Innovative teaching of spatial planning at Cracow University of Technology

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ABSTRACT: At Cracow University of Technology (CUT) spatial planning is taught in the Faculty of Architecture (FA) and in the Inter-faculty Spatial Management Study Course (IFSMSC), as well as in postgraduate studies. The innovative teaching system involves integrated module assignments, a specified order of teaching and group work. The teaching of spatial planning is in line with the holistic view of the city, with particular emphasis on environmental conditions. These issues are taught at the FA as specialist classes and lectures, such as ecology and environmental protection and regional planning. Environmental planning, regional policy, urban development and environmental protection, as well as specialist issues concerning transport and municipal economy are taught in the IFSMSC. The possibility of continuing education is an important element of the teaching.

INTRODUCTION

> *In a global community, which is trying to find its common future amongst recurring conflicts and often-flawed political and economic experiments, one of the main contributions of Europe in the 21st century will be the new model of its ancient and modern cities: cities, which are truly connected, which are innovative and productive, creative in science, culture, and ideas, whilst maintaining decent living and working conditions for their people* [1].

The *explosion of cities*, with 75 percent of the world's population expected to reside in cities by the middle of the 21st Century [2], implies an important need for specialists in teaching on the problems of cities, their development, redevelopment and the creating of new centres. The New Charter of Athens 2003: the European Council of Town Planners' Vision for Cities in the 21st Century contains a section called the Commitments of Planners. Within this, three groups of specialists are listed, whose work is directly connected with shaping the space of the city [1]. The specialists are the planner as:

- a scientist;
- designer and visionary;
- political advisor and mediator.

These varied tasks require appropriate education and specialist knowledge to fulfil the required functions.

It is important that students in Poland understand urbanisation, the development of the city and the possibility of stimulating these through spatial planning that is both theoretical and practical. This is also the result of the imperfection of the country's legal system, which is being continuously modified and corrected, yet still requires improvement [3][4].

The discussion on legal issues concerning spatial planning has been ongoing in the country for many years, but has remained unsettled [5]. Therefore, teaching spatial planning requires a focus on action and a strong connection with theory instead of relying on transient legal resolutions [6]. In other Central and Eastern European countries with stable urban planning, there is a greater possibility for the use of student's work in design and implementation, because they can be based on a stable legal system [7-10].

In Poland, the education of spatial planners in the technical sciences is conducted as a part of architecture and urban design, as well as by spatial management courses at technological universities. Education concerning urbanised areas is also conducted at universities specialising in the humanities and economics, as a part of geography and spatial management courses.

At Cracow University of Technology (CUT), the teaching of spatial planning is conducted in the Faculty of Architecture in the Architecture and Urban Planning course, as well as a part of the newly established Inter-faculty Spatial Management Study Course (IFSMSC). For the purposes of shaping the landscape, spatial planning is also taught in the Landscape Architecture course at the FA, although with a limited number of hours. Innovative methods of teaching spatial planning for both courses were developed and have been implemented by the author over the past 10 years.

TEACHING SPATIAL PLANNING TO ARCHITECTS

Architectural studies that develop spatial imagination and the skills of shaping space are taught at the CUT on the basis of solving spatial layouts that range from the simplest to the most complicated. Therefore, problems concerning the spatial planning of cities, as the most complicated and multi-threaded, primarily appear at the second tier of studies.

The innovative method of teaching preparing a design of a spatial development plan of a small town by students of the FA first involves a number of introductory modules. These are then followed by highly integrated modules. This makes it possible for students to learn the sequence of documentation, in addition to the relationships and consequences of planning decisions, which is of the highest significance.

Preparing an assignment as a part of the spatial planning module is based on teaching introductory modules during the first semester of second-tier studies. The main objective is to familiarise students with the subject through lectures on the theory of city planning, and as a part of the ecology and environmental protection module (see Table 1) [11]. The lectures highlight specialist problems of the urban environment, its associated threats and decay, as well as the possibilities of stimulating it, in addition to the presentation of examples of good practice carried out primarily in European cities.

