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## The Graduate Real Estate Program at the Technion in Israel: Rationale and Implementation Process

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**Abstract:** Israel's real estate market is a central component of the country's land-planning, its economy and society. The country's high population growth, high density and high property prices have created special challenges for decision makers and developers alike. A unique real estate regime has emerged, and a complex system of laws and taxes imposed especially on real estate. Land-related decisions – public or private - have far-reaching economic, environmental and social ramifications. Although the need for specialized professionals in the field of real estate is obvious, until recent years no such academic training existed. This paper describes the emergence of the country's first dedicated real-estate degree: , the process of forming the program within the framework of the Technion - Israel Institute of Technology, the program's structure and the contents of the courses offered. The conclusions pertain to the level of implementation and success.

**Keywords:** Real Estate education, Real Property, Land development, Land Management, Graduate studies

### 1. Introduction

The State of Israel has a small area (approx. 21,000 sq.km) and a steadily increasing population growth rate. In the past, population growth was due largely to mass immigration of Jewish refugees from all over the world. In recent years, the growth is mostly internal, reflecting Israel's high birth rate compared with all other advanced-economy countries. When the State of Israel was established in 1948, its population numbered about 600,000. In 2013, Israel had almost 8 million residents and a population density of about 380 persons per sq. km. This places Israel among the higher-density group of countries. And since the southern half of the country is a sparsely inhabited desert, the effective density is twice as high, and steadily rising.

It is therefore not surprising that Israel's real estate policies present special challenges for both the public and the private sectors. The country's high density and high property prices have produced a unique real estate policy and a complex system of laws and taxes which apply specifically to real estate (Alterman 2001; 2002). The real estate market is a central component of the Israeli economy, contributing an estimated 8-10% to the gross national

product<sup>1</sup>. Thus in Israel, decisions on the subject of real estate – whether those made by individuals or by the government – have far-reaching and long-term economic, environmental and social ramifications. Therefore, Israel is in critical need for specialized professionals in the real estate field. But surprisingly, until recently a special academic degree for real estate studies was not established in Israel.

The resulting void has until recently been filled by professionals with a smorgasbord of academic degrees, whose qualifications interface with only a few aspects of the real estate field. Such professionals include lawyers, economists, business managers, civil engineers, architects and city planners. Because each of these professions lacks a comprehensive view of real estate, many of these professionals have had to acquire knowledge informally, “on the job”. This means that practitioners have not had the knowledge base to look beyond the limited knowledge base underlying existing local practice. Inevitably, this limitation affected the level and quality of real estate related policy and practice in Israel.

Within this void, the status of real estate appraisers (also called “valuers”) has grown much beyond its intended proportion. Although land appraisal has always been a statutorily recognized quasi-profession, up to the 2000’s, the law required only high-school education (not even a basic-level matriculation certificate which is a precondition for eligibility for any higher education).. A 2001 legislative revision touted as “academization” of the profession, in fact only introduced a requirement for an undergraduate degree in ANY field whatsoever from any academic institution, regardless of its specialization or standing. This requirement came into force several years later, but was unable to achieve any significant change in the knowledge base of land appraisers.

Traditionally, Israeli land appraisers got their training as apprentices in the offices of licensed appraisers. The Ministry of Justice would issue out a limited number of licences to those who passed a set of exams determined by an advisory council composed mostly of senior appraisers appointed by the Ministry. Because only statutorily licensed appraisers may issue officially valid value estimates of real property, land appraisers gained a high level of remuneration and prestige without any recognized academic requirements. This closed-circle approach affected the quality and level of professional activity in the real estate field. Yet, in the absence of targeted academic education, the real estate appraisers have in practice, taken up a much larger part of the professional activity in the real estate fields than the law had intended.

In the absence of academic education in real estate, the practitioners in Israel lack access to knowledge based on international research and a scientific community, as is normally expected from a respectable profession. Thus, ironically, the real estate field – an area so essential for Israel’s wellbeing – falls far short of the level of scientific excellence that characterizes the other professions in Israel, such as engineering, law and economics.

This paper is structured in six parts: Chapter 2 introduces the Technion and its relationship with real estate studies; Chapter 3 describes the strategy whereby the real estate degree was initiated; Chapter 4 describes the processes of establishing the program and its components; in Chapter 5, we specify the program and syllabi for the various topics; and

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<sup>1</sup> According to estimates by the Bank of Israel (lectures by Professor Stanley Fisher, Governor of the Bank of Israel, in 2013)

Chapter 6 presents a summary and conclusions from the program's performance in its first seven years.

