# Second Midterm Test – Semantic Web course a.a. 2024/2025

**Instructions**

The candidate has to submit two files: (i) one file containing the ontology in Turtle format, with extension .ttl or .owl; (ii) one file in PDF format, containing the answers to each question from Q8 to Q10. The solution must be submitted via the Moodle of the course.

**Exercise**

The fundamental concepts in a museum-related application domain are curators, exhibitions, and collections. The facts characterizing this domain are as follows:

1. A curator is a person who organizes at least one exhibition and is employed in at least one museum.
2. A museum is an organization that manages buildings and maintains collections.
3. Each museum is identified by a unique ID (a positive integer).
4. Each museum has a name (a string) and employs a minimum of one curator.
5. Each museum hosts at least two exhibitions.
6. An exhibition can be either temporary or permanent. Each exhibition is displayed in at least one room.
7. Each room is located in exactly one building and contains more than five museum objects.
8. Each museum object belongs to exactly one collection and is assigned a unique ID (a positive integer).
9. Museums, curators, exhibitions, collections, rooms, buildings, and museum items are pairwise disjoint concepts.

The candidate must express all the above statements in an OWL 2 DL ontology, using the RDF Turtle notation. In particular, the ontology must:

Q01. Declare the required classes.
Q02. Define the class taxonomy.
Q03. Declare the required object properties, providing for each property:
    Q03.3. one axiom defining the domain of the property
    Q03.4. one axiom defining the range of the property
    Q03.5. one axiom defining the inverse of the property
Q04. Define the object property taxonomy.
Q05. Declare the required data properties, providing:
    Q05.3. one axiom defining the domain of the property
    Q05.4. one axiom defining the range of the property
Q06. Define the axioms necessary for expressing any statement from 1 to 9.
Q07. Populate the ontology with at least one individual for each class, and at least one assertion for each property.

In addition, the candidate must:

Q08. Define the complex role inclusion axiom capturing the fact that if a curator organizes an exhibition that is displayed in a room located in a building managed by a museum, then the curator is employed by that museum.
Q09. Identify one assertion that would make the ontology inconsistent.
Q10. Verify and explain whether or not the created ontology (including the complex role inclusion axiom defined in Q08) satisfies the global restrictions on the axioms of an OWL 2 DL ontology.