

# Drone Mapping

Development of a course on drone regulations, flight preparation, drone image acquisition and image processing using Open Drone Map

**Planned ECTS:** , **Number of learners:** 6, **Mode of delivery:** Blended

**Status:** NOT STARTED, **Course public access:** Private

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Course learning outcome	Level	Weight
3. Understand the theoretical basis for drone operations (according to EASA Open Category A1 / A3)	Remembering	16
2. Able to develop movies to enrich course content	Applying	16
4. Able to use a Phantom 4 Pro V0.2 drone, associated software tools and flight planning app as well as DGPS control point collection	Applying	12
6. Apply photogrammetry tools (ODM) for drone image data processing and map creation	Applying	32
7. Create and format digital course material and integrate these in the Moodle LMS to facilitate course execution in Ethiopia	Applying	12
1. Plan and develop a Drone Mapping course designed for f2f, blended and online course delivery	Evaluating	12
5. Conduct a drone flight and collect DGPS ground control points	Creating	4
		<b>Total Weight: 104</b>

Topic / Unit name	Workload	Learning type	Mode of delivery	Groups	Collaboration	Feedback	Assessment		
							Points	Types	Providers
<b>Course design for different mode of delivery/Transitioning your course to an online/blended mode of delivery</b>									
<b>1. Plan and develop a Drone Mapping course designed for f2f, blended and online course delivery (100%)</b>									
<b>course design</b>									
Higher level course design using Balanced Design Planning tool The BDP tool is a research-based, innovative, constructive-alignment oriented and modular solution based on learning outcomes (LOs) and learner workload as foundations of learner-centered learning approach.	180 min	Acquisition	Onsite	Synchronous	Teacher present	Yes	No	No	No
Didactic principles (Update on) didactic principles for different modes of course design and delivery	240 min	Acquisition	Onsite	Synchronous	Teacher present	Yes	No	No	No

LMS and digital tools Update on use of LMS and tools that can be used for classroom, DE and Blended course delivery	120 min	Acquisition	Onsite	Synchronous	Teacher present	Yes	No	No	No
Review of Drone Mapping course design Review of current drone mapping course designed using BDP	240 min	Discussion	Onsite	Synchronous	Teacher present	Yes	Yes	Other	No
Review of (audio-visual) course materials required Conduct a first assessment of all materials that would be required to conduct a drone mapping course for classroom, DE and Blended course delivery	60 min	Discussion	Onsite	Synchronous	Teacher present	Yes	No	No	No
<b>Total unit workload</b>	<b>14h</b>								

Topic / Unit name	Workload	Learning type	Mode of delivery	Groups	Collaboration	Feedback	Assessment		
							Points	Types	Providers
<b>Audio-visual recording</b>									
2. Able to develop movies to enrich course content ( <b>100%</b> )									
<b>Creating a new recorded presentation</b>									
Presentation practice in the studio Test your presentation skills: practice small presentations in a studio environment	180 min	Practice	Onsite	Synchronous	Teacher present	Yes	No	No	No
Audio-visual studio & equipment preparation Review and familiarization of all provided equipment	120 min	Discussion	Onsite	Synchronous	Teacher present	Yes	No	No	No
Operating equipment for audio visual recording in the studio Operating the recording equipment	180 min	Practice	Onsite	Synchronous	Teacher present	Yes	No	No	No
Audio-visual recording outside Recording outdoor activities. To be used later to record activities during drone test flight	120 min	Practice	Onsite	Synchronous	Teacher present	Yes	No	No	No
<b>Total unit workload</b>	<b>10h</b>								
<b>Editing of recorded videos and movie creation</b>									

<b>Editing audio visual recordings</b> Video editing for movie production	300 min	Production	Onsite	Synchronous	Teacher present	Yes	No	No	No
<b>Integrating recordings into course</b> Do's and Don't in provision of audio-visual materials in Learning Management System for online & blended courses	60 min	Discussion	Onsite	Synchronous	Teacher present	Yes	No	No	No
<b>Total unit workload</b>	6h								

Topic / Unit name	Workload	Learning type	Mode of delivery	Groups	Collaboration	Feedback	Assessment		
							Points	Types	Providers
<b>Theoretical basis for drone operations (according to EASA Open Category A1 / A3)</b>									
3. Understand the theoretical basis for drone operations (according to EASA Open Category A1 / A3) <b>(100%)</b>									
<b>Aviation regulations and airspace restrictions</b>									
Aviation regulations and airspace restrictions There are many rules, regulations and laws which cover unmanned aircraft operations. Some are specific to drone operations while others refer to manned aviation law.	120 min	Acquisition	Onsite	Synchronous	Teacher present	Yes	No	No	No
Self study Self study chapter 1 EASA Open Category - A1/A3	120 min	Acquisition	Hybrid	Asynchronous	Teacher not present	No	No	No	No

Quiz conduct a small self-test in the form of a quiz	15 min	Assessment	Online	Asynchronous	Teacher not present	No	No	No	5	Summative	Self
Total unit workload	4.25h										
Human factors											

<p><b>Human factors</b> As a drone pilot you are an important part of the entire operation, which can only be executed safely and effectively if you perform well. In this chapter we look at some of the factors which affect your performance. For example, your eyesight and hearing must be good enough to track the drone, monitor your surroundings and listen to feedback from your crew.</p>	60 min	Acquisition	Onsite	Synchronous	Teacher present	Yes	No	No	No
<p><b>Self study</b> Self study chapter 2 EASA Open Category - A1/A3</p>	60 min	Acquisition	Hybrid	Asynchronous	Teacher not present	No	No	No	No