## **2. The Technion and Real Estate Studies**

The Technion - Israel Institute of Technology was founded in 1912 and opened its doors in 1924, becoming Israel's first university. At the time there were only two departments - Civil Engineering and Architecture and Town Planning. Since its establishment, the Technion has expanded and new faculties were opened, covering most fields in natural science, engineering, medicine, and management. Some 14,000 students are enrolled in 18 Faculties in undergraduate and graduate studies. Since its inception, the Technion has awarded over 82,000 degrees to scientists and professionals who have played, and still play, key roles in Israel's physical and economic development. Several important interdisciplinary research centers in cutting-edge fields were opened in recent years, in order to maximize the Technion's and Israel's position in knowledge creation for the 21<sup>st</sup> Century.

The Technion is the leading science and technology university in Israel. Its mission is to be among the best in the world in two areas: developing leading-edge technologies; and, educating engineers and scientists to be leaders in implementing state-of-the-art know-how in Israel, to assure its independence, security, welfare and economic growth. With 2 Nobel Prizes granted to three of its faculty members, the Technion holds a very high global ranking, and is listed among the world's leading universities in science and technology. Its vision is to excel even further, and continue its dedication to the creation of knowledge and the development of human capital and leadership, for the advancement of the State of Israel and all humanity.

The two Faculties that established the real estate program are the very same Faculties that launched the Technion and are thus the oldest academic units in Israel's history. Over the decades, these two Faculties evolved and diversified, and remain the country's leading institutions in their respective fields.

Today, the Faculty of Civil and Environmental Engineering features a very broad spectrum of education programs and research. These include: Structural Engineering; Construction Management; Building Materials, Performance and Technology; Geotechnology; Transportation Engineering; Mapping and Geo-Information (Geomatics) Engineering; Environmental Engineering; and, Agricultural Engineering. With about 1700 students registered at any given time (more than 500 of whom are graduate students), the Faculty constitutes a prestigious and unique center of research and higher education.

The Faculty of Architecture and Town Planning too features a broad spectrum of degree programs and research including: Architecture, urban design, Urban and Regional Planning; Landscape Architecture, and Industrial Design. With about 850 students registered at any given time (more than 350 of whom are graduate students), the Faculty constitutes a prestigious and unique center of research and higher education. Both Faculties maintain a high level in both academic education and professional training and have very strong international reputations.

Our decision to establish a real estate degree at the Technion was based on the realization that these two Faculties - Civil and Environmental Engineering on the one hand, and Architecture and Town Planning on the other hand – were already the homes of high-level researchers engaged in topics relevant to real estate activities, and were already offering some of the relevant courses, in a dispersed fashion. The relevant topics included: construction management, , mapping and cadastre, Urban and Regional Planning, Urban Economics, real estate economics, planning law, real-property law and policy, and Construction.

### **3. Preparations for Establishing the Real Estate Studies Program**

The authors of this paper – representing the two relevant Faculties – teamed together to propose to the Technion to establish a graduate degree program in real estate studies. Like any academic degree in Israel, such initiative would require the review and approval by the Council for Higher Education in Israel (which is responsible for approving educational programs in the higher education system in Israel). In order to learn from the experiences of other countries, where real estate education has a longer history, we undertook a comprehensive examination of the purpose and curricula of relevant degree programs in the USA, several European countries, and some Far East countries. We also reviewed the academic literature about real estate studies program.

#### **3.1. Curriculum Content**

Schulte (2001) edited a book which contains chapters describing the various levels of training in real estate in various countries worldwide. The book includes a survey of European countries (among them Germany, France, Italy, Sweden, Finland, Belgium, Holland, Greece, Poland, the Baltic states), eastern countries (among them Japan, Hong Kong, Indonesia, Korea, India, Malaysia), counties on the American continent – in addition to the USA, also Mexico and Brazil – and also a survey of Australia and New Zealand.

In the last two decades, much effort in various fields has gone into defining the Body of Knowledge (BOK), which will define the subjects that professionals are expected to know during their professional work – this should also constitute a target framework of sorts in the academic training processes. The origin of developing the BOK is mainly the USA, and one of the more detailed research projects has been carried out in the last decade in the fields of mapping and surveying by the American Congress on Surveying and Mapping, and was recently published (Greenfeld, 2011). Detailed contents were defined at the micro level in all sub-fields of the profession.

The American Real Estate Society also established a Body of Knowledge Committee in the 1990's, aimed at trying to define the required knowledge from their point of view. The paper by Epley (1996) reported on these efforts, and the committee's conclusion was that the comprehensive subjects of the BOK are too extensive for one individual or group to handle efficiently; accordingly, it may only be possible to obtain a detailed document which would include all the relevant knowledge over many years, while publishing papers in real estate literature publications and performing periodic surveys, in coordination with BOK committees of other, similar organizations.

