**3.5 Detailed programme and contingency plan**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **DAY\_1.** Monday 6th July | **DAY\_2**. Tuesday 7th July | **DAY\_3**. Wednesday 8th July | **DAY\_4**. Thursday 9th July | **DAY\_5**. Friday 10th July |
|  | **(Arrival and welcome)** | **Spectroscopy, field sampling and sUAVs, APEX** | **Ecophysiology, fluorescence and biophysical measurements** | **APEX tutorials and field training with instruments** | **Trial measurements at study site** |
| ***9:00-10:30*** |  | Plan for training course and outline of the programme **[AM, RJ, IR]** | **Lecture 7:** Ecophysiology and the reflectance and fluorescence signals **[AP]** | **Lecture 12:** Post processing hyperspectral images (Geometric and atmospheric correction) **[DS]** | **8:30** Departure  **9:00-10:00** Introduction to the site and measurements performed **[BCH, RJ]** |
| Self-introduction of students and scientific working group (WG) supervisors, division of students into scientific working groups (4 groups of 5 persons: coordinator, rapporteur, data manager, protocols and meta data, data analysis responsible), allocation of scientific working group supervisors and group science project **[AM, IR, RJ]** | **Lecture 8:** Theory of reflectance and fluorescence and approaches to fluorescence retrieval from spectroscopic measurements **[MR]** |
| ***10:30-11:00*** |  | Coffee break | Coffee break | Coffee break | **10:00-12:30Student activity 5:**  **4 parallel sessions of 2 hours trial measurements** **[ALL WG supervisors and WG]**  trial measurements of reflectance, fluorescence, LAI, fAPAR, CO2 fluxes at selected plots. Trial measurements with sUAVs.  [4 WGs rotate (each WG group performs 2 sessions of 2 hours trial measurements)] |
| ***11:00-12:30*** |  | **Lecture 1**: Principles of Field Spectroscopy and design and calibration of spectrometers for reflectance and fluorescence measurements **[AM]** | **Lecture 9:** Retrieval of vegetation properties in the flux tower footprint from airborne and ground spectral measurements **[AD]** | **Tutorial 1:** ATCOR & Parge tutorial (atmospheric-geometric data processing of APEX) **[DS]** |
| ***12:30-13:30*** |  | Lunch | Lunch | Lunch | Lunch |
| ***13:30-15:00*** |  | **Lecture 2:** FS sampling strategies and measurement uncertainties near the ground and from sUAVs **[KA and/or AM]** | **Lecture 10:** Introduction to ground measurements of biophysical parameters and chamber and eddy covariance methods for GHG fluxes measurements. Integration of fluxes and reflectance data **[RJ/ET or BHCH]** | **DEMO 2 and Student activity 3 in 4 groups with scientific working group supervisors. 4 scientific working groups rotate.**  Demonstration and training in use of all field instruments in grounds of hotel. **[AM, MR, ET, KA, LA]** | **13:30 – 17:30 Student activity 6:**  **4 parallel sessions of 2 hours trial measurements [ALL WG supervisors and WG]**    Trial measurements of reflectance, fluorescence, LAI, fAPAR, CO2 fluxes at selected plots. Trial measurements with sUAVs.  [4 WGs rotate (each WG group performs the next 2 sessions of trial measurements)] |
| ***15:00-15:30*** | **15:00-16:30 Departure from the LAWICA AIRPORT to OBRZYCKO palace** | Coffee break | Coffee break | Coffee break |
| ***15:30-16:30*** | **Lecture 3:** Airborne hyperspectral imaging spectroscopy, APEX: instrument and its calibration **[AH]** | **Lecture 11:** Introduction to ground measurements of biophysical parameters and chamber and eddy covariance methods for GHG fluxes measurements. Integration of fluxes and reflectance data **[RJ/ET or BHCH]** | **DEMO 3 and Student activity 4 in 4 groups with scientific working group supervisors; 4 scientific working groups rotate.**  Demonstration and training in use of all field instruments and UAVs in grounds of hotel. **[AM, MR, ET, KA, LA]** |