Table 1: Listing of introductory modules in the teaching of spatial planning at the FA (Source: Author).

No.	Module name	Tier/semester	Number of students per semester	Type of classes	Hours/semester
1	Theory and principles of city planning	II/1	250	Lecture	15
2	Ecology and environmental protection	II/1	250	Lecture Exercises	15 15

Assignments are to feature essential documentation of fragments of a city; for example, the identification of various types of damage and threat to the environment; development; as well as compositional and aesthetic matters. Essential, too, is the presentation of directions on making the development more sustainable.

Integrated spatial planning modules start at the first semester of second-tier studies with summer urban planning practical training, during which students in four-person groups perform a functional, compositional and aesthetic survey of a selected small town (see Table 2) [11].

Table 2: Listing of integrated modules in the teaching of spatial planning at the FA (Source: Author).

No.	Module name	Tier/semester	Number of students per semester	Type of classes	Hours/semester
1	Urban surveying practical training	II/1	250	Exercises	30
2	Theory of spatial planning	II/2	250	Lecture	15
3	Spatial planning	II/2	250	Design exercises	105
4	Regional planning	II/2	250	Lecture Exercises	15 15
5	Specialist and diploma project design	II/3	20	Seminars and design	

During the following semester, students work in the same groups preparing documentation of environmental conditions, and a sketch of a conceptual proposal of the development of the region of the city they worked on as a part of the regional design module. At the second semester of second-tier, based on the knowledge gained during spatial planning and regional planning lectures, as well as materials collected during practical training, they prepare a synthesis of development conditions and directions for the town, drawn to a scale of 1:10,000. Lectures on spatial planning accompany subsequent stages of preparing a draft city plan. Afterwards, working in two-person teams, students prepare a conceptual proposal of a plan of the entire town, drawn to a scale of 1:5,000, followed by drafts of a local spatial

development plan for a fragment of the town, prepared individually at the end of the assignment. The presentation of the design assignment for the entire city is captured on a perspective drawing or birds-eye axonometric view, where the compositional value of the design can be highlighted.

As a result of group work and the integration of several modules, with a relatively low number of hours, students are able to master complicated and multi-faceted subject matter associated with preparing the design of a city plan. Their prior preparation in terms of urban and architectural design, the history of urban planning and matters of transport, make it easier to understand and perform spatial design.

The urban planning practical training that precedes the preparation of a city plan draft makes it possible to learn specialist notation used in spatial planning, which appears to be problematic to architecture students at the start of classes. For some of them, these difficulties are also caused by changing the scale to which the projects they prepare are drawn to, as they previously most often prepared urban design projects to a scale of 1:500, 1:1,000 and 1:2,000.

Students often participate in competitions and workshops organised by the Institute of City and Regional Design in co-operation with local governments, during which students have the opportunity to become familiar with actual problems that occur in small towns. Such tasks prepare graduates of the FA for creative and design work, as well as academic and administrative work.

INTER-FACULTY SPATIAL MANAGEMENT STUDY COURSE

This interdisciplinary course is jointly taught by three faculties at Cracow University of Technology: Architecture (FA), Civil Engineering (FCE) and Environmental Engineering (FEE). The curriculum was developed by academic teachers from the three Faculties. Initially, it was Professor Elżbieta Nachlik PhD, DSc Eng., who inspired the establishment of the course. Since 2016, the curriculum of the IFSMSC has been developed by the Course Council, which includes vice-deans in charge of student matters from the FCE and the FEE, as well as the author of this article, as a representative of the FA.

Course classes are taught by academic teachers from all faculties, with a relatively even share of teaching, in addition to invited professors and adjunct professors, who represent other branches of academia. Spatial planning is taught in conjunction with problems associated with transport, municipal management, water management and other subjects. Spatial planning is taught during the fourth semester of first-tier studies. This follows modules concerning planning graphics, legal theory, spatial and terrain information systems, GIS analysis and urban and rural technical infrastructure (see Table 3) [12]. During graphics classes students learn the graphical notation applied to plans of all scales, ranging from the regional scale to local plans drawn to a scale of 1:2,000 and 1:1,000.