A similar attempt, in the narrow real estate field dealing only with real estate appraisal, was carried out by a team set up the Appraisers' Association of America. The paper, already published in 1997 by (Williams et al.), includes an extremely broad detailing of theories, paradigms and applications in the profession of real estate appraisal. The authors' assumption was that the real estate appraiser cannot possess knowledge in all the profession's sub-fields; thus this paper, despite its high level of detailing, is not a guiding document for defining the syllabi of academic study programs.

Another paper dealing with BOK analyzes the results of a survey sent to academics and professionals in the field of real estate worldwide, which attempts to define the fields of knowledge relevant to real estate. A list of thirty-six topics was developed from a preliminary survey; the topics are graded and include a comparison of differences according to geographic location as well as to the professional field of the respondents (Black and Rabianski, 2003).

A similar effort has recently begun, this time in the UK, supported and funded by the Royal Institute of Chartered Surveyors (RICS) in the framework of the Birmingham School of the Built Environment, to define the knowledge required of those dealing in real estate. The project is in its initial stages and the reporting concerns the administrative frameworks of the working organization and data collection, while it is estimated that it will still take several years to reach a BOK from the British point of view (Boyd and Amidu, 2012).

Several papers dealt with the content of real estate education programs, suggesting different approaches to enriching the content of the programs. Problem-based learning is an educational technique that employs real world problems, scenarios and cases aimed at enhancing the problem solving and critical thinking skills of students. While used extensively in other disciplines, problem-based learning has not been widely incorporated into most real estate curriculums (Anderson et al., 2000). A detailed framework of problem-based learning was suggested for faculty that can be used as a guide in implementing it in their courses.

An attempt to broaden the capacity of knowledge which should be provided to students in real estate studies was implemented by Gibler and Nelson (2003), who introduced a survey of consumer behavior concepts relevant to the real estate field and who suggest how to integrate and broaden the training in the field. By integrating concepts such as maximization of value and wealth, given prices in the face of income constraints, and the influence of personal taste and preferences of the real estate consumer, it is possible to improve the education process for students in real estate studies.

Galuppo and Worzala (2004) reported on the process and the methodology used at the Real Estate Center, University of San Diego, to develop a graduate program in real estate. An attempt to integrate techniques of communal study while working in teams in the classroom into real estate studies was proposed by Butler et al. (1998). The emphasis was on building teams of students, in combination with computer skills and communications, instead of a basic study program, by accumulating knowledge in various courses and implementing the acquired knowledge in the framework of real projects from the real world. It was also clarified that these study frameworks would necessitate a large investment of time and effort by staff members as well as by the students; thus, it is not clear how applicable these techniques of communal learning would be.

In light of the changes in the higher education system in Europe following the "Bologna Process", with the transition to a three-year framework of studies for an undergraduate degree in all European countries, and two-year studies for a graduate degree, the implications of this process on real estate studies were also examined, based on the European Course Accreditation Data, supported by the relevant professional association in the UK – the RICS. Proposals are submitted for the required changes in order to implement the adaptation in the real estate field to the "Bologna Process" in the European framework (D'Arcy and Taltavull, 2009).

An additional paper in this context was written by Poon et al. (2011) within the framework of the Centre for Education in the Built Environment in the UK, which, again referring to the demands of the RICS, examined the gaps existing in British universities' programs between the academic frameworks and requirements on one hand, and the demands from professionals for a more practical approach in training real estate students on the other. It appears that there are significant differences between the attitudes of employers and graduates and that of university staff in everything to do with the need and the extent of the practical experience which students should acquire during their studies.

### **3.2. Models from Other Countries**

Following the examination of professional literature, the curriculums of a large number of universities worldwide were also examined. Among others, the programs of the following American universities were examined: University of Southern California; University of Wisconsin-Madison, MIT, New York University, John Hopkins University, San Diego state University, Pennsylvania State University, University of Pennsylvania, University of Denver, University of Michigan at Ann Arbor, University of North Texas, Texas A&M, Columbia University.

The programs in these universities vary in their scope as well as in the duration of required study – from a minimal program of 30 credit points and one year's study to around 90 credit points over two and a half years' study. The contents and emphasis in the different programs are quite varied, from emphasis on MBA courses to research courses awarding an MSc degree (with the emphasis on finance). The topics included, on one level or another, in some of the programs, include: Real Estate Investment, Project Analysis, Real Estate Finance, Real Estate Markets, Valuation of Real Estate, Real Estate Economics, Real Estate Law, Planning and Land-Use Controls, Technology (GIS), Construction Process, Development of Real Estate, Basic Accounting, Federal Taxation, Estate Planning.