| ***16:30-18:00*** | ***16:30-18:00*** Registration and room allocation | **Lecture 4:** **16:30 to 17:30** APEX flight campaign planning (scientific and operational) **[KM]**  **Lecture 5: 17:30 to 18:00** Introduction to UAVs for spectroscopy and remote sensing | **16:30 to 18:30** **Student activity 2** With scientific working group supervisor develop field work plan incl. selection of instruments and sUAV sampling strategies and development of draft APEX flight plan (with the support of APEX flight campaign manager)  **[AM, MR, ET, KA, AH, LV, KM]**  **Data base management [AH]**  **REPORTING 1:** Each scientific working group reports on sampling strategy and flight plan [each WG rapporteur] | **Lecture 13** Sentinel EO lecture and Sentinel tools tutorial by ESA **[FR]** |  |
| ***18:00-18:30*** | **18:00-18:30 Welcome** EUFAR and OPTIMISE **[IR, RJ, AM]**  **18:30-18:45** General info on training course and research site **[RJ]**  **18:45-19:00** Information about HOST **[JO]** | **Lecture 6*:*** sUAV H&S and regulatory framework.**[P TP]** | REPORTING 2: Each scientific working group reports on 4 sessions of trial measurement [each WG rapporteur] |
| **DEMO 1 and Student Activity 1**sUAV demo outside hotel Fixed-wing and rotary-wing sUAVs [**AM, KA, ET]** |
| 19:00-20:00 | Dinner (hotel) | Late Dinner (outside, bonfire) | Dinner (hotel) | Dinner (hotel) | Dinner (hotel) |

**Option 1 Preferred flight date**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **DAY\_6** Saturday 11th July | **DAY\_7.** Sunday 12th July | **DAY\_8.** Monday 13th July | **DAY\_9.** Tuesday 14th July | **DAY\_10.** Wednesday 15th July | **DAY\_11** Thursday 16th July |
|  | **Image post processing, Flight planning AH and VITO** | **Flight and field work**  **Option 1** | **Airborne data processing (VITO tutorials and hands on sessions)** | **Tutorials, modelling and data analysis**  **Scaling measurements from ground to satellite** | **Group work** | **Student presentations**  **Scaling measurements from ground to satellite** |
| 9:00-10:30 | **Lecture 14 and Tutorial 2:** SPECCHIO lecture and tutorial with data collected or archived data including MATLAB and R programming **[AH]** | **8:00** Pre-flight: GO/NO GO  if GO:  **8:30** Departure to experimental site  Equipment and site preparation (ground targets)  **[ALL WG leaders]** | **Lecture** **16** (0,5h) on VITO Central Data Processing Facility and demonstration by **Marian-Daniel Iordache**, [VITO] | **Tutorial 8 Modelling and data analysis tutorials**  SCOPE introduction [CvdT]  How to use SCOPE and SPECCHIO [AH] | Group work | **REPORTING 3**  **Scientific Working Group I**: Presentation  **Scientific Working Group II**: Presentation |
| **Tutorial 5** **Scientific Working Group and VITO/RSL**: Data inspection (quicklooks, raw data and field (ASD, sun photometer) measurements) Data analyses/modelling **[VITO]** |
| 10:30-11:00 | Coffee break | Cold drinks and snacks | Coffee break | Coffee break | Coffee break | Coffee break |
| 11:00-12:30 | **Lecture 15:** Modelling for data analysis and tutorial with data collected or archived data **[ET]** | **Mission FLIGHT (1) + ground measurements (1) +UAVs (1)**  **[ALL WG leaders]** | **Tutorial 6** **Scientific working group and VITO**: PKtools, open source image processing tools for vegetation studies **[PK]** (with archived APEX data) | **Tutorial 9 Modelling and data analysis tutorial**  ARTMO [JV] | Group work | **Scientific Working Group III**: Presentation  **Scientific Working Group IV**: Presentation  Conclusions **[AM, JR]** |
| 12:30-13:30 | Lunch | Lunch | Lunch | Lunch | Lunch |
| 13:30-15:00 | **Tutorial 3** Modelling for data analysis and tutorial with data collected or archived data **[ET]** | **Tutorial 7** **Scientific working group and VITO:** PKtools, open source image processing tools for vegetation studies(with archived APEX data **[PK]** |  | Group work | **13:30-15:30**  **Student Departure** to Poznan LAWICA airport |
| 15:00-15:30 | Coffee break | Lunch (station) | Coffee break | Coffee break | Coffee break |
