI 231  
Course Number  

Commercial Pilot III  
Course Title  

3  
Credits  

Hours: 3  

Pre-requisite: AVI 132  

Co-requisite: MAT 135  

Implementation  

Fall 2016  

Catalog description (2015-16 Catalog):
Complements Flight III and Flight IV courses, with basic information to pass the FAA Instrument Pilot Examination. Subject areas include altitude instrument flying, instrument flight charts, IFR clearances, and IFR regulations.

Is course New, Revised, or Modified? Revised

Required texts/other materials:

- Instrument Pilot FAA Written Examination

Revision date:  
March 2018  

Course coordinator:  
Judith Stillwagon, (609) 570-3487, stillwaj@mccc.edu

Information resources: (Not Mandatory)

Text Books:
- Guided Flight Discovery Instrument/Commercial

Other learning resources:

- College Learning and Tutoring Center
- King Schools Software (www.kingschools.com)
- Flight student mentoring group
- Aviation Digital Data Service Intellicast (www.adds.org)

- Student’s Flight Instructor
- Gleim Software (www.gleim.com)
- AOPA (www.aopa.org)
- FAA (www.faa.gov)
Course Competencies/Goals:

The Course Goals are outlined in the requirements for the issuance of instrument rating for an airplane as described in CFR 141 Appendix C Section 3 b (1)-(10). The ground training must include the following aeronautical knowledge areas:

1. Applicable Federal Aviation Regulations for IFR flight operations. (PLO 1,4,6) (ILG 1,4,9)
2. Appropriate information in the "Aeronautical Information Manual". (PLO 1,4,6) (ILG 1,4,9)
3. Air traffic control system and procedures for instrument flight operations. (PLO 1,4,5) (ILG1,4,10)
4. IFR navigation and approaches by use of navigation systems. (PLO 1,4,5) (ILG1,4,10)
5. Use of IFR en route and instrument approach procedure charts. (PLO 1,4,5) (ILG 1,2,4,11)
6. Procurement and use of aviation weather reports and forecasts, and the elements of forecasting weather trends on the basis of that information and personal observation of weather conditions. (PLO 1,4,5,6) (ILG 1,3,4,10,11)
7. Safe and efficient operation of aircraft under instrument flight rules and conditions. (PLO 1,4,5,6) (ILG 1,3,4,10,11)
8. Recognition of critical weather situations and wind shear avoidance. (PLO 1,4,5,6) (ILG 1,3,4,10,11)
9. Aeronautical decision making and judgment. (PLO 1,4,5,6) (ILG 1,4,5,9,10,11)
10. Crew resource management, to include crew communication and coordination. (PLO 1,4,5,6) (ILG 1,4,5,9,10,11)

Program Learning Outcomes (PLO):

The student will be able to:

1. Demonstrate the knowledge and skills required to obtain the private and commercial certificates and instrument rating, including aeronautical technical skills and decision-making, while demonstrating safety as their primary focus

4. Demonstrate effective and correct written and verbal communication

5. Research and present information pertinent to their aviation discipline individually and in teams

6. Demonstrate an awareness of the ethical and professional issues associated with the aviation industry, including the importance of becoming a life-long learner in the aviation world
Institutional Learning Goals (ILG):

Institutional Learning Goal 1. Written and Oral Communication in English. Students will communicate effectively in both speech and writing.

Institutional Learning Goal 2. Mathematics. Students will use appropriate mathematical and statistical concepts and operations to interpret data and to solve problems.


Institutional Learning Goal 4. Technology. Students will use computer systems or other appropriate forms of technology to achieve educational and personal goals.

Institutional Learning Goal 5. Social Science. Students will use social science theories and concepts to analyze human behavior and social and political institutions and to act as responsible citizens.


Institutional Learning Goal 10. Information Literacy: Students will recognize when information is needed and have the knowledge and skills to locate, evaluate, and effectively use information for college level work.

