

Master and Doctorate in Logic and Philosophy of Science: the Logic Itinerary

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Abstract. Our MA in Logic and Philosophy of Science has been running since the school year 2007-08. The purpose of the MA is to form and prepare students in the different subjects of the knowledge area of Logic and Philosophy of Science as it is conceived of in Spain. Moreover, it intends to prepare its students for their doctoral dissertation.

This contributed paper has two parts. The first and longer part of the paper is a presentation of our current MA program, while the main purpose of its second part is to assess the logic itinerary in our MA program in the light of the changes that have taken place in the Spanish Academic scenario. Namely, when the Academic Program for the MA was proposed, almost five years ago, none of the subjects then taught in our “licenciatura” in philosophy were allowed to appear as subjects to be taught at the master level. At the moment, most Spanish students following it are “licenciados” in philosophy; but soon graduate students in philosophy will be the ones intended to follow our program. And the problem is that they will have a much meager knowledge of logic than their predecessors, “licenciados” in philosophy. That conveys that our logic itinerary needs to be reconsidered.

1. Our MA Program: the Logic Itinerary

1.1 General aspects of the Program

One of the major strengths of our program is that six universities/research centers are part of the organization, namely, Universidad de Salamanca, Universidad de Valladolid, Universidad de La Laguna, Universidad Autónoma de Madrid, Universidad de Santiago de Compostela, Universidad de A Coruña and Instituto de Filosofía (CSIC, Madrid). Moreover, associate professors and professors of many other universities and of some other research centers in Spain (Granada, Complutense de Madrid, Valencia, Murcia, Málaga, Ikerbasque, UNED, Sevilla) participate in our program. It is a truly inter-university program. Furthermore, a couple of associate professors or professors from non-Spanish European Universities are also part of our academic staff.

The program site moves. Its first site was at the University of Salamanca. Being the site of the program conveys organizing the academic plan (time table, calendar, exams dates, qualification dates, etc), being responsible for the welfare of the students during the onsite lessons, and so forth. Currently (2009-10 and 2010-11) the official site is the University of Santiago de Compostela, while Valladolid will be in charge of the next two editions.

The official Postgraduate Program in Logic and Philosophy has been designed as a Master and Doctorate research program offering postgraduates a unique opportunity to do their own research of international relevance into the world of Logic, History and Philosophy of Science, and Philosophy of Language.

The purpose of our Inter-university MA in Logic and Philosophy of Science is to train “licenciados” and graduates with a level of excellence in the field of Logic and Philosophy of Science. In particular, the Program intends to:

- Provide expertise on current and classic problems of research in formal logic as well as information on possible applications of logic in the field of computing.
- Provide expertise in traditional and current problems of philosophy of language, philosophy of mind and their connections with other disciplines (cognitive science, artificial intelligence, etc.).
- Provide expertise on traditions, classical and current problems of philosophy of science, their implications for intellectual, cultural, social, and methodological applications for research in natural and social sciences.

Moreover, it intends to:

- Provide appropriate methodological tools to enable high-level research in the area.
- Encourage an active attitude, not only for studying and learning, but also for the design and publication of research papers.
- Enhance doctoral-thesis writing excellence in the area of Logic and Philosophy of Science.
- And enable an appropriate degree of specialization through the different routes planned, so that the competence profile of each student is adequate to continue to work in different areas.

Upon completion of these studies and in correspondence to the track followed, the student will have achieved:

- High critical and analytical skills.
- Capacity for understanding, reconstructing and elaborating complex arguments.
- Capacity to analyze, interpret and assess philosophical and scientific texts in at least two major languages.
- Competence to do research work in the field.
- Expertise in various areas of the philosophy of science.
- Or expertise in various areas of logic.
- Or expertise in different areas of the philosophy of mind and language

Our Students are:

- “Licenciados” in Philosophy (now “licenciados”, graduates in the future)
- “Licenciados” in the field of natural sciences, mathematics and computer science (now “Licenciados”, graduates in the future)
- “Licenciados” in the field of social sciences and philology (now “Licenciados”, graduates in the future)
- Other “Licenciados” with equivalent degrees of diverse origin.

