

New trends and challenges in civil engineering education

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EUCEET Conference



Conference and Cultural Centre of the University of Patras

CIVIL ENGINEERING EDUCATION, 12 YEARS AFTER BOLOGNA – A CASE STUDY: ROMANIA

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“European Higher Education Area” – EHEA

- Gave the title of the Bologna Declaration, June 19th 1999
- Set to be accomplished in 2010, by the Conference in Prague, May 19th 2001
- Officially launched by the Conference in Budapest and Vienna, March 12th 2010
- First Conference after the launching of the EHAEA: Bucharest, 26-27 April 2012

Civil Engineering Education in Romania – a tradition of almost 200 years

- Technical University of Civil Engineering Bucharest, continuator of “*the National School of Bridges and Roads*” founded in 1867
- Other main schools:
 - University “Politehnica” Timisoara, founded in 1921
 - Technical University “Gheorghe Asachi” Iasi, founded in 1941
 - Technical University Cluj-Napoca, founded in 1913

Higher Education in Romania – a snapshot on the academic year 2011-2012

- **112 universities:**

 - 56 public

 - 35 private accredited

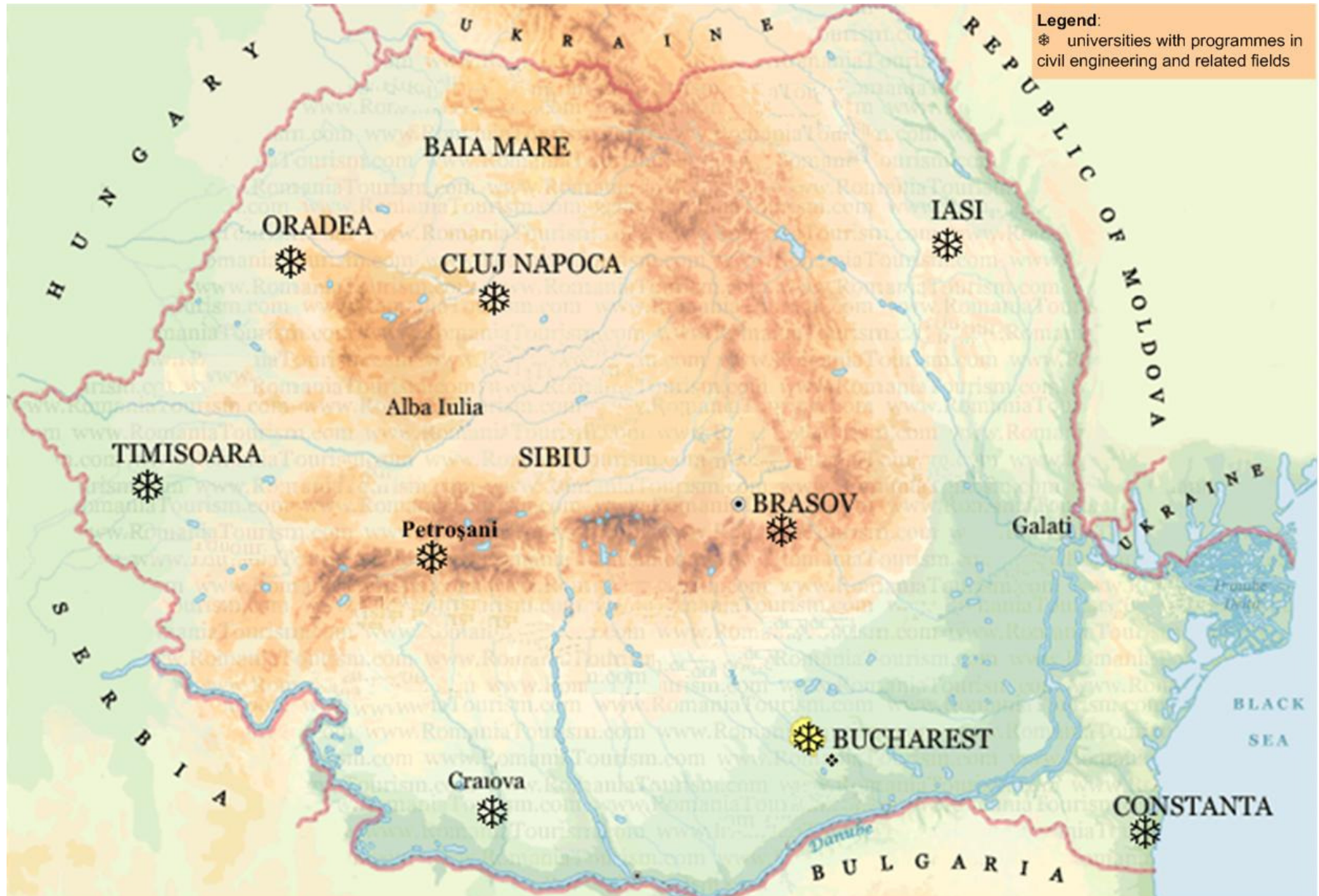
 - 21 private authorized

 - 27 engineering fields**

 - 148 engineering specialization**

- **12 universities** offering programmes in civil engineering and related fields:

 - Installation Engineering,
 - Engineering Geodesy,
 - Environmental Engineering,
 - Mechanical Engineering,
 - Engineering and Management.



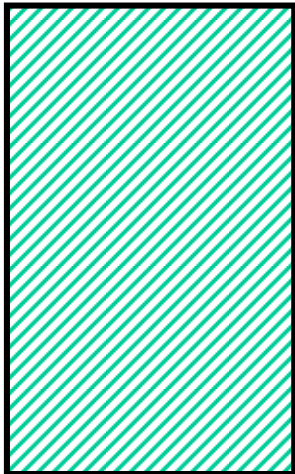
