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### Continuing Education of Bridge Engineers in Poland

Formation permanente des ingénieurs des ponts en Pologne

Kontinuierliche Schulung der Brückenbauingenieure in Polen

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#### SUMMARY

The education of civil engineers has been pursued on at the Wrocław Technical University (WTU) for many years. The fundamental educational task is undergraduate study, which consists of two parts: a 3-year basic part and 2-years specialization. The paper also presents other forms for continuing education of bridge engineers.

#### RÉSUMÉ

L'École Polytechnique de Wrocław forme des ingénieurs civils spécialisés dans la construction de ponts depuis de nombreuses années. Les études comportent la formation de base d'une durée de trois années jusqu'au premier diplôme, suivie d'une spécialisation de deux années. L'article donne en outre les autres formes de formation continue et de perfectionnement prévus pour les ingénieurs des ponts.

#### ZUSAMMENFASSUNG

Seit vielen Jahren sind an der Technischen Universität Wrocław Bauingenieure, die sich im Brückenbau spezialisieren, geschult worden. Die grundlegende Bildungsaufgabe ist die Zeit bis zum ersten Diplom, die sich aus dem dreijährigen Basisteil und der zweijährigen Spezialisierung zusammensetzt. Der Artikel gibt ausserdem andere Formen der kontinuierlichen Weiterbildung für Brückenbauingenieure an.



1. INTRODUCTION

The Wrocław Technical University is one of the largest technical universities in Poland. Today it employs some 6500 personnel, including nearly 2000 faculty members: co. 350 full rank professors, 1350 lecturers and assistant professors, 270 instructors, as well as 180 teachers of physical education, foreign languages, etc.

Annually, about 1200 incoming students are enrolled to 11 faculties, making the total number of the University undergraduates around 6500.

The University has a sound physical layout: 195 buildings with a total area of 327000 sqm including several hundred laboratories and workshops. All students of the University have access to terminals at the Computer Center.

The University Library System, consisting of the main library and several specialized Faculty, Institute and Interinstitute Libraries, has developed considerably. Its holdings consist of approximately 550000 books, 115000 magazines (with 573 titles), and 602000 special pieces (maps, microfilms, standards).

Students at the WTU are educated in 20 broad disciplines and are able to choose from among dozens of specializations.

The education of bridge engineers is carried on by the Bridge Group of the Institute of civil Engineering. In the Group 12 faculties and 4 technical workers are employed. During last ten years the