| 15:30-16:30 | **Tutorial 4** Finalization of APEX flight plan with the support of APEX operator **[BB}** | **15:30-17:00** trip to the airport (Pila flying-club) | **Student Activity 8** processing data with PKtools supervised and assisted by all trainers | Group work | **Scientific Working Groups**: Preparation of final presentation |
| 16:30-18:00 | **Student Activity 7 Scientific Working Groups** Finalise field work plans and protocols  **[ALL WG leaders]** | **17:00-18:00** aircraft visiting  **18:00-19:00** Visiting of Military museum |
| 19:00-20:00 | Dinner (hotel) | Dinner in Pila (in flying club facilities) | Dinner (hotel) | Dinner (outside, bonfire) | Dinner (hotel) |  |

**Option 2 if flight does not go ahead on Sunday**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **DAY\_6** Saturday 11th July | **DAY\_7.** Sunday 12thJuly | **DAY\_8.** Monday 13thh July | **DAY\_9.** Tuesday 14th July | **DAY\_10.** Wednesday 15th July | **DAY\_11** Thursday 16th July |
|  | **Image post processing, Flight planning AH and VITO** | **Airborne data processing (VITO tutorials and hands on sessions)**  **(Archived data)** | **Flight and field work**  **Option 2** | **Tutorials, modelling and data analysis**  **Scaling measurements from ground to satellite** | **Tutorials Modelling and data analysis**  **Scaling measurements from ground to satellite** | **Student presentations**  **Scaling measurements from ground to satellite** |
| 9:00-10:30 | **Lecture 14 and Tutorial 2:** SPECCHIO lecture and tutorial with data collected or archived data **[AH]** | **Lecture** **16** (0,5h) on VITO Central Data Processing Facility and demonstration by **Kristin Vreys or backup Marian-Daniel Lordache,** | **8:00** Pre-flight: GO/NO GO  if GO:  **8:30** Departure to experimental site  Equipment and site preparation (ground targets)  **[ALL WG leaders]** | **Modelling and data analysis tutorials**  Augmentation of FS data with biopysical measurements at plot level within SPECCHIO and corresponding data analysis. Connection with models. **[AH, ET CvdT]** | **Modelling and data analysis tutorial if required [AH, ET CvdT]**  Student modelling and data analysis supervised and assisted by all trainers | **Scientific Working Group I**: Presentation  **Scientific Working Group II**: Presentation  **Scientific Working Group III**: Presentation |
| **Tutorial 5** **Scientific Working Group and VITO/RSL**: Data inspection (quicklooks, raw data and field measurements) Data analyses/modelling **[VITO]** |
| 10:30-11:00 | Coffee break | Coffee break | Cold drinks and snacks | Coffee break | Coffee break | Coffee break |
| 11:00-12:30 | **Lecture 15:** Modelling for data analysis and tutorial with data collected or archived data **[ET]** | **Tutorial 6** **Scientific working group and VITO**: PKtools, open source image processing tools for vegetation studies **[PK]** (with archived APEX data) | **Mission FLIGHT (1) + ground measurements (1) +UAVs (1)**  **[ALL WG leaders]** | **Student Activity 9** Student modelling and data analysis supervised and assisted by all trainers | Student modelling and data analysis supervised and assisted by all trainers | **Scientific Working Group IV**: Presentation  **Scientific Working Group V**: Presentation  Conclusions **[AM, JR]** |
| 12:30-13:30 | Lunch | Lunch | Lunch | Lunch | Lunch |
| 13:30-15:00 | **Tutorial 3** Modelling for data analysis and tutorial with data collected or archived data **[ET]** | **Tutorial 7** **Scientific working group and VITO:** PKtools, open source image processing tools for vegetation studies (with archived APEX data **[PK]** | Student modelling and data analysis supervised and assisted by all trainers | Student modelling and data analysis supervised and assisted by all trainers | **13:30-15:30**  **Student Departure** to Poznan LAWICA airport |
| 15:00-15:30 | Coffee break | Coffee break | Lunch (station) | Coffee break | Coffee break |