Institutional Learning Goal 11. Critical Thinking: Students will use critical thinking skills understand, analyze, or apply information or solve problems.
INSTRUMENT GROUND INSTRUCTION COURSE OBJECTIVES

The purpose of this course is to have the student acquire the knowledge and information necessary to pass the FAA instrument computer examination. This course is designed to meet the requirements specified in the Code of Federal Regulations Part 141 that pertain to the instrument pilot certificate CFR 65 Section (1) – (10).

COURSE COMPLETION STANDARDS

The student must demonstrate through oral and written testing, attendance, and classroom activities that they have gained the knowledge and understanding necessary to pass the FAA instrument rating airplane knowledge test with a minimum grade of 70%. All quizzes and unit tests, whether written or oral, must be corrected to 100% upon review by the student.

Unit 1    Flight Instruments, 100 minutes

**Learning Objectives**
Six basic flight instruments will be discussed in this lesson. The student will be informed about the construction, operation, and peculiarities and limitations of these instruments. In addition to the basic six, other types of instruments will be discussed.

**Lesson Content**
Flight Instruments and System Errors

1. Pilot Static Instruments
2. Altitude and Height Measurements
3. Pressure Altimeter
4. Encoding Altimeter, Radar Altimeter
5. Vertical-speed Indicator
6. Airspeed Indicator, Types of Airspeed
7. True Airspeed Indicator, Mach Indicator
8. Gyroscopic Instruments and Principles
9. Sources of Power for Gyro Operation
10. Attitude Indicator
11. Turn Coordinator, Turn and Slip Indicator
12. Heading Indicators
13. Compass and Compass Errors
14. Remote Indicating Compass
15. RMI, HSI, Flight Director System
16. Primary Flight Display / Garmin 1000
17. Multi-function Display / Garmin 1000

**Lesson Completion Requirements**
The student must pass the unit test at the College Testing Center with a minimum grade of 84%.

**Next Assignment**
Flight Operations

Unit 2    Flight Operations, 100 minutes
**Learning Objectives**
This lesson details the basic concepts of IFR Flight Operations. Major topics include the basic four; climbs, turns, descents, and fundamental skills. Appropriate sources for information involving scan will also be reviewed. Flight problems such as unusual attitudes, wake turbulence, turbulence and collision avoidance concludes this lesson.

**Lesson Content**
Flight Operations

1. Straight and Level
2. Turns, Rate of Turns, Standard Rate of Turns
3. Load Factor in Turns
4. Relationship of Airspeed and Bank Angle for a Standard Rate Turn
5. Attitude Indicator Use in Turn
6. Half Standard Rate Turns
7. Climbs and Descents
8. Leveling off from a Climb or Descent
9. Six Configurations – Power Setting Chart
10. Instrument Cross Check, Instrument Interpretation, Airplane Control
11. Appropriate Instruments for IFR, Scan
12. Unusual Attitudes
13. Key Instrument in an Unusual Attitude
14. Wake Turbulence
15. Turbulence
16. Wind Shear
17. Collision Avoidance

**Lesson Completion Requirements**
The student must pass the unit test at the College Testing Center with a minimum grade of 84%.

**Next Assignment**
Airports and ATC

**Unit 3**
**Airports and ATC, 200 minutes**

**Learning Objectives**
This lesson is concerned with detailing information about IFR airport structure and functions. Air Traffic Control is also discussed.

**Lesson Content**
Airports and ATC

1. Structure and Functions of Air Traffic Control System
2. Airport Traffic Control Towers
3. Air Route Traffic Control Centers
4. Flight Data Center
5. IFR Control Sequence
   a) ATIS
   b) Clearance Delivery
   c) Ground
   d) Tower
e) Departure
6. Precision Instrument Runway Markings
7. VASI, PAPI
8. IFR Flight Planning Information
9. IFR Flight Plan
10. ATC Clearances
   a) Types
11. ATC Communication Failure
12. Radio Communication Failure
14. Types of Airspace

Lesson Completion Requirements
The student must pass the unit test at the College Testing Center with a minimum grade of 84%.

Next Assignment
Aeronautical Information Manual

Unit 4 Aeronautical Information Manual, 150 minutes

Learning Objectives
This lesson is designed to provide the student with basic instrument flight information and Air Traffic Control procedures. This material contains the fundamentals required to fly in the United States National Airspace System.