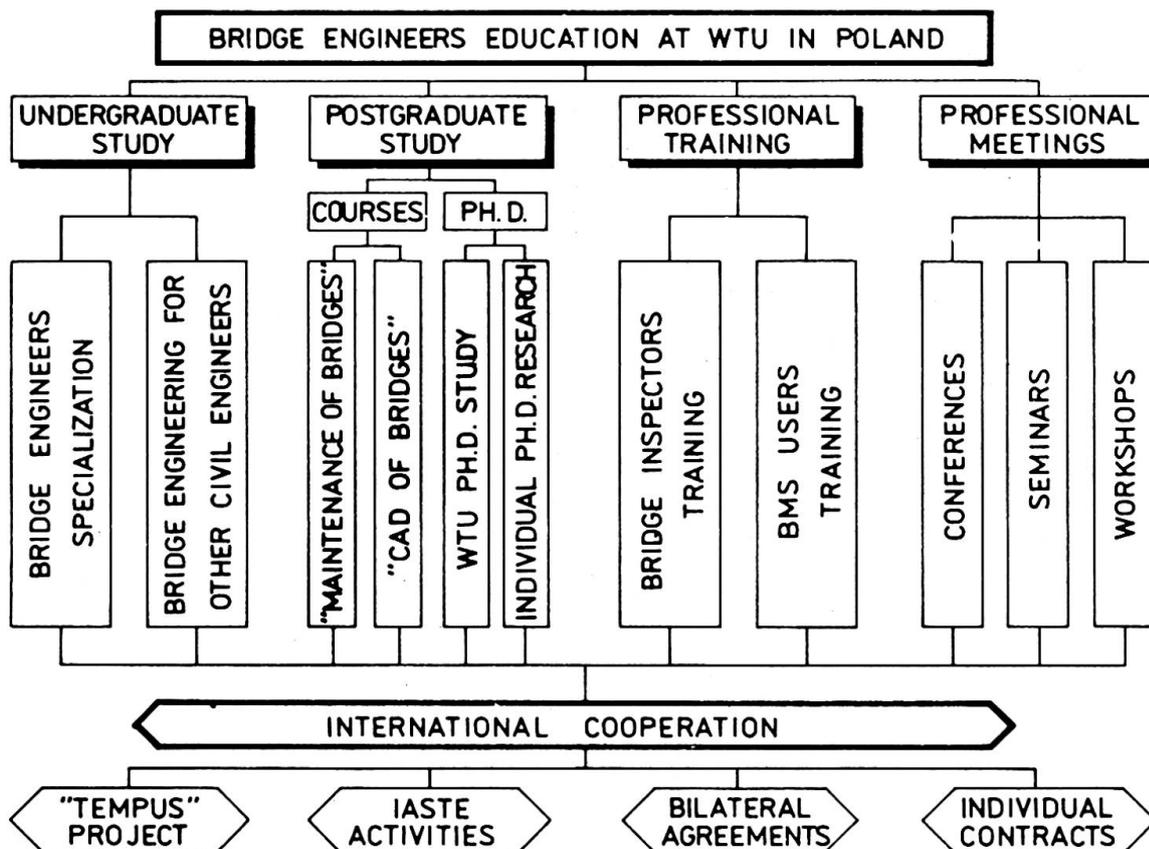


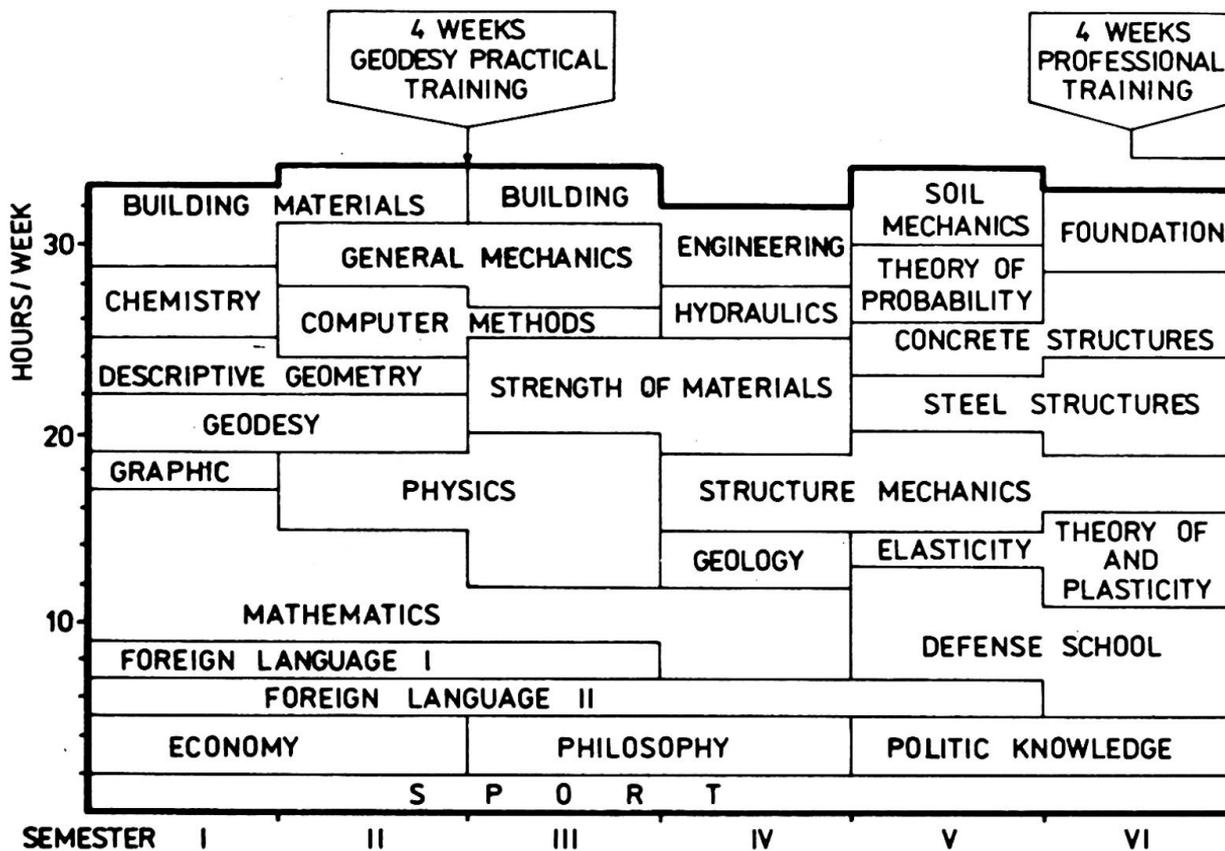
Fig.1 Scheme of continuing education of bridge engineers at Wrocław Technical University.



special programme of the continuing education of bridge engineers has been elaborated and implemented. This programme is realized in several forms presented in Fig.1. In 1991 about 120 undergraduate students and some of 90 bridge engineers have been taken a part in all forms of bridge engineering education.

