

# Land Surveying Education in Sweden Student Perspective

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## SUMMARY

Studies in surveying and land management cover a broad spectrum of courses, including law, economics, real estate planning, applied construction subjects, mathematics and geomatics. As students we appreciate the variety of subjects, and we feel that our engineering profile is specific, with less emphasis on maths and engineering than other engineering programmes. We need some years to fully understand the profile of the programme, and the forthcoming profession.

The programme is unique in Sweden, as other universities offer programmes with land surveying as one of several specialisations in a broader engineering programme. The yearly enrolment of 50-60 students creates good student solidarity, even between students of different years of studies.

The labour market seems to be promising, with a lot of job opportunities in different areas within the land management field.

The MSc in Land Surveying and Management at Lund University, Faculty of engineering is an interdisciplinary education which includes courses within the areas of technology, economics and law. The programme is four and a half years, which is about to change to five years due to the Bologna process, and leads to a Master of Science's degree. The first three years of the programme consist of compulsory courses followed by a specialisation that gives each student a profile. The specialisations are Property Development, Real Estate Law, the Property Market, Geographic Information Technology, Urban Development and Danish Land Surveyor. The last term of the programme is spent writing a Master Thesis. This can be done either in cooperation with a company or for a department.

Thematic terms and projects give the programme a unique structure and help to integrate different areas. All projects are done in groups and the students develop their ability to cooperate.

There are possibilities for students to study abroad or write their Master Thesis in another country. Universities all over the world have accepted students from the programme, based on Lund University exchange agreements.

Compared to other engineering programmes at Lund University the Surveying and Land Management programme has very few registered students. Approximately 60 students are admitted on the programme and this contributes to a high solidarity among the students. The programme has its own student organisation, L-TEK, which is a non-profit-organization run by eight elected students. The committee works on behalf of the students and its main purpose is to create a good environment for the students and to retain relations with the industry.

Students have the possibility to influence their education both through CEQ (Course Evaluation Questionnaire) and the board of the programme which has student representatives.

The programme stays in close contact with the labour market through lunch meetings and different business fairs, like ARKAD and the Business Line Days. On these occasions the students can get in touch with future employers. It is not compulsory to get a placement but a lot of students do get one during the summer.

Future prospects for students on the programme are favourable. The unemployment rate is very low among graduated students and many present employees will retire in a near future. Therefore, the recruitment is large and will continue to be so for the next five years.

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## **INTRODUCTION**

Faculty of Engineering at Lund University, is with its 7000 undergraduates and 800 postgraduates, among the leading engineering faculties in Europe. One of the programmes offered is the Master of Science in Engineering, Surveying and Land Management. It is unique in Sweden since it offers a broad education including both engineering and social sciences.

The programme attracts students with different backgrounds from all over Sweden. In opposite to many other engineering programmes, the distribution between the sexes is as good as equal. Furthermore the range of ages is widely spread. The Department of Real Estate Science and the board of the MSc programme work closely together with the student organisation, L-TEK, to create a pleasant atmosphere and study environment for every student. The collaboration between students and the department is highly appreciated, since it enhances the quality of the education and the environment for both students and employees.

The integration between the students and the labour market is of great importance, and is therefore implemented from the first term. The contact is maintained throughout the programme with guest lectures as well as social events like lunch meeting and labour market fairs. This relationship, together with the promising future labour market, is highly motivating for the students.

## **THE PROGRAM**

The subject of surveying and land management covers a broad spectrum of engineering and social sciences. It includes land development, administration and financing of property, property management, real estate economics, geographical information technology and changes in land use planning. These areas require knowledge in technology, economics and law. The subjects are introduced to the students during the first three years of the programme, which constitutes the compulsory part of the education. The students are then offered another two years of studies in areas of specialisation.

In the beginning of the programme, students are introduced to all of the disciplines concerned, giving an introduction and a wider perspective of the land surveying and management sphere. The subjects are studied interdisciplinary and although they are widely spread, they do have common factors that allow them to be organized and studied in such way that gives the students the opportunity to see them as one science. Unique for the programme is its layout with thematic terms. The aim of this layout is to integrate the different subjects and show how

they complement each other as well as to prepare the students for the working environment. The thematic terms consists of traditional lectures and written exams, where one learns the theory and gains personal knowledge. Every term also has a project where students, randomly put together in groups, do further research on the subject. Team-work increases each individuals ability to adjust and cooperate with each other. The sharing of individual knowledge also gives each student additional understanding from another perspective.

