Universidad Zaragoza

Academic Year/course: 2021/22

27041 - Differentiable Manifolds

Syllabus Information

Academic Year: 2021/22
Subject: 27041 - Variedades diferenciables
Faculty / School: 100 - Facultad de Ciencias
Degree: 453 - Degree in Mathematics
ECTS: 6.0
Year: 4
Semester: First semester
Subject Type: Optional
Module:

1. General information

2. Learning goals

3. Assessment (1st and 2nd call)

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives.

A wide range of teaching and learning tasks are implemented, such as lectures, problem-solving sessions, tutorials and autonomous work and study. The proposed projects about complementary aspects of the subject will be supervised by the teacher along the course.

4.2. Learning tasks

This course is organized as follows:

- Lectures (three weekly sessions).
- Problem-solving sessions (one weekly session; oral presentations of problems).
- Tutorials (including the supervision of the proposed projects).
- Autonomous work and study.

These tasks will take place in-person at the classroom, unless the University of Zaragoza stablishes that, because of the public health situation, they should be done online.

4.3. Syllabus

This course will address the following topics:

Topic 1. Differentiable manifolds.

Topic 2. Manifolds and smooth maps.

Topic 3. Topological properties of manifolds. Partitions of unity.

Topic 4. Tangent space. Differentiation on a manifold.

Topic 5. Submersions, immersions and embeddings.

Topic 6. Submanifolds.

Topic 7. Lie group actions.

Topic 8. Integral curves and flows.

Topic 9. The Lie derivative.

Topic 10. One-parameter subgroups of a Lie group.

Topic 11. The exponential map.

Topic 12. The closed subgroup theorem.

4.4. Course planning and calendar

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course will be provided on the first day of class or please refer to the Faculty of Sciences website and Moodle.

4.5. Bibliography and recommended resources

- Lee, J.M.: Introduction to smooth manifolds. Second edition. Graduate Texts in Mathematics, 218. Springer, New York, 2013.
- Lee, J.M.: Introduction to Riemannian manifolds. Second edition. Graduate Texts in Mathematics, 176. Springer, Cham, 2018.
- Auslander, L; Mackenzie, R.E.: Introduction to Differentiable Manifolds. Mc.Graw-Hill. 1963.
- Boothby, W.M.: An introduction to Differentiable Manifolds and Riemannian Geometry . Ac. Press. 1975.
- Brickell, F.; Clark, R.S.: Differentiable Manifolds . Van Nostrand, 1970.
- Warner, F.W.: Foundations of differentiable manifolds and Lie groups. Corrected reprint of the 1971 edition. Graduate Texts in Mathematics, 94. Springer-Verlag, New York-Berlin, 1983.
- Burns, K; Gidea, M.: Differentiable Geometry and Topology. Chapman & Hall /CRC. 2005.
- Conlon, L.: Differentiable Manifolds. A First Course. Birkhäuser, 1993.
- Gamboa, J.M.; Ruiz J.M.: Iniciación al estudio de las Variedades Diferenciables. Sanz y Torres 2016.
- Lee, J.M.: Introduction to smooth manifolds. Springer-Verlag 2002.
- Outerelo, E.; Ruiz, J.M; Rojo, J.A.: Topología Diferencial. Sanz y Torres 2014.

http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=27041