| 15:30-16:30 | **Tutorial 4** Finalization of APEX flight plan with the support of APEX operator **[BB]** | **Student Activity 8** processing data with PKtools supervised and assisted by all trainers | **15:30-17:00** trip to the airport (Pila flying-club) | Student modelling and data analysis supervised and assisted by all trainers | **Scientific Working Groups**: Preparation final presentation |
| 16:30-18:00 | **Student Activity 7 Scientific Working Groups** Finalise field work plans and protocols  **[ALL WG leaders]** | **17:00-18:00** aircraft visiting  **18:00-19:00** Visiting of Military museum |
| 19:00-20:00 | Dinner (hotel) | Dinner (hotel) | Dinner in Pila (in flying club facilities) | Dinner (outside, bonfire) | Dinner (hotel) |  |

**Option 3 if flight does not go ahead on Sunday or Monday**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **DAY\_6** Saturday 11th July | **DAY\_7.** Sunday 12thJuly | **DAY\_8.** Monday 13th July | **DAY\_8.** Tuesday 14thh July | **DAY\_10.** Wednesday 15th July | **DAY\_11** Thursday 16th July |
|  | **Image post processing, Flight planning AH and VITO** | **Airborne data processing (VITO tutorials and hands on sessions)**  **(Archived data)** | **Tutorials, modelling and data analysis**  **Scaling measurements from ground to satellite**  **(Archived data)** | **Flight and field work**  **Option 3** | **Tutorials Modelling and data analysis**  **Scaling measurements from ground to satellite** | **Student presentations**  **Scaling measurements from ground to satellite** |
| 9:00-10:30 | **Lecture 14 and Tutorial 2:** SPECCHIO lecture and tutorial with data collected or archived data **[AH]** | **Lecture** **16** (0,5h) on VITO Central Data Processing Facility and demonstration by Kristin Vreys or backup Marian-Daniel Iordache, | **Modelling and data analysis tutorials**  Augmentation of FS data with biopysical measurements at plot level within SPECCHIO and corresponding data analysis. Connection with models. **[AH, ET CvdT]** | **8:00** Pre-flight: GO/NO GO  if GO:  **8:30** Departure to experimental site Equipment and site preparation (ground targets)  **[ALL WG leaders]** | **Modelling and data analysis tutorial if required [AH, ET CvdT]**  Student modelling and data analysis supervised and assisted by all trainers | **Scientific Working Group I**: Presentation  **Scientific Working Group II**: Presentation  **Scientific Working Group III**: Presentation |
| **Tutorial 5** **Scientific Working Group and VITO/RSL**: Data inspection (quicklooks, raw data and field measurements) Data analyses/modelling **[VITO]** |
| 10:30-11:00 | Coffee break | Coffee break | Coffee break | Cold drinks and snacks | Coffee break | Coffee break |
| 11:00-12:30 | **Lecture 15:** Modelling for data analysis and tutorial with data collected or archived data **[ET]** | **Tutorial 6** **Scientific working group and VITO**: PKtools, open source image processing tools for vegetation studies **[PK]** (with archived APEX data) | **Student Activity 9** Student modelling and data analysis supervised and assisted by all trainers | **Mission FLIGHT (1) + ground measurements (1) +UAVs (1)**  **[ALL WG leaders]** | Student modelling and data analysis supervised and assisted by all trainers | **Scientific Working Group IV**: Presentation  **Scientific Working Group V**: Presentation  Conclusions **[AM, IR, JR]** |
| 12:30-13:30 | Lunch | Lunch | Lunch | Lunch | Lunch |
| 13:30-15:00 | **Tutorial 3** Modelling for data analysis and tutorial with data collected or archived data **[ET]** | **Tutorial 7** **Scientific working group and VITO:** PKtools, open source image processing tools for vegetation studies (with archived APEX data **[PK]** | Student modelling and data analysis supervised and assisted by all trainers | Student modelling and data analysis supervised and assisted by all trainers | **13:30-15:30**  **Student Departure** to Poznan LAWICA airport |
| 15:00-15:30 | Coffee break | Coffee break | Coffee break | Lunch (station) | Coffee break |