Lesson Content
Aeronautical Information Manual

2. Navigation Aids
   a) Air Navigation Radio Aids
   b) Radar Services and Procedures
3. Aeronautical Lighting and Airport Marking Aids
   a) Airport Lighting Aids
   b) Air Navigation and Obstruction Lighting
   c) Airport Marking Aids
4. Airspace
   a) General
   b) Class "G" Airspace
   c) Class "E" Airspace
   d) Class "A", "B", "C" Airspace
   e) Other Airspace Areas
5. Air Traffic Control
   a) Services Available to Pilots
   b) Radio Communications
   c) Airport Operations
   d) ATC Clearance/Separations
   e) Pre-flight
   f) Departure Procedures
   g) En Route Procedures
   h) Arrival Procedures
   i) Pilot/Controller Roles and Responsibilities
6. Emergency Procedures
   a) Emergency Service Available to Pilots
   b) Two-Way Radio Communication Failure
7. Safety of Flight
   a) Altimeter Setting Procedures

**Lesson Completion Requirements**
The student will pass an in-class quiz given by the instructor with a score of 70% or better.

**Next Assignment**
Federal Aviation Regulations and NTSB

## Unit 5
**Federal Aviation Regulations and NTSB, 150 minutes**

**Learning Objectives**
The purpose of this lesson is to convey to the student the Federal Aviation Regulations (FAR) that pertain to the instrument rating. Once this information is explained, the student will apply it to IFR situations.

**Lesson Content**
Federal Aviation Regulations and NTSB

A. IFR, FARs Part 61

   61.3 Requirements for Certificate Ratings and Authorizations
   61.51 Pilot Logbooks
   61.57 Recent Flight Experience: Pilot in Command
   61.65 Instrument Rating Requirements
   61.129 Airplane Rating: Aeronautical Experience

B. IFR, FARs Part 91

   91.3 Responsibility and Authority of Pilot in Command
   91.103 Pre-flight Action
   91.123 Compliance with ATC Clearances and Instructions
   91.129 Class "D1" Airspace
   91.131 Class "B" Airspace
   91.135 Class "A" Airspace
   91.155 Basic VFR Minimums
      1) VFR-on-Top Clearance on IFR Flights
         a) Controlled airspace
            i. Less than 10,000' MSL
            ii. At or above 10,000' MSL
         b) Uncontrolled airspace
            i. 1200' AGL or less
            ii. 1200' AGL but less than 10,000' MSL
            iii. 1200' AGL at or above 10,000' MSL
   91.157 Special VFR Minimums
   91.167 Fuel Requirements for Flight in IFR Conditions
   91.169 IFR Flight Plan; Information Required
   91.171 VOR Equipment Check for IFR Operations
   91.173 ATC Clearance and Flight Plan Required
   91.175 Takeoff and Landing under IFR
   91.177 Minimum Altitudes for IFR Operations
   91.179 IFR Cruising Altitudes or Flight Level
91.180 Operations within Airspace Designated as Reduced Vertical Separation Minimum Airspace
91.181 Courses to be Flown
91.183 IFR Communications
91.185 IFR Operations: Two-way Communication Failure
91.187 Operation under IFR in Controlled Airspace: Malfunction Reports
91.189 Category II and Category III Operations: General Operating Rules
91.191 Category II and Category III Manual
91.193 Certificate of Authorization for Certain Category Operations
91.205 Instrument and Equipment Requirements
91.211 Supplemental Oxygen
91.213 Inoperative Instruments and Equipment
91.215 ATC Transponder and Altitude Reporting Equipment and Use
91.219 Altitude Alerting System or Device: Turbojet Powered Civil Airplanes
91.221 Traffic Alert Collision Avoidance System Equipment and Use
91.223 Terrain Awareness and Warning System
91.411 Altimeter System and Altitude Reporting Equipment Tests and Inspections

C. NTSB Part 830
   Part 830 and NTSB Regulations

Lesson Completion Requirements
The student must pass the unit test at the College Testing Center with a minimum grade of 84%.