Several models are recognized in these universities, as mentioned above, for the academic structure of real estate training – from special departments to special schools awarding a degree in real estate (in the framework of a professional master's degree open to all undergraduates). The organizational location of these departments varies from one university to the other. Thus, there is an entire school for real estate at Wisconsin-Madison University, a real estate department at MIT, or, for example, a real estate department at the University of Southern California located in the schools of urban planning, public policy and real estate development. In contrast, in other universities the emphasis is on Real Estate Management, and there the qualification in real estate is in the framework of business management schools. For example, at the University of Michigan at Ann Arbor and also at

Columbia University, the level of specialization varies from one place to another – at Columbia the specialization is extensive and resembles a full degree, while at Ann Arbor it is much more limited.

The vast majority of American models significantly stem, in the real estate field, from the financial, marketing and business management sectors. The physical aspects of the land and the legal aspects of land rights and tax law are extremely weak in the American models, and in fact most of the schools there do not offer multi-disciplinary training in real estate. The gap remains between those with economic-management knowledge in real estate and those with physical knowledge.

Unlike the American system, training systems in the real estate field in Britain are different, and are based on other principles and parameters. The interdisciplinary real estate profession there is defined as Chartered Surveyors (with no connection to Land Surveyors or Field Surveyors). These days there are those who call for a degree using the term Estate – but the official position is still defined by the ancient term Chartered Surveyors. The prestigious professional association incorporating all those participating in this field is the Royal Institute of Chartered Surveyors (RICS). The position of Chartered Surveyor in the British system has important legal authority, which includes what in Israel is termed 'real estate appraisal', but this requires extensive and comprehensive academic training in the field of real estate, which combines physical-engineering, entrepreneurship and marketing, urban planning, economic and legal aspects. Unlike real estate appraisal in Israel, in Britain it has for decades required a prestigious and exacting academic degree (BA or Master's). Curriculums in real estate exist, among others, in the following British universities: Aberdeen University, Nottingham Trent University, University of Salford, Oxford Brookes University, University College London, University of Reading, and University of Glasgow. These programs take place at most of the universities within engineering and/or planning departments or faculties, such as - Faculty of Engineering, Science & the Built Environment; Bartlett School of Planning; Department of Real Estate and Construction; School of Architecture, Design and the Built Environment.

In a large number of these programs the degrees are research (e.g. MSc in Real Estate) and some are also accredited by the RICS. As a consequence of these research study frameworks, a large and significant body of research and publications has emerged alongside the academic training, for which Britain is known worldwide.

The influence of the British model has spread well beyond the limits of the UK. The British academic model of training real estate professionals has spread to many countries. This is the accepted model in the Scandinavian countries, in some countries in mainland Europe, in a significant number of countries in Asia and Africa, and of course in Australia and New Zealand. Real estate schools in many countries have adopted RICS standards. Among others, curriculums exist in a format similar to the British one in the following universities: University of Queensland (Australia); University of Auckland (New Zealand); KTH – Royal Institute of Technology (Sweden); University of Hong Kong (Hong Kong).

#### **4. Consolidation of the Real Estate Study Program**

Since the fields of real estate are addressed, as mentioned above, in two departments of the Technion – Civil and Environmental Engineering, and Architecture and Town Planning – it was decided to establish a team to consolidate a program for real estate studies, which includes staff members from both faculties who cover, in their fields of knowledge and research, most of the subjects relevant to real estate. The disciplines covered by team members are: Urban and Regional Planning, Urban Economics, Finance, Mapping and Cadastre, Construction Management, and Legal aspects of Planning and Construction.

After analyzing curriculums at American universities on one hand and British universities (or those following the British model) on the other and comparing the models at various universities, the team concluded that the American model is not suited for Israel. In Israel – whether due to congestion or the complicated processes and laws – working in the real estate field requires a much more solid knowledge in the engineering, planning and legal disciplines than that found in the American model. On the other hand, the British model is extremely suitable for the needs in Israel. According to it, the authority which we call "real estate appraisal" is rooted in a wide-ranging free profession which enables – and even demands – a multidisciplinary concept of real estate.

After consolidating the model which is suited to Israel, the team discussed the question, why it is appropriate to establish this degree specifically at the Technion. And the answer to this question is quite clear. The Technion is the natural home for a degree in real estate. It is beneficial to the Technion and to the profession: for the Technion it is beneficial as it already trains people in several disciplines related to real estate, and it would be a pity if it were not also a leader in the real estate profession, which has such an impact on the economy and the environment in Israel. Opening a graduate degree in real estate would attract Technion graduates as well as graduates in various fields of knowledge from other universities. For the students it would be beneficial because the Technion is at a leading scientific level in most disciplines relating to real estate, and it is, in fact, the only academic institute which can offer a group of faculty members well known in disciplines that pertain to almost every subject which makes up real estate studies.

