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Course Level

IFP Advanced

PANS-OPS advanced PBN online

Duration	At student's discretion	Recommended to complete within 6 months
Tuition Fee	CHF 3200 per participant	
Instructors	Beat Zimmermann (IFP)	Robert Bukovics (IFP)
Certificate	ANI Certificate	

Questions at a glance	Answer
ICAO recognised?	No, there is no such thing as an ICAO recognition for training. ANI is a State-approved training provider and complies with all ICAO training regulations.
Pre-requisites?	Yes. Please see below for details.
Practical?	Just Mastery Test exercises to solve for the various minimum lines. No travel required.
Is an instructor available for questions?	Of course. Questions by email are always possible. It is also possible to set up a live coaching session via Zoom.

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1. ANI Procedure Design Training Program and Concept

All ANI Procedure Design/PANS-OPS courses cope with ICAO document 9906 "Quality Assurance Manual For Flight Procedure Design", vol. II "Flight Procedure Designer Training".

2. ANI Advanced Level training

Based on educational experience some of the more complex criteria are covered as advanced training. It was observed that mastery of skills is better when the basic concepts of procedure design are consolidated with some practical work before the advance level training is started.

The course covers all vertically guide procedures based on modern navigation: Baro-VNAV (LNAV-VNAV minima), SBAS procedures to LPV minima with APV-I or Cat-I performance as well as LP minima, RNP AR. Furthermore the use of RF legs in an A-RNP environment is covered, especially the use of splaying RF protection in departures and the associated obstacle assessment.

All approaches are consolidated with a sample scenario Mastery Test exercise that allows to compare the different minima in the same scenario.

Online training allows to progress at a personal pace and spend more time on a specific topic than in a class. However, online training should only be chosen by students who are experienced with disciplined self-learning. Not everybody is geared up for that.

3. Pre-requisites

To join an ANI advanced level course, students must demonstrate that they have undergone basic training, preferably at ANI, the Singapore Aviation Academy or ENAC Toulouse. Furthermore students should have some basic level procedure design experience (at least OJT after the basic training). If these requirements are not met, the ANI cannot guarantee successful completion.

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PRE-REQUISITE SKAS

(extract from ICAO do. 9906, vol. II)

3.3.1 Mathematics

3.3.1.1 Algebra

Students should be competent in Algebra to at least the level of resolving equations with 2 unknowns and handling operations of the 3rd level (Exponentiation, Radical, Logarithms, Angular functions). This requirement will assure the understanding of formulas given in the relative criteria documents as well as the ability to follow rationales, on which certain criteria are based.

3.3.1.2 Geometry

Students should be familiar with the classical Euclidian Geometry (Plane Geometry, Solid Geometry) as well as Thales and Pythagoras constructions.

3.3.1.3 Trigonometry

Students should be competent in all Trigonometry Functions such as Sine, Cosine, Tangent, Cotangent, Secant and Cosecant. Furthermore they should be familiar with Trigonometry Theorems such as the Theorem of Sines and the Theorem of Cosines.

3.3.1.4 Probability and Statistics

Students should have basic knowledge of Statistical and Probability Mathematics, particularly an understanding of the Gaussian (Normal) distribution.

3.3.2 Aviation or Aviation-related pre-requisites

The job profile of an Instrument Flight Procedure Designer requires knowledge in various fields of activity in aviation. Training providers are encouraged to offer ab-initio training and that the following prerequisites are met by the student so as to ensure that the length of training can be optimized.

3.3.2.1 Air Traffic Management

Students should demonstrate fundamental knowledge of Air Traffic Management (ATM) as in ICAO doc. 4444 (PANS-ATM), as well as understanding the broad concept of ATM which consists of ATS including ATC (Air Traffic Control), ATFM (Air Traffic Flow Management) and ASM (Airspace Management), other fields related to ATM such as route spacing, ATC separation, aviation weather, etc.

3.3.2.2 Navigation, Navigation Systems and Geography

Students should demonstrate knowledge of Navigation, Navigation Systems and Geography to the level of any pilot's licence with Instrument Rating (IR). It is however not a requirement to hold such a license.

3.3.2.3 Aircraft Operations

Students should demonstrate knowledge of the basics of flying and aerodynamics. It is however not a requirement to hold a pilot's license.

3.3.2.4 Aircraft Performance
Students should demonstrate knowledge of Aircraft Performance to the level of any pilot's license with Instrument Rating (IR). It is however not a requirement to hold such a license.

3.3.2.5 Aeronautical Information Services
Students should demonstrate fundamental knowledge of Annex 15 (Aeronautical Information Services).

3.3.2.6 Aerodrome safeguarding
Students must be familiar with the basic requirements for aerodrome safeguarding (Annex 14 Obstacle limitation surfaces, Aerodrome reference codes).