Next Assignment
Navigation

Unit 6 Navigation, 225 minutes

Learning Objectives
In order for an IFR pilot to be competent in his/her navigation, he/she must understand and be able to utilize the radio equipment to its fullest. The student will be given information about radio principles, VOR, DME, Area navigation, and GPS. The student will be able to use and interpret these systems.

Lesson Content
Navigation

1. Basic Radio Principles
2. Static Disturbance
3. VOR Facilities
4. VOR Accuracy Checks and Signal Strength
5. Interpreting VOR Indicators
6. Bracketing
7. Intercepts
8. Time and Distance
9. VOR Limitations
10. DME & RMI
11. HSI
12. Radio Magnetic Indicator
13. DME Arcs
14. Common Errors in the Use of Navigation Instruments
15. GPS

Lesson Completion Requirements
The student must pass the unit test at the College Testing Center with a minimum grade of 84%.

Next Assignment
IFR Approaches
Learning Objectives
In this lesson the student will become familiar with the ILS, GPS and VOR procedures. We will discuss the various ground components of the instrument landing system and how they are used. We will also utilize approach charts and extract the information needed. Other areas that will be included are inoperative components, straight-in landings, and circling approaches.

Lesson Content
IFR Approaches

1. ILS Approaches
   a) ILS Components
      1) Localizer
      2) Glide slope
      3) ILS marker beacons
      4) Compass locators
      5) ILS with DME
      6) ILS visual aids
      7) ILS categories
         i. Cat I, Cat II, Cat III

2. Flying the ILS Approach
   a) Non-radar ILS Procedures
   b) Approach Chart Review
   c) Setting up the Approach
   d) Transition via DME-ARC
   e) Approach Procedures

3. Back Course Approaches
   a) Interpretation
   b) Flying with HSI

4. VOR Approaches
   a) Approach Clearance
   b) VOR Approach Procedures
   c) Off Airport Facility
   d) On Airport Facility
   e) VOR DME Procedures
   f) RNAV Approach Procedures

5. GPS Approaches
   a) Accuracy
   b) Equipment Requirements and Self-testing
   c) RAIM
   d) Entering Routes
   e) Final Approach Way Point
   f) Stand-alone Approach
   g) WAAS Approaches
      1) LNAV
      2) LNAV+V
      3) LNAV+VNAV or LNAV
      4) LPV

6. Additional Approaches and Procedures
a) SDF  
b) LDA  
c) LOC  
d) Vectored Approaches  
e) DME Arc  
f) Circling  
g) Missed Approach Procedures  
h) STARS  
i) Procedure Turns  
j) Timed Approaches from a Fix  
k) Side Step Maneuver  
l) No Procedure Turns

**Lesson Completion Requirements**  
The student must pass the unit test at the College Testing Center with a minimum grade of 84%.

**Next Assignment**  
Holds

**Unit 8**  
Holds, 150 minutes

**Learning Objectives**  
The purpose of this lesson is to understand holding patterns. The student will be taught the various procedures and circumstances that are used in conjunction with holding patterns.

**Lesson Content**  
Holding Patterns

1. Standard Holding Patterns  
2. Non-standard Holding Patterns  
3. Timing  
4. Crosswind Correction  
5. Holding Speeds  
6. Holding Pattern Entries  
   a) Direct  
   b) Teardrop  
   c) Parallel  
7. Visualizing Entry Procedures  
8. ATC Holding Instructions, EFC Times  
9. Radio Procedures

**Lesson Completion Requirements**  
The student must pass the unit test at the College Testing Center with a minimum grade of 84%.

**Next Assignment**  
IFR En Route
Unit 9  IFR En Route, 300 minutes

Learning Objectives
Instrument flight covering the en route phase will be discussed in this lesson. The IFR en route chart interpretation will be taught. The student will also learn how to write and accept departure clearances. This lesson will conclude with information about takeoff and alternate minimums, standard instrument departures, IFR cruising altitudes and communication loss.

