



The current study pathway was developed to represent an already experienced RP in the open category, who has considerable experience in the operation of light multi-rotor multi-purpose drones.

Professional Remote Pilot in the Open Category Upskilling for Specific/Certified Category		
FORMAL TRAINING		
	Main Topic	Description of content
<b>Theoretical Training: Learning Courses and Instruction required to being ex. Pilot</b>	Air Law	<ul style="list-style-type: none"> <li>- Introduction to EASA and the aviation system</li> <li>- Regulation (EU) 2019/945 and Regulation (EU) 2019/947 (or other Vigeant at time)</li> <li>- National Regulation applicable to UAS (which may differ from International)</li> <li>- U-Space</li> <li>- Unmanned Traffic Management (UTM)</li> <li>- Airspaces</li> <li>- Insurance</li> <li>- Responsibilities of the Unmanned Aircraft Systems (UAS) operators and remote pilot</li> <li>- Registration (Operator, Remote Pilot and Aircraft)</li> <li>- Rules of the air</li> <li>- Procedures for air navigation services</li> <li>- Air Traffic Services (ATS) and Air Traffic Management (ATM)</li> <li>- Aeronautical Information Services (AIS)</li> <li>- Aerodromes</li> <li>- Mandatory and voluntary reporting</li> </ul>
	Principles of Flight	<ul style="list-style-type: none"> <li>- Physics, Bernoulli's law, conservation of mass</li> <li>- Speed of sound</li> <li>- Dynamic, Static, and total Pressure, Lift and Drag Airspeeds (IAS, CAS, TAS, GS)</li> <li>- Air foils (camber, chord, thickness, and ratios)</li> <li>- Forces acting on an airplane</li> <li>- Turning and accelerated flight</li> <li>- Primary and secondary flight controls</li> <li>- Stall</li> <li>- Stability (long and lateral, static, and dynamic stability)</li> <li>- Flight limitations and envelope</li> <li>- Flight in adverse weather conditions</li> </ul>



		<ul style="list-style-type: none"> <li>- Speed of sound</li> </ul>
	Performance	<ul style="list-style-type: none"> <li>- Stages of flight</li> <li>- Factors affecting performance</li> <li>- Speed definitions</li> <li>- Take-off, Climb, Cruise, Descent and Landing performance (in the case of multi-engine Performance with one engine inoperative)</li> </ul>
	Aircraft Systems	<ul style="list-style-type: none"> <li>- Mainframe, wings, tail, canards, control surfaces</li> <li>- Powerplants and accessories; powerplant limitations (RPM, blade tip speed, ice, high temperatures)</li> <li>- Electrics and electronics</li> <li>- Landing gear</li> <li>- Surveillance and ATC systems: GNSS, ADS-B, SSR and Transponder, Laser altimeter</li> </ul>
	UAS General Knowledge	<ul style="list-style-type: none"> <li>- Unmanned aircraft: types of UA, flight characteristics, limitations, operational limitations</li> <li>- Autopilot flight modes: manual, fly-by-wire, automatic (altitude hold, heading based, waypoint based), autonomous; control laws and flight envelope protection</li> <li>- Ground control station: introduction, configurations, crew specifications</li> <li>- Datalink: frequencies, jamming, limitations, power, omni-vs-direct antennas</li> <li>- Payloads: electro-optic visible, infra-red and stabilized cameras, synthetic aperture radar, magnetometer, range finder, Field of View,</li> </ul>
	Mass and Balance	<ul style="list-style-type: none"> <li>- Center of Gravity</li> <li>- Datum line</li> <li>- Balancing of an aircraft</li> <li>- Effects of CG shift forward and aft</li> <li>- Types of fuel and respective calculations</li> </ul>
	Navigation and Flight Planning	<ul style="list-style-type: none"> <li>- Principles of navigation</li> <li>- Latitude and Longitude</li> <li>- Types of Charts and cartography</li> <li>- Meridians and Rhumb lines</li> <li>- Satellite Navigation: types, signal frequencies and carriers, constellations, DOP, signal augmentation, real time kinematics and differential GPS</li> <li>- Inertial Navigation</li> <li>- Dead Reckoning</li> <li>- Flight planning</li> <li>- Take-off and landing planning</li> <li>- Contingency planning</li> <li>- Lateral and vertical navigation</li> </ul>