It is only natural that the Technion should take advantage of its relative advantage. Four out of the five main disciplines needed to put together a master's degree in real estate already exist in the Technion – and some of them exist only in the Technion: Civil Engineering (especially in the field of construction management), geodetic engineering, town and regional planning (including urban economics), financing (in industry and management), and planning and building law. Outside augmentation would be necessary in one area only – real estate and tax law. Only at the Technion is there already a group of faculty members analyzing and publishing in the field of real estate (well known in Israel and in the international community). Therefore, the team concluded that the Technion would have an advantage in receiving accreditation from the Council for Higher Education in Israel, which is responsible for approving new study programs.

Having concluded that the Technion is, in fact, the appropriate place to open a program for a master's degree in real estate studies, the team also examined the question of how great a demand this degree would have among employers in Israel (in the private as well as the public sectors) on one hand, and the extent of the demand to study this discipline by



candidates and those seeking graduate studies on the other. The team estimated that there is indeed a demand for the proposed degree, and the Technion could attract excellent candidates for it. There are many fields of employment, especially in Israel, where the economy was, and still is, extremely affected by the real estate factor. These fields include initiative companies, investment banks, local authorities managing the town's assets (usually lacking in professional knowledge these days), the Israel Lands Authority, industrial companies which own real estate assets (Israeli Telecommunication company, Israeli Electric company, ports, private companies with many branches such as gasoline companies) and many others. In an analysis carried out by the team concerning potential candidates who would want to study in the framework of the program, it was clarified that there is a real prediction that varied groups of students would see it as an attractive degree, with high prospects of employment in both the private and public sectors. These groups include, among others:

- Engineering graduates (in different fields) who are not interested in a research master's degree, and the proposed degree could be attractive to them (as management is attractive to many).
- Architecture or landscape architecture graduates interested in the business-initiative aspect.
- Accredited appraisers with an undergraduate degree in any subject, some of whom may want graduate studies to broaden their knowledge in other aspects of real estate.
- Graduates of interfacing disciplines, such as: geography, economics and other social sciences. These generally lack a "profession" after completing their undergraduate degree, among them those with very high achievements, who would be interested in professional training.
- Lawyers dealing with the legal aspect of real estate, who would want to broaden their knowledge into its engineering, mapping and planning aspects.

After concluding that the Technion is the natural place to open a graduate program for real estate studies on one hand, and that there is a real expectation for many candidates' demand to study in the framework of the program, the team began to consolidate the curriculum itself. The parameters developed as guidelines for establishing a curriculum were:

- As wide a variety of subjects as possible, including the fields of knowledge required from the program's graduates in order for them to integrate well into the real estate field in Israel (and overseas).
- The program would consist of study courses only (without a research thesis), with only an advanced seminar as a final project.
- The scope of studies would be in a format similar to those of other study programs in universities in Israel (40-50 credits).
- The program would be intended for external students who would devote part of their time to study, concurrent with their employment.
- The program would be planned as a study framework of 4 semesters (two years' study) after working hours.

- The advanced seminar as a final project would be implemented after completing the studies, in an additional summer semester.

Having defined the guidelines, the team began building the curriculum. After comprehensive work by sub-teams for the various sub-topics, a curriculum was consolidated which comprised 16 subjects of study with a scope of 46 credits, and an additional advanced seminar with a scope of 5 credits. The division of responsibility between the Civil and Environmental Engineering Faculty and the Faculty of Architecture and City Construction appears in Table 1.

Table 1: Courses by Faculties

No.	Faculty	Courses	Credits
1	Civil and Environmental Engineering	7	21.0
2	Architecture and Town Planning	7	21.0
3	External service courses	3	9.0
<b>Total</b>		<b>17</b>	<b>51.0</b>

The program's subjects were divided into three sections: (i) Basic studies; (ii) Construction, Planning and Mapping, and (iii) Real Estate Advanced Courses. The number of subject and the scope of each section appear in Table 2. The program's subjects syllabi are detailed in section 5.

