

## **GEM – the first GI Erasmus Mundus Masters Course**

Petter Pilesjö<sup>1</sup>, Andrew K. Skidmore<sup>2</sup>, Andre Kooiman<sup>2</sup> and Ulrik Mårtensson<sup>1</sup>

<sup>1</sup>GIS Centre, Lund University, Lund, Sweden, [Petter.Pilesjo@giscentrum.lu.se](mailto:Petter.Pilesjo@giscentrum.lu.se),  
[Ulrik.Martensson@nateko.lu.se](mailto:Ulrik.Martensson@nateko.lu.se)

<sup>2</sup>International Institute for Geo-Information Science and Earth Observation, ITC, Enschede, the Netherlands, [Skidmore@itc.nl](mailto:Skidmore@itc.nl), [Kooiman@itc.nl](mailto:Kooiman@itc.nl)

**MAJOR THEME: GI education and training**

**NATURE OF THE ABSTRACT: Strategic**

### **Abstract**

The Master of Science course “Geo-information Science and Earth Observation for Environmental Modelling and Management” (GEM) is an 18 months GI education offered by four European Universities. In this paper we discuss the development of the course, as well as “practices and pitfalls”. The need for “true partnerships”, where the partners trust in each other and have a common view on e.g. aims, ideas, agreements and flexibility in order to create a successful program is stressed.

**KEYWORDS:** *GI education, Masters course, Erasmus Mundus, GIS, GEM*

### **1. INTRODUCTION**

Five years ago four renowned European institutes formed a consortium to offer GI students a unique Master of Science (MSc) course named “Geo-information Science and Earth Observation for Environmental Modelling and Management (GEM). The course, which is 18 months and comprises 120 ECTS of education, starts annually in September.

The course is supported by the prestigious EU Erasmus Mundus programme. We offer EU-funded scholarships to exceptional (non-EU) students, as well as access for full fee-paying students (from the EU and the rest of the world). The course is run sequentially by:

- the University of Southampton (United Kingdom)
- Lund University (Sweden)
- the University of Warsaw (Poland)
- the International Institute for Geo-Information Science and Earth Observation ITC (the Netherlands)

GEM combines the best elements from these institutes into one course. World renowned faculty from the four Universities, as well as visiting scholars, teach this course. Apart from geo-information and remote sensing the course focuses on an understanding of the scientific process and ability to undertake scientific research. Students gain a thorough awareness of European and global environmental problems and an understanding of the complexity of factors involved in environmental decision making. We also stress an understanding of geographical information management and an ability to apply GIS, remote sensing and related tools to applied problem solving. All graduating students are trained in project and programme management as well as leadership-, negotiation- and communication skills. Since the students spend a considerable time in different European countries, the course represents a unique opportunity to discover Europe and gain valuable insight into the academic, social and cultural diversity of northern Europe.

The 15 modules included in the course, which are built around common geo-information and environmental themes, are taught at the four partner institutes: the student start at Southampton University in the UK in September, where she/he stays for 17 weeks. As a cohort, the students then move to Lund University in Sweden in January for 19 weeks. Field work is undertaken at the University of Warsaw (Poland) during the summer months (June/July) as well as special course on Environmental Policy in Central Europe. The student completes her/his study at ITC in the Netherlands (42 weeks) by writing a MSc thesis.

This paper deals with “practices and pitfalls” related to the implementation of an international GI education. Problems and weaknesses will be discussed, as well as possible solutions and recommendations. Even if not all parts are directly related to GI we think the material can be of interest in our joint effort to harmonize and integrate course curricula worldwide.

## 2. APPLICATION PHASE

In order to get a Masters course accredited and funded as a European Union Erasmus Mundus education a number of criteria have to be fulfilled. Among these are: at least three universities in Europe have to be involved, the quality has to be very high, and the students have to be exposed to different European culture and languages. It was early decided that the GEM course should be sequential, where students move between the partner universities.