One of the traditional problems for the research area of Logic and Philosophy of Science is that few students are willing to do research in the area in general, and even less are ready to do research in Logic. Launching this common program has had the following advantages:

- It has allowed different Spanish universities to offer a very attractive program, with excellent experts working in the different sub-areas of specialization, while sharing the costs of paying for these experts.
- The universities share students. We have managed to recruit students from Spain, Europe and Latin America. In particular, the programme has had students from Portugal (5), Italy (4), Rumania (1), Greece (1), Japan(1), Venezuela(2), Colombia (6), Ecuador (1), Chile (3) , Brazil, Mexico(8), Argentina (6), Peru (2), and many from Spain. The approximate number of students in each of the last two editions of our Master has been 45.
- Counting on so many professors and subject allows us to make our program à la carte: our students are to choose 8 out of 32-33 offered subjects.

The program has 60 credits. 15 correspond to the master thesis, 5 correspond to a compulsory subject by means of which our students refresh their knowledge of logic,

philosophy of science or philosophy of language, and 40 correspond to 8 non-compulsory subjects of 5 credits each. Those non-compulsory subjects are structured in itineraries or tracks.

One of the salient features of the program is that the learning methodology is a blended one; in other words, it mixes different learning environments since part of the learning is e-learning, while ten hours per subject take place at the university that is responsible for the program at the time. Onsite lessons take place during two weeks at the beginning of the first semester, and two weeks at the beginning of the second semester. The rest of the teaching/learning is on line teaching/learning. For that purpose we use the Moodle e-learning platform managed by the Universidad de Salamanca.

1.2 The Logic Itinerary

The subjects of this itinerary are: 1) The study and development of classical and non-classical logics; 2) the study of various information technologies and of the formal problems that are to be solved in order to develop and apply them in fields such as Artificial Intelligence, Semantic Web, Computability, etc. ; 3) the study of History and Philosophy of Logic.

The first block in this itinerary is concerned with the improvement of the student's logical skills and general knowledge of logic:

- Concepts and Techniques for the Analysis of Arguments
- Higher Order Logic
- Non-classical logics
- Explicative Reasoning

The second group of subjects covers the study of logics applied to information technologies, problems of software development, the possibility of Artificial Intelligence and its future as the discipline in charge of the development of Intelligent Systems, the development of specific languages for the web, languages capable of supporting useful technological information for searches which have led to the so called "semantic web". By following this itinerary, the student will also learn about the design of programs, computer languages, development of semantic web, and expert systems.

- Logics for the Web
- Logic Programming
- Automated Deduction for extensions of classical logic
- Theoretical Computation: the State of the Art
- e-Science: from artificial intelligence to middleware: some epistemic remarks.
- Objectivist Conceptions of Information: Logic and Ontology

Finally, what can be considered a third group of subjects introduces the student in the knowledge of the some of the main issues in the History and Philosophy of Logic:

- History and Philosophy of Logic
- Contemporary approaches to the philosophy of logic: Foundational Issues.
- Quantifiers and Logical Constants

The Master counts also on a compulsory course, the "Methodological and Introductory Course". This course is intended to refresh or introduce the student in the three basic fields of research in the master: logic, philosophy of language and philosophy of science. Students are allowed to choose to follow any of the three options depending on their interests. Those following the logic track should, of course, take the logic option.

1.3 The Teaching of Those Subjects: Strengths and Problems to Be Overcome

The main general strengths of our program are:

1. Interdisciplinarity: not only philosophers but also students from other disciplines, both "licenciados" in the humanities and social and empirical sciences. Not in vain logic is the ultimate interdisciplinary subject.