Lesson Content
IFR En Route

1. En Route Charts
   a) Low Altitude En Route Charts
      1) Victor Airways
   b) High Altitude En Route Charts
      1) Jet routes
   c) Front Panel of Charts
      1) Jeppesen chart
      2) NOS chart
d) Navigation Aids
   1) Symbols
      i. Victor Airways
      ii. Mileage Breakpoint
      iii. Intersections
      iv. Compulsory Reporting Points
      v. Non-compulsory Reporting Points
      vi. Minimum En Route Altitude
      vii. Minimum Obstruction Clearance Altitude
      viii. Maximum Authorized Altitude
      ix. Minimum Reception Altitude
      x. Minimum Crossing Altitude
      xi. Changeover Point
      xii. Communications
      xiii. Remote Communications Outlet
      xiv. Airports
      xv. Airspace
      xvi. Area Charts

2. Departure Charts
   a) Pilot Nav Sid
      1) Initial set of instructions
      2) Transition routes
      3) Radar vector segment
   b) Vector
      1) Initial set of instructions
      2) Minimum climb gradient

3. IFR Clearances
   a) Elements of an IFR Clearance CRAFT
   b) Cruise Clearance
   c) VFR on Top
   d) To VFR on Top
   e) VFR Restrictions to and IFR Clearance
   f) Composite Flight Plan
   g) Tower En Route Control Clearance
   h) Hold for Release
i) Clearance Void Time, RVITa
j) Clearance Readback
k) Clearance Shorthand

4. Communication Failure
   a) Alerting ATC
   b) Route
   c) Altitude
   d) Leaving Clearance Limit

5. Takeoff and Alternate Minimums
   a) FAR Regulations

6. IFR Cruising Altitudes
   a) Low Level
   b) Jet Routes

Lesson Completion Requirements
The student must pass the unit test at the College Testing Center with a minimum grade of 84%.

Next Assignment
Weather

Unit 10 Weather, 225 minutes

Learning Objectives
This lesson explains the major concepts regarding weather appropriate to IFR flight operations. Weather theory, hazards and avoidance will be discussed. Weather reports, forecasts, and charts will also be reviewed. The unit will end with high altitude aspects of meteorology.

Lesson Content
Weather Factors and Hazards

1. Weather Factors
   a) Layers of the Atmosphere
   b) Atmosphere Circulation
   c) Moisture
   d) Atmospheric Stability
   e) Clouds
   f) Air Masses

2. Weather Hazards
   a) Thunderstorms
   b) Thunderstorm Avoidance
   c) Turbulence
   d) Low Visibility
   e) Restrictions to Visibility
   f) Icing
   g) Estimating Freezing Level
   h) Avoiding Ice
   i) Hydroplaning
   j) Cold Weather Operations

3. Printed Reports and Forecasts
   a) Routine Aviation Weather Report (METAR)
   b) Radar Weather Reports
   c) Terminal Aerodrome Forecasts (TAF)
   d) Area Forecasts
e) Wind and Temperatures Aloft
f) Severe Weather Reports and Forecasts
g) In-Flight Weather Services
h) AWOS

4. Graphic Weather Reports
   a) Surface Analysis Reports
   b) Weather Depiction Chart
c) Radar Summary Chart
d) Constant Pressure Charts
e) Freezing Level Chart
f) Low-level Significant Weather Prognostic Chart
g) Severe Weather Outlook

5. High Altitude Considerations
   a) Jet Stream
   b) Jet Stream Turbulence
c) Winds Aloft
d) Tropopause Data Chart
e) High Level Significant Weather Prognostic

Lesson Completion Requirements
The student must pass the unit test at the College Testing Center with a minimum grade of 84%.

Next Assignment
Crew Resource Management

Unit 11  Crew Resource Management, 150 minutes

Learning Objectives
The purpose of this unit is to detail the human factors that apply to each phase of flight. Aeronautical decision making, crew resource management, single-pilot resource management and the decision making process are elements that will be discussed.

Lesson Content
Advanced Human Factors Concepts

1. IFR Decision Making
   a) Risk Elements
      1) Environment
      2) Pilot
      3) Aircraft
      4) Operation
      5) Overall situational awareness and confirmation of correct runway lineup

2. Applying the Decision Making Process
   a) Reactive
   b) Proactive
c) Decide

3. Assessing risk

4. Pilot in Command Responsibility

5. Self-Assessment

6. Crew Relationships

7. Communications

8. Resource Use
   a) Internal
b) External
9. Workload Management
10. Situational Awareness
11. Conflict Resolution

Lesson Completion Requirements
The student must pass the in-class quiz with a minimum grade of 70%.