Map of Romania with the location of universities offering programmes in civil engineering and related fields in the academic year 2011-2012

Names and codes of the first cycle degree courses for various fields (profiles) 2011-2012

Field	Code	Name of the degree course (specialization)	Code
Civil Engineering	CE	Civil, Industrial and Agricultural Buildings	CIAB
Civil Engineering	CE	Railways, Roads and Bridges	RRB
Civil Engineering	CE	Constructions and fortifications	CF
Civil Engineering	CE	Hydraulic Structures	HS
Civil Engineering	CE	Mining Construction	Min
Civil Engineering	CE	Sanitary Engineering and Environmental Protection	SANEP
Civil Engineering	CE	Land Reclamation and Rural Development	LRRD
Civil Engineering	CE	Civil Engineering	CE
Civil Engineering	CE	Urban Engineering and Regional Development	UERD
Civil Engineering	CE	Infrastructure of Metropolitan Transport	IMT
Civil Engineering	CE	Civil Engineering (in English)	CEEn
Civil Engineering	CE	Civil Engineering (in French)	CEFr
Civil Engineering	CE	Civil Engineering (in German)	CEGe
Installation Engineering	IE	Building Services	BS
Installation Engineering	IE	Installations and Equipment for Atmospheric Protection	IEAP
Installation Engineering	IE	Building Services for fire protection	BSFP
Installation Engineering	IE	Building Services (in French)	BSFr
Geodesy Engineering	GE	Geodesy and Land Cadastre	GLC
Environmental Engineering	EE	Environmental Engineering	EE
Mechanical Engineering	ME	Engineering and Management of Technological Resources in Construction	EMTRC
Engineering and Management	EM	Engineering Economics in Constructions	EEC

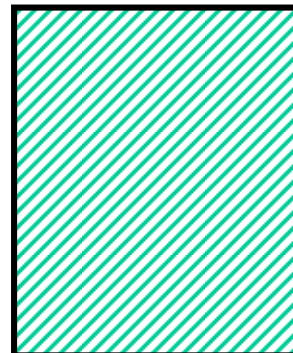
Civil Engineering Education in Romania before Bologna (until 2004-2005)