The courses given during the first three years include the sciences mentioned above as well as engineering subjects such as mathematics and computer programming. The combination of land surveying oriented and general engineering subjects are highly appreciated among the students since it results in both applied knowledge and further logical thinking. Each thematic term has its specific subject that all teaching revolves around. For example, the theme term Land use and Environment consists of four smaller courses that are carefully integrated with each other. The finishing project includes parts and elements from each course and the entirety is graded.

Year 1	Calculus in One Variable		Linear Algebra	Sustainable Construction
	Introductory Law and Real Estate Law		Infrastructure Technique	
Year 2	Calculus in Several Variables	Mathematical Statistics, basic course	Property Technology	
	Geodetical Measurements	Geographical Information Technology		Programming, first course
Year 3	Property Economics	Real Estate Law	Real Estate Information Technology	Alternative Compulsory Courses

**Picture 1.** Compulsory courses given during the first three years.

After having finished the compulsory courses, the first three years of the programme the students have, since 2008, the option of graduating with a bachelor degree or to take an additional two years of studies to receive a masters degree. The students have the option to situate their studies at another university, either in Sweden or abroad. If one chooses to complete their studies at the Faculty of Engineering of Lund University, there are six specialisations to choose between. The former courses serve as an introduction to all of these and will have given a proper foundation for making the decision. The programme is finished off with a Master Thesis.

The specialisations are the following:

### 1. Property development

Studies of financial methods, economics and knowledge in engineering, legislation, management and statistics gives qualifications of working with property management, real

estate economics and construction engineering.

## 2. Real estate law

Gives knowledge on how to deal with real estate in an integrated way, including engineering, economics, legislation and environmental planning. One also gains knowledge in cadastral development, urban and rural planning.

## 3. The property market

Studies in mathematical statistics and economics gives one knowledge on how to analyse the property market with regard to its profit and risks.

## 4. Urban development

The courses cover subjects such as land development and urban planning. They are often taken together with students of civil engineering and architecture.

## 5. Geographic Information Technology

The core of this specialisation is geomatics, geodesy and geographical information systems used for different kinds of activities.

## 6. Danish land surveyor

The Faculty of Engineering at Lund University and Aalborg University in Denmark have a double degree agreement which allows students from both universities to obtain a double degree.

The range of the specialisations shows the width of the education. This is greatly appreciated among students as well as employers. The present labour market allows the students to choose their specialisation based on their own interest instead of making a solely strategic decision. The different subjects also provide the labour market with a variety of competences.

The last semester of the education consists of working with a Master Thesis. Students can write the thesis on an inquiry from a company or else seek and inquire about writing for a company or an institution. Each thesis is supervised by a tutor. A thesis can also be written abroad, though they are most commonly written in Sweden.

A few examples of thesis written at the Department of Real Estate Science at Lund Institute of Technology are:

- *“The Administration Cost for the Pre-emption Act in the Municipalities”* by Emil Ekstrand and Andreas Lundh.

Ekstrand and Lundh here deal with the Swedish pre-emption act, whether it fulfills its purpose and in what extension it is practiced.

- *“Cost –Benefit-Analysis- a Suitable Part of the Decision-making of Land Developing Issues”* by Martin Midler.

In this master thesis Midler analyses and presents a model that can be used to detect

economical effects on community planning in an early stage. The Swedish municipality of Jönköping initiated the project.

- *“Electric supply in three-dimensional real estate subdivision”* by Oskar Berglund and Mattias Sjöberg.

This master thesis is written upon an inquiry by the power producing company E.ON. Berglund and Sjöberg deal with the rights of electric power lines in three-dimensional real estate.

## **EXCHANGE STUDIES**

During term seven until nine there is a possibility to study abroad. The compulsory courses have been finished and the specialisation can be studied abroad. All specialisations, apart from Real Estate Law which is specific for every country, are suitable. By studying abroad the student hope to gain life experience and knowledge that cannot be obtained in their native country as well as improve their language skills. It is possible to apply for either one term or a whole year at a different university.

Universities from different parts of the world have chosen to welcome students from the programme. In Europe students have studied foremost at two German universities, Technische Universität München and Fachhochschule Konstanz, but exchange has also taken place with Jagiellonian University in Poland and Nottingham University in Great Britain. Students have chosen to study at different universities in Canada such as University of Waterloo, University of Toronto, Université de Montréal and Ecole Polytechnique de Montréal. In 2004 there was an exchange with Universidad Technologica Metropolitana in Chile. University of Adelaide and University of New South Wales in Australia have accepted students as well as University of Auckland in New Zealand. The National University of Singapore has also accepted a student.

