Università di Roma Tor Vergata

# SUMMER SCHOOL
## UNIVERSITY OF ROME TOR VERGATA

# LOGICAL REASONING IMAT PROGRAMME (update 27/03)

**Lecturer**
**GIUSEPPE SERGIOLI**

**Teaching Hours**
**15**

**Analytical Syllabus**

| Date | Topics | Hours |
|---|---|---|
| 4th September | Entry test, to assess the starting level of the class.<br><br>Description of the logical connectives: negation, conjunction, disjunction, implication, double implication. Different applications of the logical connectives in different argumentative contexts. | 14.00 - 16.00 |
| | Examples of solving problems related to the use of the logical connectives: distinguish between inclusive and exclusive disjunction, identify the different forms of implication and recognize hidden forms of conjunctions. | 16.00 – 17.30 |
| 5th September | Definition of an argument. Definition of valid and correct argument. Formal and practical strategies to distinguish correct and incorrect arguments. Definition of logical quantifiers. Definition of “necessary condition” and “sufficient condition”. Formalizing this expressions by recalling the definition of implication and by exploiting the true tables. | 14.00 - 16.00 |
| | Examples of solving problems related to the logical quantifiers: identify correct and incorrect arguments containing expressions such as “for any”, “for all”, “not for any”, “not for all”, “for at least one”, “for any except one” etc… Examples of solving problems related to the logical connectives, logical quantifiers and | 16.00 – 18.00 |

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| | "necessary and sufficient" conditions: there will be analysed complex statements containing all these ingredients mixed together. | |
| 6th September | Introduction to standard mathematical-logical problems. A brief introduction to the set theory and to the standard way to solve simple problem by using equations and systems of equations. A brief introduction of the use of trigonometry to solve geometrical problems. | 14.00 - 16.00 |
| | Examples of solving problems by using set theory, equations and systems of equations. Solving geometrical problems by using trigonometry. | 16.00 – 17.30 |
| 7th September | Example of solving problems by using Least Common Multiple, Greatest common divisor.<br><br>Overall summary of the topics previously introduced. | 14.00 - 16.00 |
| | Final test to assess the final level of the class. | 16.00 – 18.00 |
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