One of the basic ideas of the course, to make it unique and take advantage of “best practice” at the different partner institutions, was to link technical skills with environmental management and policy. Even if the involved partners each have a lot of different types of GI activities, they still are specialized in a limited number of research areas. By letting students study at all partner universities they are directly exposed to a diverse mixture of GI research and applications. This, in combination with students programs offering courses in different EU languages and culture make GEM attractive for international students, as well as meeting the stated EU policy.

Of course, a 120 ECTS Masters program is not created over-night. An existing network of professors/research groups among the potential partner universities is crucial. An excellence in spatial and environmental sciences among the partners, and support by each partner’s Rector/VC is a necessity. The importance of good relations between the partners can not be exaggerated, nor the importance of a “common aim”, in line with institutional objectives. In the case of GEM the different partner universities have focused on different target groups in terms of student recruitment:

- ITC has concentrated on developing countries
- Southampton University has concentrated on the Commonwealth and US
- Lund University has concentrated on EU and China
- Warsaw University has concentrated on Central Europe

Students from all over the world visiting the four different countries require much more logistics than “normal” exchange student do. Even if partners are used to international education logistics (at ITC for example the majority of the students are from outside Europe) multiple preparatory meetings are needed. A Memorandum of Agreement has to be written and signed by the partners, and issues like tuition fees, visas, grading, degree awarding and quality assurance (see below) have to be solved. The MoA is in fact a legal document, binding the partners into a multiyear contract, and clearly laying out the obligations and responsibilities, as well as how to share the benefits of the course.

In order to “test” all different components of the course the consortium decided to run a “trial” course before the launching of the full scale education (today approx. 35 students with a budget of about 2 million euros per year). Six students were selected for this “trial” course. They were all given

scholarships from the consortium, a cost shared between the partner universities. We highly recommend this way of testing new courses. It is definitely worth the cost.

### 3. TUITION FEES, GRADING AND DEGREE

Since different countries in Europe have different policies regarding tuition fees this automatically becomes an issue when starting joint programs and courses. These policies are also changing over time, and it is important to find sustainable solutions avoiding numerous updating of the memorandum of Agreement. An example of different tuition fee policies is listed below:

- UK charges full commercial fees (about 20 k Euros for an MSc)
- The Netherlands charges medium rate (about 10 k Euros)
- Sweden has no charges
- Poland is moving to a cost recovery system

As required by the EU Erasmus Mundus policy, it was decided to charge students ONE fee for the whole course. Individual fees when visiting different partners would have been too complicated, and not an indication of a joint course. Hence it was decided to make all financial arrangements at a "consortium level". It is the consortium that offers the course, charges the students, and split revenues among the partners.

In the case of GEM the partners agreed on a commercial fee for the course: the rate for EU students was set to 3 750 Euros and the rate for non-EU students was set to 9 500 Euros. Lund University, which is not allowed to charge fees is reimbursed for "services", and the other partners split revenues according to teaching load. Final "balancing" of teaching load is carried out through supervision of theses. However, most probably Sweden will allow fees within a year or two. Then Lund will be treated in the same way as the other full partners. Since the cooperation between the partners is, and probably has to be, based on trust and flexibility it was decided to avoid a strict accounting system. Partners are reimbursed for costs, and these are not necessarily equal. A 10% overhead for management is also paid to ITC.

A major task when offering joint programs is the grading procedure. Almost all countries have different grading systems, which are well known to the teachers and very difficult to change. As a result of the ongoing "Bologna process" it is recommended to use a common grading system, and a proposed system is based on the so-called European Credit Transfer System (ECTS). However, the ECTS system is not even allowed in all countries (e.g., Sweden), and the implementation procedure will probably take a long time. Thus it was decided to keep the national grading systems, but translate these grades into the indicative ECTS system. The students receive their grades both in the national systems (UK grading for UK modules, Swedish grading for Swedish modules etc.) and in the ECTS format. The problem is then to translate between systems. If the national system is coarser than the ECTS grading (like in Sweden where the national system only contains fail, pass or high pass) the grading has to be done according to ECTS grading and then translated to the national system. If the ECTS grading is coarser than the national system (like in UK where the national system is in percentages) the national grades have to be translated to ECTS grades.