## 2. UNDERGRADUATE STUDY

The undergraduate study is the main field of educational activity of the University. There are two periods of study in each curriculum. The first period lasts for semesters and is interdisciplinary in character. All students are required to attend this general segment of their education in a rigid manner. It consists of coursework in the so called basic theoretical subjects (mathematics, physics, and in some cases chemistry); general technical subjects like engineering graphics, computer science, courses in foreign languages, social sciences, physical education and few electives in a student's proposed field of specialization. Thus the student has an opportunity to broaden himself intellectually as well as to pursue individual interests. The frame programme of the general education of bridge engineers (first 3 years) is presented in Fig.2.



**Fig.2** Programme of general part of bridge engineers education at WTU

The second period of study, called specialized education, continues through semesters VII-IX. Curricula for this period are specified



for each specialization, but are set up by the Faculty Council in form of a general schedule for each specialization. Only few electives are possible.

The last, 10th semester is designed for preparing the master thesis, whose topic is drawn up and given to the student following his completion of eight credited semesters. The preliminary work for the thesis may be done for credit starting at 8th semester in the independent study programmes. In this programmes students solve original technical problems and are under individual supervision of a staff members. Problems are presented so as to take advantage of the entire theoretical and methodological corpus acquired by the student during his earlier years of study.

Education in Bridge Engineering is carried on two ranges:

- comprehensive, for bridge engineers,
- limited, for civil engineers of other specialization (see Fig.1).

The programme of bridge engineers specialization (last 2 years) is presented in Fig.3.

Majority of graduates leave the university and seek a job in the industry at the technical management or research/development positions (engineers). Some of them enter the graduate school and work in the University Institutes on their Ph.D. for additional 3-4 years.

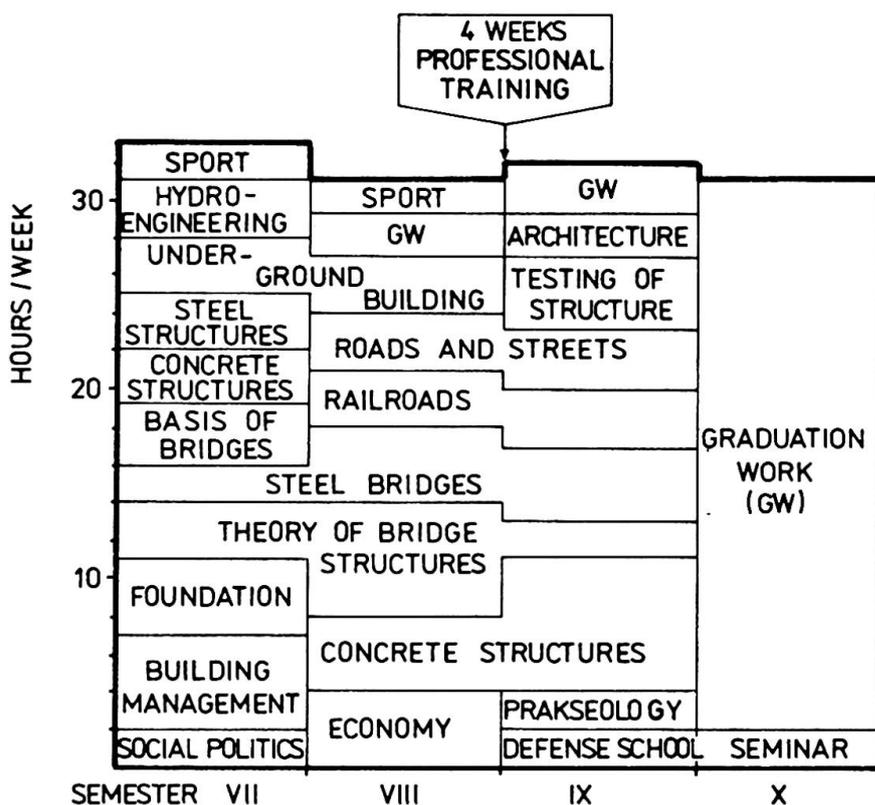


Fig.3 Programme of specialization of bridge engineers at WTU

### 3. POSTGRADUATE STUDY AND PROFESSIONAL TRAINING/MEETINGS

Three main forms of continuing education of bridge engineers are carried on at the WTU: postgraduate study, professional training and professional meetings.



Two kinds of postgraduate study can be distinguished: postgraduate courses and Ph.D. study. At present two annual courses are carried on: "Maintenance of Bridges" for engineers employed in both the Public Road Administration and the Railway Administration and "Computer Aided Design of Bridges" for bridge designers. The frame programmes of the courses are presented in Fig.4.