2. Internationality. We have been attracting not only our own students in a variety of “licenciaturas”, but also a number of other students both from other countries, mainly from Latin America, and some from the European Union countries.
3. Individuality. One of the characteristics of our MA is that it allows each student to choose from a wide range of options and that even the proposed special itineraries or are not watertight compartments, making it possible that no two students completed exactly the same subjects.

1.4 The structure of the subjects

Each course is 5 ECTS finally representing 125 hours of student work. As it was mentioned above, ten hours are taught at the classrooms of the university in charge, while the rest of the teaching is e-teaching. Students are asked to read a number of papers, or to do a number of problems and exercises. They are also asked to write short research papers. Teachers correct all the material, and give students feedback on their results. This methodology conveys that students get very personal attention, and teachers do have quite a lot of work to do.

The major advantages of learning via the Internet are the adjustment of the pace of learning to students and the availability of learning tools regardless of geographic or time limits. On the other hand, according to the principles of educational renewal of the EHEA and its emphasis on the responsibility of the students in their own learning, blended-learning is an excellent tool to enhance the greater involvement of students in their training. The so-called blended learning or combined education refers to the use of both strategies classroom training and distance education at the same time. Is a modality that aims to be the alternative to classroom education generated in e-learning environments and combines the physical with the virtual, using multimedia and internet technology.

In general, the tools of any virtual training strategy are, first, different utilities for the presentation of content (text, links to web pages, animations, graphics, videos etc.) and other communication tools for students and tutors of the courses such as e-mail or chat rooms and forums.

Moodle learning platform is the most used free of charge free software especially designed for creating online courses. It incorporates the philosophy of continuous improvement by implementing tools and resources generated by the users. It was created by Martin Dougiamas, the latest version is available in www.moodle.org.

1.5 Master Thesis

The academic value of Master Thesis in our program is of 15 ECTS credits. The research and the writing of the thesis should take around 9 weeks at the end of the second semester. The thesis topics vary widely. Some examples of master thesis on logic or argumentation theory are:

2009-2010: Carmen Santander, “La paradoja del mentiroso: Análisis desde el lenguaje natural y el formal”, (Supervisor: Juan Barba (UVA))

2009-2010: Martín Andor, “The Modus Ponens Paradox in Indicative conditionals”, (Supervisor: María José Frápolli, (Granada))

2009-10: Manuel Crescencio Moreno Gómez, *Los argumentos ontológicos clásicos*, (Supervisor: María Manzano(USAL))

2009-10: Elias Fuentes Guillen, *El estudio de las matemáticas a partir de los segundos planteamientos de Thomas S. Khun*, (Supervisor: José Ferreirós (CSIC))

2008-2009: Luis Urtubey, "Completud e interpolación: Un enfoque a partir de la generalización del método de constantes de Henkin", (Supervisor: Mara Manzano (USAL))

2008-09: Francisco Aranda Martínez, *Las bases lógicas de la racionalidad*, (Supervisors: Luis Vega Reñón (UNED) and María Manzano(USAL))

2008-09: Thomaida Antoni, *Hybrid and Description Logics*, (Supervisor: María Manzano (USAL))

2008-09: Corina Yoris-Villasana, *La fuerza de los argumentos por analogía*, (Supervisor: Huberto Marraud (UAM))

2008-09: Miguel Rosso Carrasco, *Discusión contemporánea sobre la relatividad lingüística*, (Supervisor: Agustín Vicente(Ikerbasque))

2008-09: Asier Lafarga Fuertes, *La naturaleza de los conceptos*, (Supervisors: Agustín Vicente (Ikerbasque) and María Manzano (USAL))

2008-09: Ingrid Rodríguez Hernández, *Argumentación y Retórica*, (Supervisor: Margarita Santana (ULL))

2008-09: Violeta Hernández Guanche, *Retórica y Perlocución: ¿una aproximación a la Teoría de la Argumentación?*, (Supervisor: Margarita Santana (ULL))

