**Course topics**

**Day 1:**

Introduction

1. Introduction to SPA workflows and Scipion (COSS)

From movies to particles

1. Dose filter (COSS)
2. Correct gain orientation (Marcos)
3. Defocus estimation (Marcos)
4. Particle picking (Marcos)
5. Retraining a picker (Marcos)
6. 2D classification with and without a mask (Marcos)
7. Workflow at facilities (COSS)

From particles to 3D maps

1. Understanding angular assignment errors (COSS)
2. Non-uniform angular distributions (COSS)
3. Effect of the CTF (COSS)
4. Effect of the 3D reconstruction algorithm (COSS)
5. Initial volume and landscape of solutions (COSS)
6. Having the correct hand (COSS)
7. Angular consensus (Marcos)

**Day 2:**

1. Classification problems (COSS)
2. Attraction (COSS)
3. Classification without alignment (Marcos)
4. StructMap (COSS)
5. Good 2D classes is a necessary, but not sufficient, condition for 3D (COSS)

Validation

1. Local resolution and validation through atomic models (COSS)
2. Directional resolution and anisotropy (Marcos)
3. Validation server (COSS)

Advanced topics

1. Sharpening (Marcos)
2. Focused classification (Marcos)
3. Mask refinement (Marcos)
4. (a) Map subtraction particle level (COSS) and (b) volume level (Marcos)
5. (a) Symmetry relaxation, expansion, and (b) localized reconstruction (Marcos)
6. Local defocus (Marcos)
7. Volume consensus (COSS)

**Day 3:**

Other Scipion domains

1. Atomic models
2. Tomography: from movies to tomogram
3. Tomography: picking 1
4. Tomography: picking 2
5. Tomography: subtomogram averaging
6. Flexibility analysis
7. Virtual drug screening

Some of the topics can be seen offline at <https://www.youtube.com/watch?v=C2t6GCGO76Y&list=PLQjWIcrmtc4JjyC-_BM99_XW-VsDa4_i3&index=62>