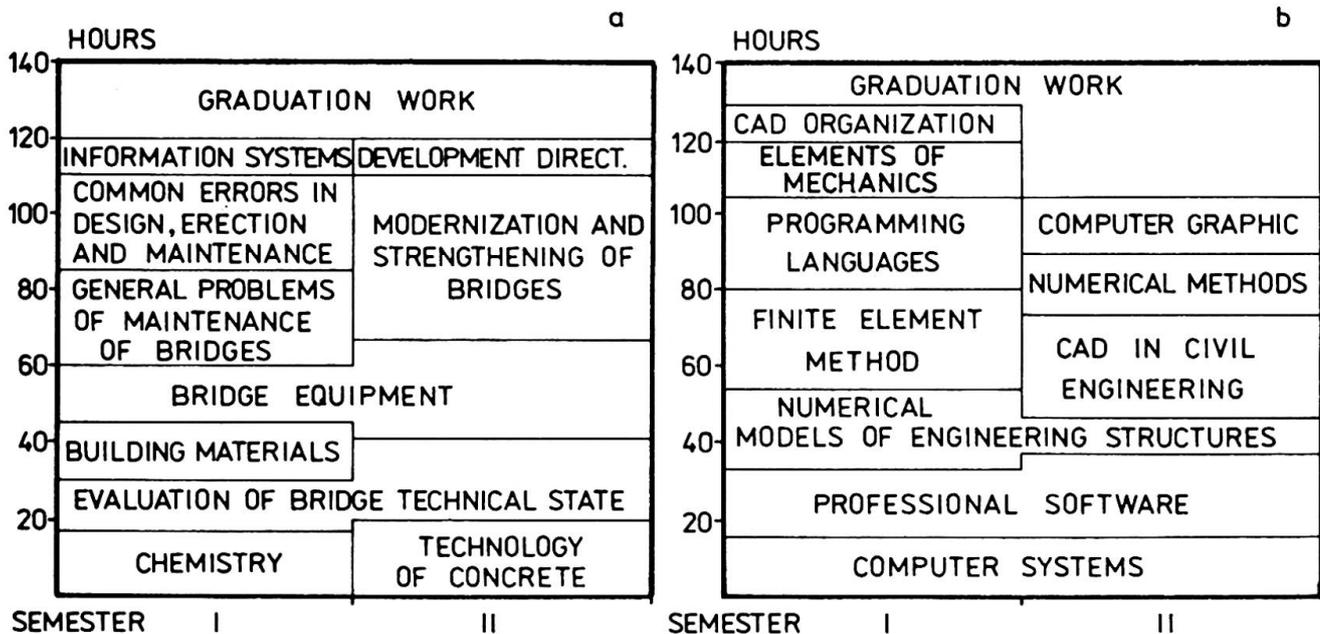


Fig.4 Programmes of postgraduate courses: (a) - "Maintenance of Bridges", (b) - "Computer Aided Design of Bridges".

The Ph.D. thesis can be completed during special Ph.D. study organized by the WTU or as a individual research work. Short-term (3-4 weeks) professional training is dedicated to bridge inspectors ("Bridge Inspectors Training") and to managers from road administration ("Bridge Management System Users Training") who are implementing the computer BMS developed with the WTU Bridge Group participation.

Professional meetings (conferences, seminars, workshops) are organized periodically (e.g. International Conference "Safety of Bridge Structures", National Conference "Short-Span Bridges Problems") or incidentally. Two to three meetings are organized every year.

#### 4. INTERNATIONAL COOPERATION

Civil Engineering education is facing several challenges. The practice of engineering has evolved to large firms conducting multi-national projects in many countries and cultures. To be contemporary, graduates need to be internationally competent in the practice of civil engineering. Typical curriculum does not provide international skills. The teaching of the practice of engineering has been diminished by introduction of science, theory and extensive computer capability and discarding of previously taught



practical skills. Overhaul is difficult within accreditation constrains on curriculum content. The graduates are not meeting the expectations of industry. European Civil Engineering curricula have a strong practical focus which complements the U.S. needs.

The Institute of Civil Engineering of the WTU has three direct cooperation agreements with the counterpart institutes in :

- the Delft University of Technology in the Netherlands,
- the University of Nevada-Reno in USA,
- the Colorado State University.- Fort Collins in U.S.A..

On the basis of these cooperation some programs of joint educations in bridge engineering are created. They are submitted as well to the TEMPUS project as to the National Science Foundation and FIPSE project of U.S. Ministry of Education. The idea of continuing education in bridge engineering may be proposed within these projects. The International School for Bridge Engineering is the idea for focusing of individual efforts, experiences of different institutions and universities policy for improvement of education in Civil Engineering. The School activity would occur in several forms:

- exchange of video tapes (with subject concerning bridge engineering elaborated by each cooperating institutions ) between associated by the School participants,
- seminars with invited lectures,
- lecture course for undergraduates and postgraduates,
- practical training,
- joint research and design project, etc.

Realization of this plan needs some funds which will be searching after general agreement between participants. The role of IABSE and other international associations is helping with the program of the School and assistance with its implementation.