Next Assignment
IFR Trip Review

Unit 12  IFR Trip Review, 150 minutes

Learning Objectives
The purpose of this lesson is to plan various IFR trips based upon data supplied by your instructor.

Lesson Content
IFR Trip Review

1. The student will plan an IFR trip when supplied with the following information:
   a) Description of Flight
   b) Partially Completed IFR Flight Plan
   c) Aircraft Equipment Status List
   d) Partially Completed Flight Log
   e) Sid and Stars
   f) Airport/Facility Directory Excerpts
   g) Instrument Approach Charts
   h) Low Altitude En Route Chart

Lesson Completion Requirements
The student must pass the unit test at the College Testing Center with a minimum grade of 84%.
Valuation of student learning:

Grading Criteria:

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<td>In-Class Quizzes</td>
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* A score of less than 70 on the FAA Knowledge Test will result in a failure for AVI 231
** Projects, Homework, Participation

Academic Integrity Statement:

MCCC

ACADEMIC INTEGRITY POLICY

Mercer County Community College is committed to Academic Integrity – the honest, fair and continuing pursuit of knowledge, free from fraud or deception. This implies that students are expected to be responsible for their own work and that faculty and academic support services staff members will take reasonable precautions to prevent the opportunity for academic dishonesty.

The College recognizes the following general categories of violations of Academic Integrity, with representative examples of each. Academic Integrity is violated whenever a student:

A. Uses or obtains unauthorized assistance in any academic work.
   - Copying from another student's exam
   - Using notes, books, electronic devices or other aids of any kind during an exam when prohibited
   - Stealing an exam or possessing a stolen copy of an exam

B. Gives fraudulent assistance to another student.
   - Completing a graded academic activity or taking an exam for someone else
   - Giving answers to or sharing answers with another student before, during or after an exam or other graded academic activity
   - Sharing answers during an exam by using a system of signals

C. Knowingly represents the work of others as his/her own, or represents previously completed academic work as current.
   - Submitting a paper or other academic work for credit which includes words, ideas, data or creative work of others without acknowledging the source
   - Using another author's words without enclosing them in quotation marks, without paraphrasing them or without citing the source appropriately
   - Presenting another individual's work as one's own
   - Submitting the same paper or academic assignment to another class without the permission of the instructor
     o Falsifying bibliographic entries
     o Submitting any academic assignment which contains falsified or fabricated data or results

D. Inappropriately or unethically uses technological means to gain academic advantage
   - Inappropriately or unethically acquiring material via the Internet or by any other means
   - Using any electronic or hidden devices for communication during an exam

Each instructor and academic support service area is authorized to establish specific guidelines consistent with this policy.
Consequences for Violations of Academic Integrity

For a single violation, the faculty member will determine the course of action to be followed. This may include assigning a lower grade on the assignment, assigning a lower final course grade, failing the student in the course, or other penalty appropriate to the violation. In all cases, the instructor shall notify the Chair of the Academic Integrity Committee of the violation and the penalty imposed.

When tow (or more) violations of academic integrity are reported on a student, the Academic Integrity Committee (AIC) may impose disciplinary penalties beyond those imposed by the course instructors. The student shall have the right to a hearing before the AIC or a designated AIC subcommittee.

Appeals

The student has a right to appeal the decision of the instructor or the Academic Integrity Committee. Judicial procedures governing violations of Academic Integrity are contained in the Student Handbook.

Approved: Board of Trustees  
May 19, 1983

Revised: May 18, 2000  
March 18, 2004

ATTENDANCE POLICY

Students are expected and required to attend all classes. If you cannot avoid an absence, contact your instructor for assignments. Prolonged absences due to illness, injury, bereavement for an immediate family member should be reported to the office of the Executive Dean for Student Affairs. If for a valid reason you require an excused absence, you may obtain consent from your instructor, provided you fulfill all course requirements.
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