		<ul style="list-style-type: none"> <li>- Airspace reservation</li> </ul>
	Weather	<ul style="list-style-type: none"> <li>- The atmosphere, pressure, temperature, and density with altitude</li> <li>- Wind</li> <li>- Coriolis effect</li> <li>- Precipitation</li> <li>- Pressure systems</li> <li>- Types of clouds</li> <li>- Fronts and respective characteristics</li> <li>- Ice formation conditions</li> <li>- Forecast and report</li> <li>- METAR, TAF, SPECI</li> <li>- QNH, QNE, QFE</li> <li>- Altimetry</li> <li>- Low level charts</li> <li>- Regional weather phenomena</li> </ul>
	Operational Procedures	<ul style="list-style-type: none"> <li>- Responsibilities of the RP</li> <li>- Surrounding environment analysis, including terrain, airspace, people, buildings, electromagnetic interferences, and jamming</li> <li>- Meteorology and limitations imposed on the flights</li> <li>- Databases and accesses - where and how to consult the required updated information</li> <li>- Requirements of GCS, regarding minimal operational statuses and backups</li> <li>- Briefing and debriefing</li> <li>- Checklists</li> <li>- Pre/post flight inspections</li> <li>- Flight preparation forms to be completed before flight</li> <li>- Overflight of uninvolved people</li> <li>- Maintenance</li> <li>- Procedures in case of unintended operation near other aircraft</li> <li>- BVLOS operations</li> <li>- Notions of Low visibility operations</li> <li>- Handover procedures</li> <li>- Emergency procedures</li> <li>- MEUH method: Meteorology, Environment, UAS, Human</li> <li>- Duty times</li> <li>- Operational Authorization Process</li> </ul>



		<ul style="list-style-type: none"> <li>- Mandatory and voluntary reporting</li> <li>- Remote pilot logbook, maintenance records and other documentation</li> <li>- Notice to airmen (NOTAM)</li> <li>- Aeronautical Information Publication (AIP)</li> <li>- Emergency Response Plan (ERP)</li> <li>- Dangerous goods</li> </ul>
	Communications	<ul style="list-style-type: none"> <li>- U-space and UTM communication procedures</li> <li>- ATM procedures</li> <li>- SSR and transponder codes</li> <li>- Communication in phonetic alphabet and numbers</li> <li>- Phraseology</li> <li>- Weather information</li> <li>- Reporting</li> <li>- Procedures for loss of communications and data link</li> <li>- Distress phases and procedures</li> </ul>
	Human Performance and Limitations	<ul style="list-style-type: none"> <li>- Human sensing</li> <li>- Biases of remote/teleoperation when interpreting the sensors displayed in the GCS, including lags, delays and misinterpretation</li> <li>- Rest cycles</li> <li>- Workload management</li> <li>- Safety awareness</li> <li>- Threat and error management</li> <li>- Fit to fly self-analysis</li> <li>- IMSAFE assessment methodology</li> <li>- Limitations on perception (depth of field, distance/height to/from the UA, speed of the UA, night operations)</li> <li>- Perception; Disorientation and Attention</li> <li>- Stress, arousal and fatigue – detection and mitigation</li> <li>- Decision-making</li> </ul>
	Security, Privacy and data protection	<ul style="list-style-type: none"> <li>- Cybersecurity and good practices</li> <li>- Privacy and data protection for collected contents</li> <li>- Common attack methods, incl. hacking, GPS spoofing, jamming</li> <li>- Threat detection</li> </ul>



	Crew Resource Management / Multi-crew coordination	<ul style="list-style-type: none"> <li>- Crew resource management techniques</li> <li>- Different types of personalities</li> <li>- Handling incorrectly perceived information</li> <li>- Tasking, coordination, and commands within hierarchy</li> <li>- Airmanship</li> <li>- Leadership</li> </ul>
	Safety, Risk assessment and management	<ul style="list-style-type: none"> <li>- Remote Pilot and crew qualifications</li> <li>- Probability of failure</li> <li>- System Risk assessment</li> <li>- Maintenance procedures</li> <li>- Operational risk assessment for air and ground risk</li> <li>- Mitigation strategies</li> <li>- Presenting risk assessment to authorities for permit to fly issuance</li> <li>- Introduction to Specific Operations Risk Assessment (SORA) and overview of Standard Scenarios (STS) and Predefined Risk Assessment (PDRA)</li> </ul>
	<b>Main Topic</b>	<b>Description of content</b>
<b>Practical Training: All the hands-on training, which can include simulation, on-site training, supervision flying...</b>	Simulation Training	<ul style="list-style-type: none"> <li>- Adapting to the simulator, GCS, and UAV dynamics</li> <li>- Interaction with UAS software, firmware, and hardware</li> <li>- GCS cockpit layout, instruments and displays (PFD, ND, EICAS, overhead panel, central pedestal, standby instruments, radios, etc.)</li> <li>- Location and interpretation of commands, options and warnings on GCS</li> <li>- Interpretation of sensor data and operational limits of each parameter</li> <li>- Flight planning (pre- and during flight)</li> <li>- Monitoring flight parameters, incl. flight modes, path, altitude, speed, temperatures, weather, datalink, instruments, transponder and ADS-B, backups, batteries, fuel, warnings, ATC coordination, geo-fencing</li> <li>- Situational awareness</li> <li>- Low level operations</li> <li>- Decision making</li> <li>- Briefing and debriefing</li> <li>- Hand-eye coordination</li> <li>- Simulated flight training</li> <li>- Emergencies and contingency</li> <li>- Training crew coordination</li> <li>- U-space integration, procedures and new rules of the air</li> <li>- Perception of sense and avoid, interpreting sensors and automatic collision avoidance</li> <li>- ATC communication practice</li> </ul>