Table 3: Listing of integrated and supplementary modules in teaching spatial planning at first-tier studies, as a part of the IFSMSC (Source: Author).

No.	Module name	Tier / semester	Number of students per semester	Type of classes	Hours/semester
1	Planning graphics	I/2	~ 90	Exercises	45
2	Legal theory	I/2	~ 90	Lecture Exercises	30 30
3	Spatial information systems	I/2	~ 90	Computer classes	30
4	Terrain information systems	I/2	~ 90	Computer classes	30
5	Urban and rural technical infrastructure	I/3	~ 80	Lecture Design	30 45
6	Transport systems	I/3	~ 80	Lecture Exercises	15 15
7	GIS spatial analysis	I/3	~ 80	Computer classes	30
8	Spatial planning	I/4	~ 70	Lecture Exercises	30 30
9	Transport infrastructure	I/4	~ 70	Lecture Design	30 30
10	Water distribution and sewage infrastructure	I/4	~ 70	Lecture Exercises	30 15

The draft of a city plan drawn to a scale of 1:2,000 prepared at the second year of first-tier studies is based on a synthesis of conditions which is prepared in groups. The assignment is accompanied by classes on transport and water

distribution and sewage infrastructure taught by lecturers from the FCE and FEE. This gives a more comprehensive outlook of the problems of the city. During the assignment, students also discuss the role and significance of the project area in the city and analyse the environmental resources. This task makes it possible to draft detailed regulations of a plan based on individually conducted studies in graphical and written form. During subsequent years of engineering studies, students learn urban design and planning of various regions of cities and areas without urbanisation, as well as problems associated with technical infrastructure.

Second-tier studies are divided into two specialisations: the first being spatial planning and municipal management, and the second being urban design and transport. The entirety of Master's studies is in accordance with these specialisations. The teaching spatial planning is the same for both courses (see Table 4) [12].

Table 4: Listing of integrated and supplementary modules in teaching spatial planning at Master's/second-tier studies of the IFSMSC (Source: Author).

No.	Module name	Tier/semester	Number of students per semester	Type of classes	Hours/semester
1	City development planning part 1	II/1	~ 90	Lecture Design	30 30
2	Environmental planning	II/1	~ 90	Lecture Design	15 30
3	Design and development of the urban environment	II/1	~ 90	Lecture Design	15 15
4	City development planning part 1	II/2	~ 90	Lecture Design	15 45
5	Regional policy	II/2	~ 90	Lecture Design	15 15

It is initiated during the first semester with a number of integrated modules, during which students learn the principles of shaping and protecting the urban environment, environmental design and the planning of city development.

In single- and two-semester design assignments, students prepare one comprehensive plan of a small town, preceded by detailed studies and analyses of the urban environment, while working in multi-person teams. These studies concern matters of demographics, function, the landscape, the condition and size of the stock of the natural and cultural environment, as well as threats and damage. In addition, the condition in which the building stock and surface of undeveloped land is maintained, and aesthetic and landscape assessments are considered. Finally, the possibility of making a city development more sustainable and improving the ecological situation is addressed.

In the first semester, students diagnose the condition of a city and propose directions of its development. In the subsequent semester, students still focus attention on the same town and its region. In parallel with the structure of a city development plan, drawn to a scale of 1:5,000, students prepare a conceptual proposal of the development of the region as a part of the regional policy module. The design of the spatial development of an entire town is prepared in two-person teams. Students also prepare a detailed design of a selected fragment of the town, drawn to scale of 1:1,000 or 1:2,000, which they prepare individually, paying attention to the possibility of improving the quality of public spaces and producing a pro-environmental design of the space of the entire city.

Over the course of the three semesters of Master's studies, there are additional elective modules that expand on the subject matter of the planning and design of space, both in urban centres, and in areas without urbanisation and open areas. Each of the students can participate in two or three elective modules from an at least twice as many offered modules. Module offerings were prepared for each specialisation, not only supporting the subject matter, but also expanding specialist knowledge.