| 15:30-16:30 | **Tutorial 4** Finalization of APEX flight plan with the support of APEX operator **Bart Bomans, VITO** | **Student Activity 8** processing data with PKtools supervised and assisted by all trainers | Student modelling and data analysis supervised and assisted by all trainers | **15:30-17:00** trip to the airport (Pila flying-club) | **Scientific Working Groups**: Preparation final presentation |
| 16:30-18:00 | **Student Activity 7 Scientific Working Groups** Finalise field work plans and protocols  **[ALL WG leaders]** | **17:00-18:00** aircraft visiting  **18:00-19:00** Visiting of Military museum |
| 19:00-20:00 | Dinner (hotel) | Dinner (hotel) | Dinner (outside, bonfire) | Dinner in Pila (in flying club facilities) | Dinner (hotel) |  |

**3.6 Staff and student accommodation and funding schedule**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Day*** | ***1*** | ***2*** | ***3*** | ***4*** | ***5*** | ***6*** | ***7*** | ***8*** | ***9*** | ***10*** | ***11*** | ***Accommodation*** | ***Funding source*** |
| *AH - Andy Hueni, (RSL, UZH)* | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *Palace appartement* | *EUFAR trainer #1* |
| *AM - Alasdair Mac Arthur, Geosciences, (UoE, UK)* | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *Palace appartement* | *OPTIMISE trainer #1* |
| *ET - Enrico Tomelleri, (BGC, DE)* | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *Palace appartement* | *OPTIMISE trainer #2* |
| *Andreas Burkart, DE* | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *Palace appartement* | *OPTIMISE trainer #3* |
| *MR - Micol Rossini, UMI,* | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *Palace appartement* | *OPTIMISE trainer #4* |
| *LA Luis Alonso UoV* | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *Palace outbuilding* | *OPTIMISE trainer #5* |
| *IR - Ils Reusen, (VITO, BE)* | *√* | *√* | *√* | *√* | *√* | *√* |  |  |  |  |  | *Palace appartement* | *EUFAR trainer #2* |
| *LV- Loris Vescovo, (FEM, IT)* |  |  |  |  |  | *√* | *√* | *√* | *√* | *√* | *√* | *Palace appartement* | *EUFAR trainer #3* |
| *TBA* |  |  |  |  |  | *√* | *√* | *√* |  |  |  | *Palace appartement* | *OPTIMISE trainer #6* |
| *AD - Alex Damm, (RSL, UZH)* | *√* | *√* | *√* | *√* |  |  |  |  |  |  |  | *Palace appartement* | *EUFAR trainer #4* |
| *DS. - Daniel Schlaepfer, (ReSe Applications)* |  |  | *√* | *√* | *√* |  |  |  |  |  |  | *Palace appartement* | *OPTIMISE trainer#7* |
| *CvdT - Christiaan van der Tol, ( ITC, NL)* |  |  |  | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *Palace appartement* | *EUFAR trainer #5* |
| *TP- Tomasz Prost (PCAO – UAV expert PL)* |  | *√* | *√* |  |  |  |  |  |  |  |  | *Hunters Cottage* | *EUFAR trainer #6* |
| *KM - Koen Meuleman, (VITO, BE)* |  | *√* | *√* | *√* | *√* | *√* | *√* |  |  |  |  | *Hunters Cottage* | *VITO* |
| *MI - Marian-Daniel Iordache, (VITO, BE)* |  |  |  |  |  |  | *√* | *√* | *√* | *√* | *√* | *Hunters Cottage* | *VITO* |
| *PK – Pieter Kempeneers, (VITO, BE)* |  |  |  |  |  |  | *√* | *√* | *√* | *√* | *√* | *Hunters Cottage* | *EUFAR trainer #7* |
| *RJ - Radoslaw Juszczak (PULS, PL)* | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *√* | *Pheasant Cottage* | *EUFAR trainer #8* |
| *BHCH - Bogdan Chojnicki (PULS, PL)* |  |  |  |  | *√* | *√* | *√* | *√* |  |  |  | *Pheasant Cottage* | *PULS* |
| *ML - Mariusz Lamentowicz (PULS, PL)* |  |  |  |  | *√* | *√* |  |  |  |  |  | *Pheasant Cottage* | *PULS* |
| *JO - Janusz Olejnik (PULS, PL)* | *√* | *√* |  |  |  |  |  |  |  |  |  | *Pheasant Cottage* | *PULS* |
| *JV- Jochem Verrelst (U. Valencia, ES)* |  |  |  |  |  |  |  | *√* | *√* | *√* |  | *?* | *EUFAR* |
| ***Total trainers in Obrzycko Palace*** | 10 | 12 | 12 | 12 | 13 | 14 | 14 | 13 | 12 | 11 | 10 |  | |
| *Students 10 EUFAR and 10 OPTIMISE* | *20* | *20* | *20* | *20* | *20* | *20* | *20* | *20* | *20* | *20* | *20* |
| ***Total staying at hotel*** | 30 | 32 | 32 | 32 | 33 | 34 | 34 | 33 | 32 | 31 | 30 |

**Cost allocation : OPTIMISE have 60 trainer/expert days and EUFAR have 57 trainer/expert days plus VITO**