Table 2: The Study Sections of the Program

Section	Topics	Courses	Credits
I	Basic studies	5	14.0
II	Construction, Planning and Mapping	4	12.0
III	Real Estate Advanced courses	7	20.0
IV	Advanced Seminar	1	5.0
<b>Total</b>		<b>17</b>	<b>51.0</b>

After completing the program with all its components, it was passed for approval according to the following stages:

- Approval and adoption of the program by each of the two involved faculties
- Approval of the program by the Technion's administration (by all the relevant committees)
- Final approval of the program by the Council for Higher Education in Israel

The Council for Higher Education in Israel approved the suggested real estate program and authorized the Technion to awarding its students the degree of MRE – Master of Real Estate. A flowchart of the final approved program containing all courses is given in Fig. 1

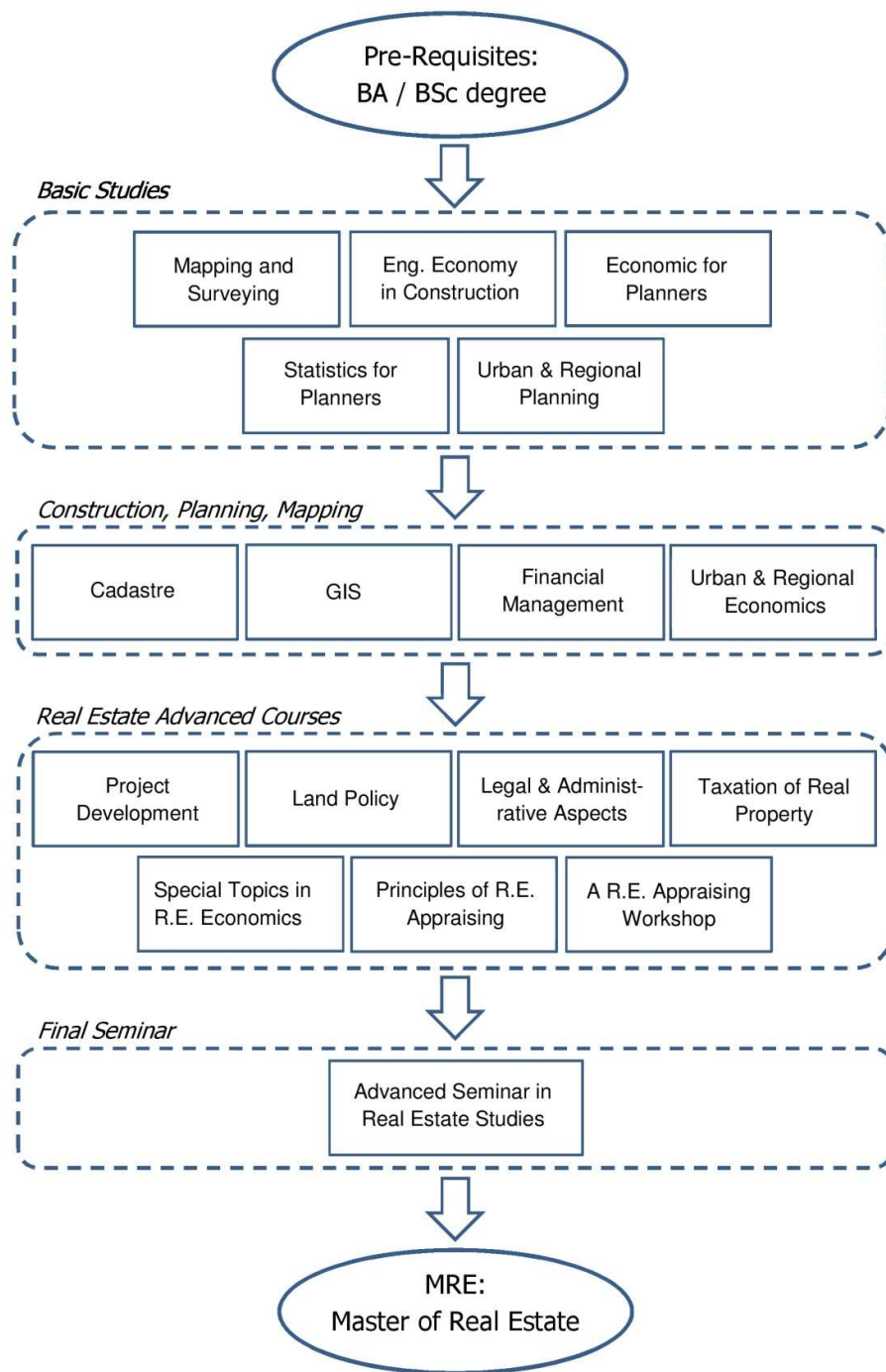


Figure 1. A Flowchart of the Real Estate Program

As mentioned above, the program was constructed in such a way that the students can study and complete the program alongside their work outside the Technion. The students can complete their studies during 4 semesters (not including the extended seminar) according to the breakdown seen in Table 3.