There is an ongoing discussion about the ECTS credits and ECTS grading system. Different countries and universities value ECTS credits differently (normally 25-30 student working hours per credit) and different teachers apply the grading system more or less strictly. If different universities and countries give a different amount of ECTS credits to courses that are equal in academic content and workload there is very unfortunate. The risk of inflation in ECTS grading, where "good" universities award more credits than others, is then obvious. The main problem regarding the grading is that ECTS grading is supposed to be a relative grading system. If this is applied on "course level"

the number of good students has to be equal to the number of weak students. This is often seen as unsatisfactory. A less strict approach is to have all European students as the reference group. The teacher can then, based on her/his experience, judge a current group in relation to all other students she/he has knowledge about. This makes it possible to give a large number of high as well as low grades to a certain group of students.

Another common problem within Europe (and the rest of the World) is the award of joint degrees. When offering a joint course it is natural to award passed students with one degree. This degree then has to be "jointly" signed by all partner universities. The, less attractive, alternative is multiple degrees, awarded by the partners. A consequence of the latter solution is one degree from every partner, maybe yielding three or four different diplomas, but containing the same academic qualification. Since joint degrees are not allowed in Sweden and the Netherlands, GEM awards a multiple degree. However, a joint diploma supplement is attached to the degrees, where the grades of the passed modules are presented both in a national system and according to the ECTS grading system (see above). The consortium has agreed to award a joint degree as soon as the legislation is adapted in Sweden and The Netherlands to allow this.

#### **4. CURRICULUM DEVELOPMENT AND IMPLEMENTATION**

In addition to the issues raised in section 3, many other matters must be sorted out before launching a new MSc course which is common to multiple partners. Examples are e.g. course calendar, admission requirements, progression rules, teaching evaluation and curriculum development. The GEM consortium has agreed to use structures existing within the partner organisations as much as possible, apply the "most stringent" policy among partners regarding admission and progression and keep to institutional rules and requirements and, if possible, use Bologna recommendations regarding teaching evaluations and curriculum development.

When a joint curriculum is developed, this often has to be translated, or at least adjusted to fit national requirements. Our curriculum development procedure involved a series of discussions on resolving different standards between the partner institutes on:

- how to write a curriculum (we adopted the ITC method as a standard, but adjusted it to conform to the Bologna ECTS credit system),
- different ways of teaching and learning,
- different examination procedures.

It is well known that different teachers and different cultures have different views on the "best way" of learning. This is not a major problem if only the learning outcome is agreed. Then a mixture of pedagogic approaches and examination becomes a strength, and not a weakness. In other words, when writing the curriculum, we used a "Bologna influenced" template, focusing on outcome statements.

Finally, a critical element of quality assurance is course evaluation and improvement based on feedback. The quality of teaching in the modules is assured through class observations, particularly inter-institute observations. Further, the quality of teaching is assessed using student questionnaires, which are assembled and processed for every MSc module each year. The feedback forms are designed to gather information on how the modules can be improved. Finally the entire course is reviewed annually by an external expert and the report used to improve practices and ensure the EU quality criteria are met.

#### **4. STRATEGIC BENEFITS AND RECOMMENDATIONS**

There are many strategic benefits of a joint GI Erasmus Mundus course. Among the most obvious are:

- European GI education is strengthened and promoted
- Co-operation yields “best practice” and higher quality
- Erasmus Mundus is a recognised stamp of quality and prestige as well as funding
- The collaboration allows for exchange of experience at European level and between GI disciplines
- Intercultural understanding through co-operation within Europe is promoted

The creation of the consortium and the development and launching of the Masters course have high-lightened a number of issues that are important. However, some are even more important than others, and can be regarded as absolute necessities for a successful outcome. According to our experience the most important issues, which also are our recommendations to colleagues initialising international GI educations, are:

- Always build on a true partnership – regarding ideas and aims as well as regarding flexibility, agreement and practice
- Sort out quality assurance and sign a common Memorandum of Agreement
- Accept and appreciate differences among partners
- Keep to standards
- Adopt and follow recommendations on best practice