Besides studying the fourth year abroad it is also possible to write a Master Thesis in another country. Burkina Faso, Ghana and Spain are examples of countries where students have written their thesis. In general, few master thesis are written abroad. It is very time consuming to learn about land management in a new country and most students find it more advantageous to write about something related to Sweden.

In the future students might finish three years of studies in Lund and then proceed a Master's programme at another university. This is a result of the Bologna process that focuses on an increased mobility among students.

## **SOCIAL ASPECTS**

The Surveying and Land Management programme in Lund has about 200 registered students which is a relatively small number compared to the other education programmes at the Faculty of Engineering at Lund University. The small number of students contributes to the

solidarity, which is very good both within and between years. The students on the programme have premises with computers, a common area and study places at their disposal. The computers available are equipped with professional software specific for the courses given. The layout of the programme requires premises like these and it constitutes a natural meeting place for all the students at the programme.

Eight elected student representatives run the non-profit-organization, L-TEK. The organization was founded in 1992 and run for the benefit of the students at the Surveying and Land Management programme. The committee positions are Chairman, Treasurer, Secretary, Labour Market Contact, Higher Educational Contact, Chairman of the Study Council, Advertising Manager and Organizer of Festivities. The committee work to create a good solidarity among the students, to improve the quality of the education and to keep good relations with the labour market. L-TEK meets about once a week to discuss current issues. Twice a year, the organisation hosts meetings where all the students are invited. During these occasions the committee summarises their activities and present the economic situation. Beside the committee there are about fifteen active students assisting the organization.

To be able to organize activities for the students, L-TEK receives financial contributions from the Faculty of Engineering at Lund University, the board of the MSc programme and different companies. Some of the financial sources are lunch lectures held by companies looking to market themselves, course evaluations and sponsorships. Once a year L-TEK and the Department of Real Estate Science arrange an evening session with about 30 invited company representatives from the business world. The purpose of these meetings is to encourage the contact and dialogue between students and companies.

L-TEK works to create and retain an enjoyable atmosphere among the students. L-TEK is also involved in other activities connected with the introduction of the new students. After the admission of new students L-TEK calls all the admitted students to welcome them, to inform about the first days and to answer questions that they might have. Another important task for the committee is to help with the introduction of new students. During the first days at the education L-TEK and the Board of the MSc programme and some of the departments arrange a three day camp. These days are an introduction to the education, but they are also about socializing and meeting new friends. Every autumn L-TEK arrange a dinner party for all students at the programme. This is an excellent opportunity for students from different years to socialize outside of campus. At a few occasions, where different programmes have common activities, the organisation arranges barbeques and similar events.

The Nordic Meeting Association was founded in 1939 for the purpose of connecting land surveying students in the Nordic countries. The members of the Nordic Meeting Association are Denmark, Finland, Norway and Sweden. The Higher Educational Contact person in L-TEK is in charge of the Swedish part of the association. Twice a year one of the member countries hosts a meeting. In these meetings the member countries inform each other about the current education and labour market in the Nordic countries through seminars, study visits and dinners.

The Board of the MSc programme work continuously together with student representatives and L-TEK to improve the education. The board of the MSc programme, is a committee that works within the department. It consists of different representatives from the different departments as well as student representatives from the Study Council.

The Chairman of the Study Council compiles evaluations after every finished course. This is done by sending out Course Evaluation Questionnaires, CEQs, by email to all students affected by the course. The final evaluations are done by the Chairman of the Council Study and a representative from the board, as well as the concerned teacher and a student representative. At the evaluation the students compiled opinion is valued highly and has a great impact on the upcoming course. This gives the students an opportunity to affect their studies and to help the teachers to improve their education by presenting the students' perspectives and reflections.

During the fourth year the students start a non-profit organisation in order to earn enough money to go abroad together. The main purpose of the journey is to gain knowledge of the international labour market but it is also an excellent ending of five years of studying together. In 2008 the destination of the trip will be New York where the students for an example will visit Skanska, a construction company in USA. The destination in 2002 was Moscow.

## **CONTACT WITH THE LABOUR MARKET**

As a student the future is one of the major concerns. It is what one is planning for and one of the reasons why one chooses to study. The future is present among the Surveying and Land Management students in many different ways. The Faculty of Engineering at Lund University gives the students several different opportunities to get in touch with companies and to get to know the labour market.