Quiz conduct a small self-test in the form of a quiz	15 min	Assessment	Online	Asynchronous	Teacher not present	No	No	No	5	Summative	Self
Total unit workload	2.25h										
UAS general knowledge											
UAS general knowledge The mechanics of flight are fairly complex but they help you understand how a drone flies. You will learn how lift is generated, and how you can influence these forces to control your aircraft effectively.	90 min	Acquisition	Onsite	Synchronous	Teacher present	Yes	No	No	No	No	
Self study Self study chapter 3 EASA Open Category - A1/A3	120 min	Acquisition	Hybrid	Asynchronous	Teacher not present	No	No	No	No	No	

Self study Review chapter on Flying tips in 'OpenDroneMap - The missing Guide' (P. Toffanin)	30 min	Acquisition	Hybrid	Asynchronous	Teacher not present	No	No	No	No		
Quiz conduct a small self-test in the form of a quiz	15 min	Assessment	Online	Asynchronous	Teacher not present	No	No	No	5	Summative	Self
<b>Total unit workload</b>	<b>4.25h</b>										
<b>Operational procedures and planning</b>											

Operational procedures and planning A drone operation generally consists of more aspects than you may think, beginning long before the drone even leaves the ground. Preparation for each operation needs to be done in detail to ensure that it is safe, efficient and legal.	120 min	Acquisition	Onsite	Synchronous	Teacher present	Yes	No	No	No			
Self study Self study chapter 4 EASA Open Category - A1/A3	120 min	Acquisition	Hybrid	Asynchronous	Teacher not present	No	No	No	No			
Quiz conduct a small self-test in the form of a quiz	15 min	Assessment	Online	Asynchronous	Teacher not present	No	No	No	5	Summative	Self	
Total unit workload	4.25h											
A1/A3 Examination												

Exam A1/A3 Multiple choice exam	60 min	Assessment	Onsite	Synchronous	Teacher present	No	No	No	80	Formative	Teacher
Total unit workload	1h										





Topic / Unit name	Workload	Learning type	Mode of delivery	Groups	Collaboration	Feedback	Assessment		
							Points	Types	Providers
<b>Drone photogrammetry and Open Drone Map</b>									
6. Apply photogrammetry tools (ODM) for drone image data processing and map creation ( <b>100%</b> )									
Introduction to drone photogrammetry									
Introduction to drone photogrammetry Background information required to understand how accurate maps are created from multiple overlapping airborne images recorded in the visible and near infrared portion of the electromagnetic spectrum	240 min	Acquisition	Onsite	Synchronous	Teacher present	Yes	No	No	No
Installation Open Drone Map Install ODM using script developed on your computer and getting started using 'docker engine'	120 min	Practice	Onsite	Synchronous	Teacher present	Yes	No	No	No

<p>Introduction to ODM and the processing datasets</p> <p>Introduction in the use of the ODM software: 'OpenDroneMap - The missing Guide' (P. Toffanin)</p>	300 min	Acquisition	Hybrid	Asynchronous	Teacher not present	No	No	No	No
<p>Review of the ODM processing pipeline</p> <p>Different options are at the user disposal within the ODM processing pipeline</p>	360 min	Acquisition	Onsite	Synchronous	Teacher present	Yes	No	No	No
<b>Total unit workload</b>	<b>17h</b>								
<b>Creating and visualizing photo mosaic, DTM and DSM</b>									
<p>Creating uncontrolled photo mosaic</p> <p>Using images collected during the test flight an uncontrolled photomosaic is created and the quality report is reviewed</p>	180 min	Practice	Onsite	Synchronous	Teacher present	Yes	No	No	No

<p>Creating mosaic using ground control points Using images and DGPS control points collected during the test flight a controlled photo mosaic is created and quality report is reviewed</p>	240 min	Practice	Onsite	Synchronous	Teacher present	Yes	No	No	No
<p>3D image visualization in ILWIS386 Use of ILWIS386 3D visualization tools to display the results obtained</p>	120 min	Practice	Onsite	Synchronous	Teacher present	Yes	No	No	No
<p>Review of ODM processing options Different options are at the user disposal within the ODM processing pipeline</p>	360 min	Practice	Hybrid	Asynchronous	Teacher not present	Yes	No	No	No
<b>Total unit workload</b>	<b>15h</b>								

Topic / Unit name	Workload	Learning type	Mode of delivery	Groups	Collaboration	Feedback	Assessment		
							Points	Types	Providers
<b>Create and format digital course material and integrate these in the Moodle LMS</b>									
7. Create and format digital course material and integrate these in the Moodle LMS to facilitate course execution in Ethiopia ( <b>100%</b> )									
<b>Implementation of the drone course in the EENSAT LMS</b>									
Review of the drone mapping course Analysis of the course developed in BDP	60 min	Discussion	Onsite	Synchronous	Teacher present	Yes	No	No	No
Setup LMS-course in Moodle Create a course in the EENSAT Moodle LMS and incorporate the materials used during this drone mapping course according to the BDP structure defined	960 min	Practice	Onsite	Synchronous	Teacher present	Yes	No	No	No
<b>Total unit workload</b>	<b>17h</b>								

**Total course workload: 111h**