

REPORT OF THE EXTERNAL EVALUATION COMMITTEE
FOR THE GRADUATE PROGRAM IN LOGIC,
ALGORITHMS AND COMPUTATION (MPLA)

1. INTRODUCTION

MPLA is a graduate program approved for a ten year period, starting in the Spring Semester of the academic year 1996-97. The current term of the program expires at the end of 2007 and MPLA will now apply to the Greek Ministry of Education for a ten year extension. As part of the application our committee was asked to provide a report containing an evaluation of the program and recommendations for its future operations. The members of the external committee are:

- Peter Aczel (Professor, Departments of Mathematics and Computer Science, University of Manchester),
- Melvin Fitting (Professor, Department of Mathematics and Computer Science, Lehman College, and Departments of Computer Science, Philosophy and Mathematics, Graduate Center, CUNY),
- Alexander Kechris (Professor, Department of Mathematics, Caltech),
- Lawrence Moss (Professor, Department of Mathematics, Indiana University),
- Helmut Schwichtenberg (Professor, Mathematical Institute, University of Munich),
- Albert Visser (Professor, Department of Philosophy, Utrecht University).

2. BACKGROUND

Detailed background information about the program is contained in the three attached documents. The first is the report of an external evaluation committee in 2001. The second is a statement by the MPLA Director, Yiannis Moschovakis, containing a description of the steps that have been taken by MPLA in response to these recommendations. The third contains various data concerning the operation of MPLA during the last 10 years.

3. OVERALL EVALUATION

It is the opinion of the committee that the program has been quite successful in its ten years of operation. It has generally fulfilled its original goals as formulated in 2. THE AIMS OF MPLA of the 2001 evaluation report and largely succeeded in establishing an international level graduate program in Logic and related areas of Theoretical Computer Science. It has been the focus of interactions between a large number of researchers in Greece as well as many international visitors. An extensive list of courses, seminars, lectures series, etc. has been offered during that time, covering an impressive range of topics. A large number of high quality M.Sc. Theses have been completed in a

very broad array of subjects. About half of the graduates of the program (26) have continued their studies towards a doctoral degree in various institutions in Greece (including MPLA) or abroad and the others have pursued careers in the private or public sector and in secondary education. In conclusion, the committee strongly endorses the continuation of the program for a second 10 year period.

4. RECOMMENDATIONS

4.1. **Recommendation.** There is some concern about the current balance in the program between Logic and Computer Science. At the moment there seems to be too much emphasis on the CS side. This is reflected for example in the large ratio of CS to logic courses and in a significant number of offered CS courses that seem to have little relationship with logic. Since at this time there are a number of first class CS programs operating in Greece, there is no point in creating another strongly CS oriented program at MPLA, which would be at a disadvantage in competing for the best students with them. It is recommended that logic, as well those parts of CS that have strong connections with logic, become the main focus of the program. If resources are available, the number of offered courses in mathematical logic as well as logic in computer science should be increased.

4.2. **Recommendation.** It is desirable to have a permanent external advisory board, which could meet regularly to monitor the program. One possibility is that the members of the board are appointed for a four-year term and they meet biennially, perhaps in conjunction with the Panhellenic Logic Symposium.

4.3. **Recommendation.** Concerning scholarships, it is strongly recommended that they continue to be offered but it is suggested that they would better serve their purpose if offered either at the start of the studies or possibly after a short period of evaluation.

4.4. **Recommendation.** There is some concern about the percentage of enrolled students that eventually graduate. This was more pronounced during the early years of the program but it seems to be currently improving. Perhaps a closer supervision, advising and monitoring of the students might help as well as a timely collection of surveys and questionnaires. Our understanding is that the Program Director (Y. Moschovakis) and the Chairman (C. Dimitracopoulos) of MPLA rather regularly but somewhat informally meet with first year students. After that the students are assigned a thesis advisor. It is a good idea to have the Program Director and Chairman do this monitoring during the first year but we recommend that a more formal structure of supervision be put into effect during that time.

4.5. **Recommendation.** It is recommended that the program specifies not only a minimum number of weeks for the completion of each course but also a minimum numbers of hours (e.g., 40).

4.6. Recommendation. Our understanding is that the MPLA has the following informal expectations from its graduates: (1) Acquiring general skills, such as being able to follow literature at a graduate level, apply math in practice, ability to collaborate, etc., (2) Mastering specific content, that covers, at a minimum, the basics of logic (including model theory, set theory and proof theory), recursion theory and its connection with computation, and finally design and complexity of algorithms. We recommend that MPLA formulates explicitly these goals.

4.7. Recommendation. The infrastructure seems good but it needs constant monitoring and updating (new books, computers, etc.).

4.8. Recommendation. Beyond continuing the very successful visitor program, it would be desirable to increase efforts of collaboration with other similar programs, e.g., through EU initiatives.

4.9. Recommendation. The program should make an effort to attract more foreign students, especially from countries in the geographic vicinity of Greece.

4.10. Recommendation. The committee found very useful the new web page of the program and the information contained in it. It would be desirable though to make the theses also available in English. This would be beneficial to the careers of the alumni.

5. ADDITIONAL COMMENTS

We quote here some additional comments of members of the committee about various aspects of the program that MPLA might want to consider.

5.1. Comment. In the 2001 evaluation it was noted that the connection between logic and theoretical computer science was strong and that this could be built on: “There is no doubt that methods from all areas of modern logic—including proof theory, model theory, computability theory and set theory—have already been employed with considerable success in most parts of computer science.” I would say there is one significant area that is missing, and that has had increasing relevance to computer science since the 2001 evaluation was written. Computers do not only compute; they store knowledge, manipulate it, and to some (slowly increasing) extent reason about it. Knowledge representation, logics of knowledge, automated reasoning, modal logic, intentional logic, fuzzy logic, all seem to find little or no place in the program. In the list of courses taught, I find non-classical logics in 1998-1999, modal logic in 1999-2000, non-classical logics again in 2001-2002, logic in artificial intelligence in 2004-2005, and that seems to be about it. I would say the list of topics that make up modern logic, in the quote above, is very traditional and somewhat outdated by now. There is, of course, no suggestion of competing with Amsterdam, so to speak. But the minimal treatment of the AI side of logic needs strengthening.

5.2. Comment. I like the division into the three specialization streams. But I think that the mathematical logic specialization is not taken seriously enough. The “what is it about” web page of the MPLA strongly emphasizes “algorithms” and not every student who might want to take that stream necessarily will want to have that focus. Even students interested in theoretical computer science may not have that focus.

My remaining comments will be given in relation to the fourteen 2001 recommendations and response.

In my view there is now plenty of emphasis on CS and the study of algorithms. Is it really necessary that students in the Mathematical Logic specialization take both Algorithms and Complexity I and II? Maybe the second Algorithms and Complexity course could be replaced as a required course by some other course (see Rec. 4).

Rec. 4: Maybe a required Logic in CS course would be a good idea, e.g. a course that focused more on deduction rather than computation that would build on the mathematical logic course. To my mind deduction and computation should be the twin pillars of a nice M.Sc. course, with two required courses on each pillar.

Rec. 5: At present there seems to be a reasonable breadth of coverage. On the mathematics/semantics side I would be happy to see more on category theory, type theory, intuitionistic logic and other non-standard logics, constructive mathematics, process algebra, universal algebra/coalgebra. But, no doubt, we each have our favorite topics.

5.3. Comment. It is good to have a clearer idea of what the Master’s Program shares with similar programs (like Amsterdam’s) and what its distinguishing marks are. These things are especially important in case MPLA wants to encourage non-Greek students to participate.

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