The Labour Market Contact in L-TEK is perhaps the primary contact with the labour market for the students. Throughout the whole education students are invited to lunch meetings where different companies introduce themselves, present their work and working area. This gives the students as well as the company opportunities to establish new connections for further co-work. It can result in a summer placement or even a proposal for the master thesis. Another important function that these lunch meetings fulfill is to give the student a broad perspective of what the future holds for a person with a Master of Science degree in Land Surveying and Management. Dinnermeetings is also an option. The main point is the same as for the lunch meetings, but this will also mean that the students and the companies' representatives have a chance to mingle, which would hopefully give a more prosperous outcome.

Once every year the official student body of the Faculty of Engineering at Lund University arranges a two-day business fair, called ARKAD, where numerous companies and organizations send representatives and hold lectures. The aim is to create a contact between

students and the labour market. Students mingle with the representatives and lectures from different companies are held which are free for the students to attend. Every company also has one or more voluntary students helping them out during the fair. This is another opportunity for the student and the company to create a bond and is very popular among the students as well as the companies. At the 2007 ARKAD fair the number of companies exceeded 120 and it had over 5'000 visiting students.

At the Civil Engineer Section, to which the Land Surveying and Management students are a part of, a yearly business fair is arranged. This fair is referred to as the Business Line Days and the companies attending are only within the civil engineering and surveying area. This is to highlight the companies that are the most interesting for the students and of matter to the education.

A placement during the education is not compulsory but many of the students do seek and receive placement, mostly during summertime. This is of course another very good way to obtain a deeper understanding for the education and courses attended as well as another source of connections in business.

The institute invites lecture holders from different areas of the labour market, mostly in the third and fourth year of the education. These are held in purpose to broaden the students' view of the future. They are held several times each semester. Educational study visits are arranged throughout the education, though they may vary from year to year due to change in courses. These educational visits are rewarding and give the students a chance to be in an environment that actually practices what they are studying.

## **THE LABOUR MARKET**

The interdisciplinary studies open up for various assignments within a lot of different areas which makes the labour market broad. Property development is one large area, where graduate students can work with land- or building development. Another related area is the one of land use planning, where students can work with regional or urban planning. Other areas with future professions for the students are property management, real estate investing, constructing, land survey, geodesy etc.

Jobs can be found all over the country, within different sectors. The public sector offers many jobs and students can be employed at the national or local government, the county administrative board or at the National Land Survey of Sweden etc. A lot of job openings can also be found within the private sector where graduate students can find employment at constructing-, consulting- or real estate firms and estate agencies. Both private firms and national government authorities are involved in and carry out activity in other countries. Therefore there are also possibilities for graduate students to work abroad.

## **FUTURE PROSPECTS**

Different economic powers control the labour market and the unemployment rate in countries, but there are also many other factors that affect the labour market and the demand usually vary.

According to different forecasts, performed by the National Labour Market Board (AMS) and the Swedish confederation of professional associations (SACO), there is a shortage of land surveyors in Sweden. The unemployment rate among land surveyors today is very low, even one of the lowest of all academic professions. Also, the average age among the land surveyors today is high and many of them will retire within the nearest future. The requirement is therefore large and is expected to stay on a high level. The forecast emphasize that the future prospects are very good for both graduates and new students.

Another factor that affects the labour market and the future prospects for the students within the programme of surveying and land management is the state of the industry. If the development within the constructing- or real estate industry is strong, there will be more jobs and the labour market will be strengthened. The labour market will also be affected by the widening industry. The broad education gives a wider range of assignments which increases the job openings. Today we have a strong industry and the labour market for land surveyors is therefore favourable which makes the future prospects very good.

## **CLOSURE**

Due to the Bologna process, great changes in courses and specialisations are to come. As a result, students will be given bigger opportunities to exchange studies with other universities, both abroad and in Sweden. By situating a part of the education abroad, the students will have an excellent opportunity to improve their professional language skills as well as their knowledge of the local culture. In the future this could lead to more work opportunities abroad and improved international relations in business.

The education is thoroughly and continuously improved and the students' opinion is taken very seriously. Students have a chance to make an impact on the courses, contacts with the labour market and also the programme's impact on the official student body at the Faculty of Engineering at Lund University. It is of importance that students do take time to participate in the voluntary work concerning the education. This does not only improve other students' situation, but also leads to personal development and valuable contacts for the future.

Thanks to the width of the Master of Science Engineering programme in Surveying and Land Management the unemployment among graduates is one of the lowest in Sweden and have the forecast to stay that way.

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