3.3.2.7 Geodesy
Geodesy, also called geodetics, is the scientific discipline that deals with the measurement and representation of the earth, its gravitational field and geodynamic phenomena (polar motion, earth tides, and crustal motion) in three-dimensional time varying space. Geodesy is primarily concerned with positioning and the gravity field and geometrical aspects of their temporal variations, although it can also include the study of the Earth's magnetic field.

Students should demonstrate fundamental knowledge in the following areas of Geodesy:

• Geoid and reference ellipsoid
• Coordinate systems in space
• Coordinate systems in the plane
• Heights
• Geodetic Datums and Datum conversion • Point positioning
• Units and measures on the ellipsoid
• Geodetic Principal Problem
• Geodetic Inverse Problem

3.3.3 Language

In order to progress through the competency-based training outlined above, trainees need to demonstrate their ability to achieve terminal objective related to the competency elements. As training will be delivered within a certain timeframe, it is important that trainees learn the material within the time allocated. For this reason, proficiency in the language in which training will be delivered (instruction and training materials) is essential.

For courses in English, it is suggested that training providers require a score of 550 in the written TOEFL (Test of English as a Foreign Language), 213 in the TOEFL Computer Based Test, 79 in the TOEFL Internet Based Test and 750 in TOEIC (Test of English for International Communication) for students whose native language is not English. Alternatively, a score of 6.5 in the IELTS Academic Module (International English Language Testing System) can be accepted. Students having studied at an English speaking institution for one year or longer can be exempted from providing a TOEFL or IELTS score.

(end of extract)

Note: For ANI courses, an ICAO language proficiency Level 5 is also accepted. Level 4 is not sufficient to understand the lectures.

5. Training Phases

The above pre-requisite SKAs refer to entry into "initial training", which according to doc. 9906 is the first time that a Flight Procedure Design Student gets in touch with actual Flight Procedure Design criteria. Any required training to get to that level is called "ab-initio". Initial Training **MUST** be followed by an On-the-Job (OJT) training phase. The length of such a phase can be specified be the PDSP (Procedure Design Service Provider). Typically an OJT phase will not be shorter than 15 weeks. So when joining advanced level training, the above prerequisites still apply, plus the fact that the student must have undergone basic (initial) flight procedure design training.

6. Advanced Training Program

The ANI advanced level training program consists of all the more complex criteria such as PBN procedures with vertical guidance (Baro-VNAV, SBAS APV-I, SBAS Cat. I and SBAS NPA, RNP AR, A-RNP, GLS) as well as Helicopter PinS procedures.

7. Course Rundown

Phase	Topic	Details
Setting the stage	PBN Concept	History of PBN as a concept
Setting the stage	Guide through LNAV procedure solution	Introduction of the exercise/Mastery Test Scenario. Revision of LNAV approach design.
Introduction to Criteria	History of the Baro-VNAV criteria	Background on first development and changes implemented. Background on the full revision in 2010/2011
Criteria	Baro-VNAV Chapter	All relevant competencies step-by-step to design a Baro-VNAV procedure
Mastery Test	Baro-VNAV procedure	Design a Baro-VNAV procedure manually for a given sample scenario.
Specifics	Classification of approach vs. missed approach obstacles	Advantage/disadvantage of using VPA' as a datum to separate between approach and missed approach obstacles.
Mastery Test	Specific calculations	Sample scenarios to identify situations where a benefit occurs to use VPA' as a datum to separate between approach and missed approach obstacles
Conclusion	Final Discussion	Comparison of derived minima with LNAV
Setting the stage	SBAS function principle and existing SBAS systems	Differential GPS, existing SBAS systems in the world certified SoL and what they can be used for.
Criteria	SBAS APV-I	Design criteria for a procedure to LPV minimum based on APV-I performance
Criteria	FAS Data Block	Encoding of a FAS Data Block
Mastery Test	APV-I procedure	Design an SBAS APV-I procedure manually in a given sample scenario
Criteria	SBAS Non-precision approach	Design Criteria for a procedure to LP minimum
Mastery Test	SBAS Non-precision approach	Design an SBAS to LP minimum manually in a given sample scenario
Criteria	SBAS Precision approach	Design criteria for a procedure to Cat. I minimum
Mastery Test	SBAS Precision approach	Design an SBAS Cat I procedure manually in a given sample scenario
Discussion	Comparison of minima	Interactive discussion regarding the various minima achieved
Setting the stage	History of RNP AR	How RNP AR as a concept and finally a PBN NavSpec was established

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Phase	Topic	Details
Criteria	RNP AR	Doc 9905 criteria, issues with the information in the manual, logic (or better: illogic) of certain requirements. Errors in 9905.
Mastery Test	RNP AR	Design an RNP AR in the same scenario as above. Discuss results, eventual benefits. etc.
Criteria	RF legs in an A-RNP environment	Protection of RF legs according to PANS-OPS
Criteria	Splaying RF legs	Logic and rationale of the splaying RF leg protection
Criteria	Departure with RF leg	Design and obstacle assessment in a departure with RF leg
Mastery Test	Departure with RF leg	Design a Departure with RF leg in a given scenario