		<ul style="list-style-type: none"> <li>- Changing ATC jurisdiction and type of airspace</li> </ul>
	<p>Real-flight training</p>	<ul style="list-style-type: none"> <li>- UA manuals, UA status, logbook, anomalies,</li> <li>- Operation of GCS Hardware and Software</li> <li>- Aircraft performance and limitations</li> <li>- Crew management and coordination (with external pilot, take-off technician)</li> <li>- Interpretation of sensor data and operational limits of each parameter</li> <li>- Pre-flight planning (weather, NOTAMS, flight plan, fuel, mass and balance, take-off performance, etc.)</li> <li>- Monitoring of the aircraft's flight path (position, trajectory, energy state, etc.) based on GCS data and pilot communications</li> <li>- Monitoring of the aircraft's systems (fuel, electrics, etc.) based on GCS data and pilot communications</li> <li>- Standard Operating Procedures (SOPs)</li> <li>- Briefing and debriefing</li> <li>- Notions of Flight procedures (before start, start, taxi, before take-off, (rejected) take-off, climb, operations, descent, approach, missed approach, landing, after landing, taxi and parking)</li> <li>- Adapting flight to weather, ATC, operational limitations, and other contingencies</li> <li>- Situational awareness</li> <li>- Low level operations</li> <li>- Communicating with other crew (e.g., payload operator, mission director) sharing and coordinating information</li> <li>- Decision making</li> <li>- Hand-eye coordination</li> <li>- Emergencies and contingency</li> <li>- U-space integration, procedures, and new rules of the air</li> <li>- Perception of sense and avoid, Interpreting sensors and automatic collision avoidance</li> <li>- ATC communication</li> <li>- Changing ATC jurisdiction and type of airspace</li> <li>- UA control handover to another RP in the same GCS</li> <li>- UA handover to another GCS</li> <li>- Cyber- and data-link security, data protection</li> </ul>



TECHNICAL COMPETENCES					
Competence	Competence Description	Knowledge	Skill	Level	Preliminary Training Topics
<i>Name</i>	<i>Short competence description</i>	<i>The individual should have knowledge of...</i>	<i>With this skill someone should be capable of....</i>	<i>Beginner Intermediate Advanced</i>	<i>How to acquire the skill?</i>
<b>Operation of GCS, UA flight path control and management, automation</b>	Coordinate the necessary in-flight manoeuvres with intended commands and automation processes. Coordinate the flight path, maintaining proper guidance, and appropriate distance to obstacles, aircraft, terrain, and people, while interpreting the GCS sensors and indicators	-GCS hardware and software -Communication link between the GCS, the aircraft and ATC -Control and telemetry link between the GCS and the aircraft -Typical UA dynamics in 3D space -Types of automation typically present in a UA (tele-operation with stick and pedals, handset operation, remote fly-by-wire, automatic waypoint-based navigation, course navigation altitude hold, position hold -How to conceptually avoid entering limited zones and avoiding conflict and risky situations by properly controlling the UA to avoid the areas (divert/heading change, climb, (de)increase airspeed	-Operate GCS tools correctly, independently, and efficiently -Use the right ground control station tools depending on the phase of flight -Accurately fly the UA in BVLOS and FPV (video - first person view) operations. - Coordinate his intentions with correct UA control -Perform proper, steady, coordinated flights and operations, by always selecting the proper flight mode and command. -Interpret and cope with AI flight modes in a correct manner	Intermediate to advanced	-Understanding of the UA flight performance, capabilities, and limitations -Familiarization with GCS/cockpit and UA flight modes -Training and practising all allowed flight modes -Practical (both simulated and real) flights in various weather conditions within the limitations of the UA; Operation in abnormal conditions
<b>Application of Procedures</b>	Identify and apply procedures in accordance with published operating instructions and applicable regulations, using the appropriate knowledge (Source: EBT ICAO)	-The importance of understanding and following procedures -The importance of regulations and rules of the air -The consequences of not following or understanding the procedures	-Understand the rules and restrictions applicable to the operation of the UA, in different locations and scenarios -Collect and assess proper information about current and future status of the UA, airspace limitations and segregation -Fulfil all requirements in terms of approvals and requests necessary for the operations	Intermediate to advanced	Studying and learning from the theoretical course; applying the theoretical knowledge to the location/scenario of the operation Being informed by the instructors about the reasoning behind the procedures and the consequences of not following them in terms of safety and security