2008-09: Henar Rodríguez Seijas, *Falacias de la relevancia*, (Supervisor: José Miguel Sagüillo(USC))

2007-08: Claudio Marcelo Conforti, *La necesidad lógica en Ludwig Wittgenstein*, (Supervisor: Concepción Martínez (USC))

2007-08: Claudio Eugenio Fuentes Bravo, *Espacios de Filosofía en la Representación de Sistemas de Información: del Conceptualismo Pragmático a la Construcción de Ontologías Formales*, (Supervisor: María Manzano(USAL))

2007-08: Davinia Miranda Suárez, *Web semántica y Filosofía: Una aproximación desde la Filosofía a las nuevas tecnologías para la web*, (Supervisor: Enrique Alonso (UAM))

2007-08: Adolfo Ruiz Calleja, *Ontologies on the Web: the promise of universal computation*. (Supervisor: Enrique Alonso (USAM))

1.6 Results

Our students' assessment of the teaching in our master is really well above the average in three of the universities involved, in the three that perform those assessments. In particular students consider that:

- Professors explain in a clear and orderly fashion.
- They meet the concerns and questions students put.
- They use internet resources appropriately.
- They use methodologies that allow for actively involving students in learning.
- Professors are available for consultation by students (tutoring, email,...).
- They report on the criteria and evaluation activities of the subject
- They meet the syllabus laid down in the schedule (schedules, program,...).
- The recommended bibliography is useful to the study of the subject.
- The classroom part helps students to understand the subject.
- Taking the different courses increases student's interest in the subject.
- If he or she were to take the subject again, they would happily do it with the same teacher.

- The structure and course content in the e-learning platform has been effective to follow the course.

1.7 International Comparison

Other international MSc programs in logic are those at the following universities: University of Amsterdam, University of Athens, Technical University of Dresden, University of Edinburgh, King's College London, University of Manchester, Université de Paris–Panthéon-Sorbonne, Carnegie Mellon University, Pittsburgh, Saarland University, Universidad de Barcelona. Two of the most interesting ones are the Amsterdam and the Barcelona programs. The former one is the broadest among those mentioned above. Our program offers a wider variety of subjects in the intersection of logic and philosophy. The Barcelona program offers a wide variety of courses in pure and applied logic, but it does not allow for the study of logic in combination with other subjects such as philosophy.

2. The Future of our MA Program: the Logic Itinerary to come

2.1 Introductory Module

This module was in our first version of the MA Program but for legal reasons it was not possible to actually incorporate it to the version that was finally approved by Spanish authorities. At the moment, it is possible to include such a module and we consider it should be added.

This module would aim at students who lack any knowledge of logic and/or philosophy. The subjects that students should study correspond to some that are ordinarily offered in the Bachelor of Philosophy. Basically, we have thought that students are to have up to 15 or 20 credits in logic, philosophy of science, philosophy of language and philosophy of mind. The MA Academic Commission will determine in each case the subjects the student is to register and follow. The way in which this module will affect the calendar of the general program is to be analyzed carefully.

2.2 Possible Subjects to be added to the Logic Track

The basic subjects that need to be added because none of our graduate students coming from philosophy will be familiar with its contents are Metalogic and Model Theory, and Set Theory. Some other subjects, not so essential but certainly interesting would be Recursion Theory and Proof Theory and Constructive Mathematics.

3 Acknowledgements

This paper has been prepared to a large extent on the basis of the Memoria for the program that was presented to the Spanish Ministry of Education, the assessment of our teaching provided by the different universities, and by self-evaluation of the Master prepared with the help of Mara Manzano.

References

- Barwise J. 1977, *Handbook of mathematical logic*, (Eighth impression 1993), Elsevier: The Netherlands.
- Jongh D. de 2006, "The MSc in Logic Programme at the ILLC", in María Manzano, Belén Pérez Lancho, and Ana Gil (eds.), *Proceedings of the Second International Congress on Tools for Teaching Logic*, 69-72.