

Learning outcomes 2025-26

Contents

0	Introduction	2
1	Week 01	3
2	Week 02	4
3	Week 03	5
4	Week 04	6
5	Week 06	7
6	Week 08	8
7	Week 09	9
8	Week 11	10
9	Week 12	11
10	Week 13	12

0 Introduction

The goal of this document is to list the key concepts of the Space Mission Design & Operations (SMDO) course. This is a concept course, that is it focusses on conceptual aspects with little formal derivations of the results. This allows to cover more topics. Therefore, the content of SMDO can feel wide ranging.

This guide should help you prepare for the exam, but also what you should remember of the course years in the future when you have left university. Of course, it does not imply that the rest is not interesting, but I do not expect the same level of understanding for the different concept categories.

1. **Key concepts:** fundamental aspects of the course. You should understand these in details and be able to describe them without hesitation. *Examples:* the three Kepler laws or the six orbital parameters.
2. **Important concepts:** you should be able to describe important concept clearly, but apply with documentation. They generally are the basis for exercises. *Examples:* Sun-synchronous orbit or Hohmann manoeuvre.
3. **Relevant concepts:** you should be able to explain them and the larger context. They can be discussed in the exam, mostly in the second discussion part. *Examples:* space weather or Lagrange points.
4. **Advanced concepts:** interesting nuggets of information or a preview of a topic not covered in the course. These will *not* be tested in the exam.

The list below is organised by week and by importance of the concept as defined above.

This guide will be distributed with each slide deck before each lecture. The complete guide in one pdf file will be uploaded to Moodle at the end of the course.

Disclaimer: This guide might not cover all concepts nor is it binding – even though I will strive to stick to it. If you spot inconsistencies or missing concepts please reach out so I can improve this list.

1 Week 01

1.1 Key concepts

N/A

1.2 Important concepts

- Newton's laws, inertial frames, energy
- Solar "constant"
- Radiation balance

1.3 Relevant concepts

- Motivations to go to space & applications
- Earth's atmosphere
- Earth's magnetic fields
- South Atlantic Anomaly
- Solar radiation (except solar "constant" → *important concepts*)
- UV radiation
- Earth's radiation budget

1.4 Advanced concepts

N/A