Modules that supplement and expand knowledge in city design and spatial planning selected for the spatial planning and municipal management specialisation cover:

- design of waterfront areas;
- revitalisation and restructuring of post-industrial areas;
- functional planning;
- intelligent municipal infrastructure;
- smart cities;
- design of spaces for recreation and tourism;
- transformation of rural areas;
- planning in mountainous areas;
- design and spatial planning of health resorts.

The last two cover the distinct problems of the Carpathian Mountains of Southern Poland. The modules that supplement and expand knowledge in city design and spatial planning for the urban design and transport specialisation cover:

- principles of designing road networks in urban areas;
- alternative energy sources in infrastructure;
- planning of heating systems;
- urban design of city centres;
- urban design of functional areas;
- principles of housing design;
- principles of the renewal and shaping of the public spaces of cities;
- planning transport in decayed and revitalised areas;
- smart cities - cities of the future.

Graduates of Master's studies usually are employed by the local and regional administration, real estate development companies, as well as in higher education. They are prepared for design work.

POSTGRADUATE STUDIES

The final tier of education is Spatial Planning Postgraduate Studies taught at the FA-CUT. This course lasts two semesters and is meant for representatives of multiple specialisations that co-operate in the process of spatial planning. Candidates for this course include both graduates of Engineer's and Master's studies. It is desirable that students of this course have professional experience in spatial planning with one or more designers of spatial development plans, specialists in landscape architecture and local or regional administration staff. As well, they should have knowledge of geography, sociology or economics.

The teaching, conducted by professors of Kraków universities and specialists and practitioners, concerns multi-disciplinary subjects related to spatial planning. Apart from lectures, students gain skills in practical classes related to obtaining information about the city. They are given the opportunity to take part in conceptual design work. Many assignments are prepared in multiple-person teams.

The subject matter covered during these studies is broad and concerns many specialist subjects associated with spatial planning:

- problems of the redevelopment of settlement centres of various size;
- spatial planning and governing city development;
- real estate management in a city;
- comparison of spatial planning systems in selected European Union countries;
- legal problems in spatial planning;
- ecology and the protection of the urban environment.

Particular attention is focused on the natural and cultural conditions of spatial planning and management, as well as the principles of planning in protected areas. Problems of water management or subjects concerning regional planning, as well as social problems in urbanised areas and areas undergoing urbanisation are also tied into spatial planning. Terrain information and monitoring systems, as well as matters associated with the design of technical infrastructure are also considered. The course ends in a diploma project, which often relates to problems that occur where students live or is directly associated with problems that they encounter in their professional work.

CONCLUSIONS

The New Charter of Athens:

> *...promotes a vision of The Connected City which can be achieved by planning and by spatial planners, as well as other professions. It embraces new systems of governance and ways of involving the citizen in decision-making processes, using the benefits of new forms of communication and information technology. At the same time, it is a realistic vision, in distinguishing between those aspects of city development where planning can exert a real influence and those where it has a more limited role* [1].

The system of teaching spatial planning is adapted to the needs of students. Instructors work individually with every student. This work is associated with the needs of local governments of municipalities primarily located in the south of Poland.

The latest experience in teaching spatial planning at the Institute of City and Regional Design in the Faculty of Architecture of Cracow University of Technology has revealed that graduates of both courses are prepared to engage in work in all fields of activity where planning is involved as per the New Charter of Athens 2003.

The preparation of specialists for planning and shaping the development of cities is important for the needs of ordering and developing the space of Polish cities and settlements. This is important after the experiments of socialism and the neo-liberal economy of the past few decades.

The relatively high number of diploma students preparing their final student assignment concerning spatial planning and the numerous awards they obtain confirm the effectiveness of the teaching methods presented in this article. The high number of the FA graduates taking up employment in urban design and spatial planning both domestically and abroad is yet another argument in its favour. In Europe, the graduates working abroad mainly work in Great Britain, but also in China, Canada and the United States.

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