<b>Assessment of operational scenario</b>	Assess the operational scenario of the operations, prior to and during the flight. Interpret the current and future status of the operational scenario based on flight planning, briefing information and current observations. Adjust flight path and control over the UA to perceived changing conditions	-The importance of performing scrupulous data collections (briefing, weather, flight planning, and contingencies) prior to the flight -The importance of being alert to the external factors affecting an operational scenario, and interpreting the information provided from the UA, considering the pre-flight briefing data	-Identify the limiting factors of the foreseen scenario of operation, including overflight of people, buildings, airspace limitations, weather, take-off and landing zones, contingency zones (MEUH) -Understand wind, clouds in the sky, their type and movement, water, infer uses for different zones in the scenario, including buildings, people actions and movement	Intermediate to advanced	- Studying and learning from the theoretical course; attention to detail and all aspects comprising a given scenario -Comparing the influence of a misinterpretation of the pre-flight information bulletin/briefing -Practical training, in normal and simulated abnormal conditions
<b>Risk assessment and safety-based judgement</b>	Identify and rank risks, to determine which are critical and above the risk tolerance or threshold and thus require attention, and then to select the risk management action(s) to take in response	-Risk assessment of the operational scenario, limiting factors and status of the UA	-Establish hierarchies of priorities according to the mission and MEUH, define “go / no go” and “return-to-home” conditions, forbidden areas or actions based on MEUH	Intermediate to Advanced	-This skill is highly dependent on the knowledge and attitude of the remote pilot; it will depend on intrinsic factors, like the boldness of the RP to take risks and to consider risks with low probability of occurring as being risk that should be acknowledged and mitigated. -The trainees should be aware of the safety behaviours and trained of how they can follow them on the field. -Training should have a practical component with case studies from real pilot situations and even with on-field training

**KEY BEHAVIOURAL SKILLS AND COMPETENCES**

<b>Competence</b>	<b>Competence Description</b>	<b>Knowledge</b>	<b>Skill</b>	<b>Level</b>	<b>Preliminary Training Topics</b>
<b>Name</b>	<b>Short competence description</b>	<b>The individual should have knowledge of...</b>	<b>With this skill someone should be capable of....</b>	<b>Beginner Intermediate Advanced</b>	<b>How to acquire the skill?</b>
Teamwork	Operate as a team member building relationship based on trust and cooperation to make	-Team dynamics -Communication, cooperation, and coordination with others -Conflict management	- Foster effective team communication -Communicate efficiently with diverse teams	Intermediate	- Theoretical training to acquire know how on team dynamics; how to efficiently work in large and international teams - Team building