Table 3: Layout by semesters

	1 <sup>st</sup> Semester			2 <sup>nd</sup> Semester		
	No	Course	Credits	No	Course	Credits
1 <sup>st</sup> Year	1	Mapping and Surveying	3.0	5	Statistics for Planners	3.0
	2	Engineering Economy in Building	2.0	6	Cadastre	3.0
	3	Economic for Planners	3.0	7	Geographic Information Systems	3.0
	4	Int. to Urban and Regional Planning	3.0	8	Financial Management	3.0
	<b>Total</b>		<b>11.0</b>	<b>Total</b>		<b>12.0</b>
	<b>3<sup>rd</sup> Semester</b>			<b>4<sup>th</sup> Semester</b>		
2 <sup>nd</sup> Year	No	Course	Credits	No	Course	Credits
	9	Urban and Regional Economics	3.0	13	Land Policy	3.0
	10	Project Development & Administration	2.0	14	Legal & Administ. Aspects in Planning	3.0
	11	Taxation of Real Property	3.0	15	Special Topics in Real Estate Economics	3.0
	12	Principles of Real-Estate Appraising	4.0	16	A Real-Estate Appraising Workshop	2.0
	<b>Total</b>		<b>12.0</b>	<b>Total</b>		<b>11.0</b>

## 5. The Proposed Program

### 5.1. Section I: Basic Studies

#### 5.1.1. Mapping and Surveying (3.0 credits)

Introduction to geodesy - the shape of the earth, geodetic coordinate systems, higher geodesy and surveying; basic issues in the theory of errors; geodetic information sources - terrestrial measurements, aerial photographs, satellites (GPS) and remote sensing; horizontal, vertical and 3D control; planimetric and topographic mapping (GIS); geodetic surveying equipment; calculation of areas and volumes, geodetic and surveying regulations.

#### 5.1.2. Engineering Economy in Construction (2.0 credits)

Methods of estimation and comparison of building costs; influence of building height and building types on costs of dwellings; costs as a function of residential density; application of linear programming to optimization problems in planning; analysis of projects and comparison of planning alternatives; economic criteria of engineering decisions in building; economic design of structural components; comparisons of alternatives for building materials; standardization and modular coordination; economic aspects in industrialized building; life cycle cost as factors in planning decisions.

#### 5.1.3. Economics for Planners (3.0 credits)

Fundamentals of economics; economic thinking and its limitations in specific relation to urban and regional planning; the problem of scarcity; the production curve; alternative cost;

relative and absolute advantage; consumer theory; producer theory; supply and demand; monopoly; government intervention in the markets; national accounting; the Keynesian model and fiscal and monetary policy; basic quantitative tools for decision-making in planning.

#### **5.1.4. Statistics for Planners (3.0 credits)**

Mathematical tools for quantitative thinking and statistics specific to the field of urban and regional planning; basic concepts and criteria for hypotheses testing; descriptive statistics; sampling and probability theory; linear and non-linear multiple regression and multi-equations models.

#### **5.1.5. Introduction to Urban and Regional Planning (3.0 credits)**

The major concepts in urban and regional planning; topics: urban and regional planning in the western world, the evolution of urban and regional planning in Israel, the decision-making system and its transformation through time, alternative approaches to planning processes, planning and politics, ethics in planning, comprehensive vs. sectorial planning, entrepreneurial vs. sectorial planning, entrepreneurial vs. public-regulative planning, introduction to initiatives.

### **5.2. Section II: Construction, Planning and Mapping**

#### **5.2.1. Cadastre (3.0 credits)**

Land registration systems in Israel; regulations regarding the mutations and preparation of plans for registration purposes; re-parcelation according to the planning and construction law; preparation of town planning regarding registration purposes; reconstruction of cadastral borderlines in practice in a variety of situations; quality control and registration plans; registry of mutation plans; introduction to analytical and 3D cadastre; resolving discrepancies between data from different sources.

#### **5.2.2. Geographic Information Systems (3.0 credits)**

Integrated vector and/or raster 2D and 3D GIS; organizing data in layers; geo-databases, fields and objects; quality assessment, quality control, standards and metadata; information retrieval with queries; spatial analysis and knowledge creation; analysis of networks, time and dynamic phenomenon; presentation of information as maps and reports; representation and application of the terrain; principles of GIS project implementation with emphasis on engineering applications; using GIS in real estate projects.

#### **5.2.3. Financial Management (3.0 credits)**

Financial management in construction companies with emphasis on the following subjects: principles of accounting, preparation and analysis of financial statements, types of businesses, cost control, budgeting and budget control, taxation and financing in construction companies.

