

Advanced Course:

**GREENHOUSE GAS ASSESSMENT AND MITIGATION IN AGRICULTURE:
CONCEPTS, METHODS AND SIMULATION TOOLS**

Zaragoza (Spain), 30 November - 4 December 2026

PROGRAMME

0. Opening (1 hour)

1. Context (2 hours) *L. Schietecatte*

- 1.1. The role of agriculture in climate change
- 1.2. Main processes underlying emissions of CO₂, N₂O, CH₄
- 1.3. The importance of the National GHG Inventories

2. Measuring agricultural GHG emissions and soil carbon changes (2 hours) *K. Klumpp*

- 2.1. Methodological challenges: spatial/temporal variability, sampling issues, etc.
- 2.2. Overview of field and laboratory methods: limitations and opportunities
- 2.3. Low cost procedures and new developments

3. GHG mitigation options for cropping systems (4.5 hours)

- 3.1. Direct and indirect GHG emissions: general concepts (3.1 and 3.5, 1 hour) ***A. Sanz-Cobeña***
- 3.2. Options for reducing direct N₂O and CH₄ emissions (3.2 and 3.3, 2 hours) ***A. Sanz-Cobeña***
- 3.3. Options for reducing indirect GHG emissions: N leaching and atmospheric reactive N
A. Sanz-Cobeña
- 3.4. Options for enhancing CO₂ removal (1.5 hour) ***J. Álvaro-Fuentes***
- 3.5. Barriers and opportunities for GHG mitigation in agriculture ***A. Sanz-Cobeña***

4. National GHG inventories (3 hours + 3 hours practical work)

- 4.1. IPCC-based methods (4.1-4.2, 3 hours) ***R. Oliveri***
- 4.2. Overcoming drawbacks, limitations and uncertainties in different national conditions ***R. Oliveri***
- 4.3. *Practical work on GHG NI based on a case study (3 hours) ***J. Álvaro-Fuentes, A. del Prado & R. Oliveri****

5. GHG estimation tools (6 hours + 7.5 hours practical work)

- 5.1. Process-based models (4 hours)
 - 5.1.1. Overview, data requirements, limitations and opportunities, applications (1 hour)
J. Álvaro-Fuentes, A. del Prado
 - 5.1.2. Field-scale models for GHG estimation (1 hour) ***J. Álvaro-Fuentes & A. del Prado***
 - 5.1.3. Regional and global models (1 hour) ***E. Lugato***
 - 5.1.4. Challenges of scaling up (or down) (1 hour) ***E. Lugato***
- 5.2. Life cycle analysis (LCA) (2 hours) (***A. Jebari***)
- 5.3. *Practical work*
 - 5.3.1. Field-scale process-based models (3.5 hours) ***J. Álvaro-Fuentes, E. Lugato & A. del Prado,***
 - 5.3.2. LCA (4 hours) ***A. Jebari and A. del Prado***

6. Decision-making oriented tools (3 hours) *E. Milne*

- 6.1. Decision support systems
- 6.2. User-friendly tools
- 6.3. Open-access databases

7. Priorities on GHG research (2 hours)

Round table discussion: ***J. Álvaro-Fuentes, E. Lugato, E. Milne & A. del Prado***

8. Closing session (0.5 hours)