	the team strong and performative		-Receive and offer positive and negative feedback		<ul style="list-style-type: none"> <li>- Simulations (practice teamwork behaviours)</li> <li>- Case Study</li> <li>- Team Reviews (teams monitor the quality of their teamwork during in-situ reviews)</li> </ul>
<b>Situational awareness</b>	Perceive and comprehend all the relevant information available and anticipate what could happen that may affect the operation (s: ICAO EBT)	<ul style="list-style-type: none"> <li>-Factors affecting situational awareness of external factors and UA statuses</li> <li>-Ways to place identify the correct location and trajectory that the UA should take to perform the desired action 3D space</li> <li>-Ways of determining distances from obstacles, aircraft, clouds, and populated areas</li> <li>-Surveillance systems (for weather, traffic, and terrain avoidance)</li> <li>- Aircraft general knowledge (systems, instrumentation)</li> </ul>	<ul style="list-style-type: none"> <li>-Perform solid navigations in 3D space and manage both external factors that have changed during the flight, as well as internal status of the UA (e.g., fuel, battery, link, geofence violation, inability to control payload)</li> <li>-Perform proper, solid, and precise navigation of the UA in 3D space</li> <li>-Anticipate accurately what could happen, plans, and stay ahead of the situation</li> <li>-Recognize and effectively respond to indications of reduced situation awareness</li> </ul>	Intermediate	<ul style="list-style-type: none"> <li>-This skill is dependent on the capability of absorbing and paying distributed attention to several factors extrinsic and intrinsic to the UA</li> <li>-This skill can be acquired by training distributed attention during daily activities, as well as simulated and real flying/training</li> </ul>
<b>Problem solving and Decision making</b>	Accurately identify risks and resolves problems. Use the appropriate decision-making processes (s: ICAO EBT)	<ul style="list-style-type: none"> <li>-Existing rules and the existing procedures</li> <li>-Possible solutions to apply in specific situations</li> <li>-Priority and urgency</li> <li>-What the priorities in specific situations are</li> <li>-The impact on safety that some actions may have</li> <li>-Problem-solving techniques</li> </ul>	<ul style="list-style-type: none"> <li>-Keep still when facing disturbances: orally explain possibilities and elaborate troubleshooting process to understand abnormalities in flight and final decision making</li> <li>-Review and improve past decision during debriefing</li> <li>-Implement an appropriate solution to a problem</li> <li>-Determine the situations that have the highest priority</li> <li>-Manage risks effectively without impacting safety</li> </ul>	Intermediate to advanced	<p>Theoretical Training:</p> <ul style="list-style-type: none"> <li>-Possible solutions to apply in specific situations</li> <li>-Potential hazards</li> <li>-How to set priorities in specific situations</li> <li>-Risk Assessment process</li> </ul> <p>This skill is deeply connected to the attitude and personal behaviour of the RP Nevertheless, it can be trained by stimulating stress and forcing the RP to cope with it during simulated and real operations. This skill is also dependant on the experience of RP Training quick assessment of possibilities, and rapid reasoning of their respective outcomes</p>



<p><b>Workload Management</b></p>	<p>Manage available resources efficiently to prioritize and perform tasks in a timely manner under all circumstances</p>	<ul style="list-style-type: none"> <li>-Aviation psychology (human overload and underload, fatigue, and stress management, etc.).</li> <li>Threat and error management</li> <li>-Time management / planning</li> <li>-Multi-tasking strategies</li> </ul>	<ul style="list-style-type: none"> <li>-Maintain self-control in all situations</li> <li>-Plan, prioritize, and schedule tasks effectively</li> <li>-Manage time efficiently when carrying out tasks</li> <li>-Offer and accepting assistance and asking for help early</li> <li>-Review, monitor and cross-check actions conscientiously</li> <li>-Manage and recover from interruptions, distractions, variations, and failures effectively</li> <li>-Perform all the above for one or more aircraft with a single on-board pilot</li> </ul>	<p>Intermediate to advanced</p>	<ul style="list-style-type: none"> <li>-Practising parallel processing and multitasking</li> <li>-Practising the establishment of priorities</li> <li>-Training on the detection of lags on the assessment of current statuses of the systems and identifying main causes of the lags/distractions</li> </ul>
<p><b>Communication</b></p>	<p>Demonstrate effective verbal and non-verbal communications, in normal and non-normal situations</p>	<ul style="list-style-type: none"> <li>-The importance of properly communicating to the crew and to outside receiver stations</li> <li>-Types of communication</li> <li>-Effective communication techniques</li> </ul>	<ul style="list-style-type: none"> <li>-Actively listen</li> <li>-Ensure the recipient is ready and able to receive the information</li> <li>-Ask relevant questions</li> <li>-Accurately read and interpret required documentation and datalink messages</li> <li>-Correctly interpret non-verbal communication</li> <li>-Convey messages clearly, accurately, and concisely</li> </ul>	<p>Intermediate to advanced</p>	<ul style="list-style-type: none"> <li>-Communication styles and techniques</li> <li>-The Communication processes</li> <li>-Active Listening and effective communication</li> <li>-Performing quick reasoning of information received and try to pose different questions to it</li> <li>-Practising reading of technical documentation to better get a sense of the type of language used</li> <li>-Practicing crew and ATC communications</li> <li>-Instruction of the main expressions of non-verbal communication</li> <li>-An important extra will be: Learning English language</li> <li>-Performing quick reasoning of information received and try to pose different questions to it</li> <li>-Practising reading of technical documentation to better get a sense of the type of language used</li> <li>-Practicing crew and ATC communications</li> <li>-Instruction of the main expressions of non-verbal communication</li> </ul>



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