#### **5.2.4. Urban and Regional Economics (3.0 credits)**

Economic systems, theoretical explanations for location and spatial dispersion of activities and economic units such as households, industries and commerce, theories of economic

growth, stagnation and degeneration of cities and regions, externalities and institutional system - taxation against subsidies, tools for regulating externalities in housing, urban renewal, transportation, environment and others.

### **5.3. Section III: Real Estate Advanced courses**

#### **5.3.1. Project Development and Administration (2.0 credits)**

Preparation of building programs and performance specification; parametric estimating methods; value analysis of alternative plans; building permits procedures; advanced contracting methods; coordination of design and construction; information system; quality assurance.

#### **5.3.2. Land Policy (3.0 credits)**

Understanding of land policy is important for urban planners concerned with ways of implementing planning policy; alternative and comparative land policies and criteria for their assessment and selection; topics: the Israel Lands Authority, long term leases, expropriation, compensation, land betterment taxes, land readjustment, introduction to land appraisal; the point of view of the private developer.

#### **5.3.3. The Legal and Administrative Aspects in Planning (3.0 credits)**

The principles behind planning law in Israel and other countries; the statutory planning system as an aspect of Israeli public administration; institutional structures, local planning bodies and local governments; types of plans, their content and their approval procedure; information and public participation; instruments of implementation: expropriation, compensation, taxation, re-parcellation, non-conforming use, building permits, enforcement and its limitations.; analysis of the legislation and selected court decisions.

#### **5.3.4. Taxation of Real Property (3.0 credits)**

The theoretical basis and public objectives of taxation in general and real-property taxation in particular; real-property taxation in Israel from a cross-national comparative perspective; the principles that distinguish taxes from other payments to the public purse; taxes and their relationship with the principles of public finance; the legal bases for property taxation in Israel; nationally and locally levied taxes and charges; charges levied by the Israel Lands Administration through its public-leasehold contracts; the "consent charges" and "permit charges".

#### **5.3.5. Special Topics in Real Estate Economics (3.0 credits)**

Focusing on recent literature in real estate economics; topics: Weiner/Ito process - a stochastic model of land value, rational expectation theory and speculative bubbles in real estate markets, hedonic theory applied to housing value and implicit markets for real asset attributes.

#### **5.3.6. Principles of Real-Estate Appraising (4.0 credits)**

The various principles required for a real-estate appraisal and specific real-estate appraisal problems; topics: measurement units in real-estate appraising, value principles, value components analysis, value types analysis, writing a real-estate appraisal report, residential,

commercial and rural property appraising, the appraisal principles of real-estate, bundle of rights, issues in valuing public interest properties and approaches to their valuation appraisal of "special-use" property - definition, characteristic, principle and approaches.

#### **5.3.7. A Real-Estate Appraising Workshop (2.0 credits)**

Real-estate appraising through case studies: rural rezoning, the betterment tax, compensation for injuries to land, loan security appraisal, lessee/lessor rights valuation, public expropriation compensation, rezoning and subdivision according to the planning and building law, appraisal of "special-use" property and development location property, "combination" contracts for development in exchange for land, appraisal of rent-control property, appraisal of Israel land administration owned property.

#### **5.4. Section IV: Advanced Seminar (5 credits)**

Analysis of general problems in real-estate appraising; preparation of a full real-estate appraising report - including: gathering zoning/planning, legal and market information, structuring the appropriate principles, factors and considerations, value calculations and conclusions, writing and presenting a full appraising report; the seminar topics include both the theoretical aspects of real-estate appraising and the more empirical/practical aspects of fieldwork.

### **6. Summary and Conclusions**

The program has been running for a number of years, with complete success. The students who are accepted into the program, after fulfilling strict prerequisites, are undergraduates in quite a broad variety of fields, and include engineers in different engineering disciplines, architects, landscape architects, business management, economics and statistics graduates, lawyers and geographers. Demand for the program has grown from year to year. At the first stage, one class was opened each year (around 20-30 students only, with the aim of enabling individual access and attention to each student); later, in light of the growing demand, classes began opening each semester (2 new classes per year). Concurrently with the growing demand, the prerequisites for being accepted into the program became stricter, and in the last selection of candidates for the program, there was already a ratio of 3-4 times the candidates to everyone who was finally accepted into the program. The demographic cross-section of the students has also been extremely varied. From young students in their late 20's arriving to the program straight from, or a short time after, completing their undergraduate studies, to older people (aged 50+ and even 60+) arriving to the program with decades of professional experience in a variety of fields. The Israeli market has started to become aware of this study program and of the professional abilities of the program's graduates. The program's graduates have begun integrating into a variety of positions – including senior positions – in the private and public sectors. Among others, typical examples are graduates of the program being appointed as Director General of a governmental office, Vice President of one of the largest real estate companies in Israel, and more.

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