A pure “continental” or “binary” system



Five year

“Inginer diplomat”

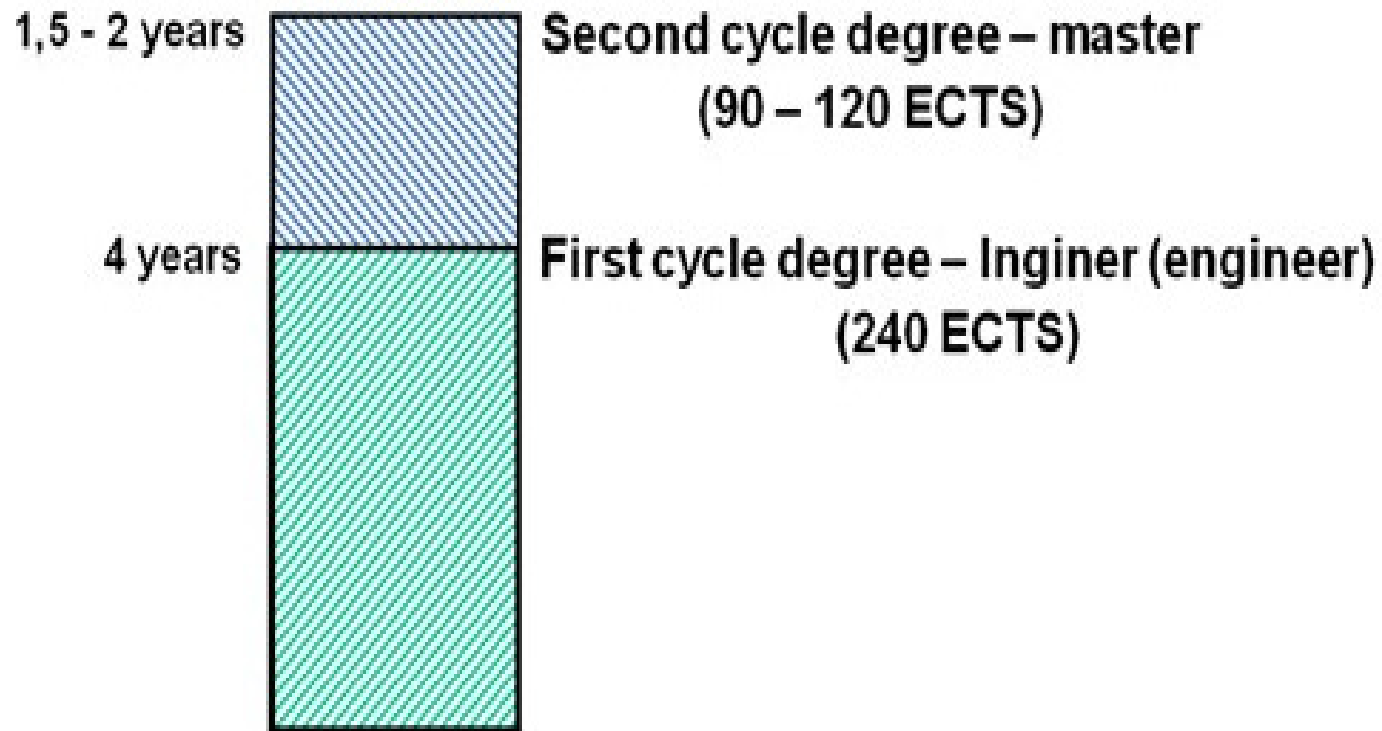


Three year

“Inginer colegiu”

“Law on the organisation of university studies” (288/2004)
(for the implementation of the Bologna Declaration)

- First cycle, 3-4 years (180-240 ECTS Credits) leading to “*Licența*” degree
 - For engineering, as an exception, 1st cycle is of **4 year duration**
- Second cycle, 1-2 years (60-120 ECTS credits) leading to a “*Master*” degree
- **Cumulative duration** of 1st and 2nd cycles: **at least 5 years** (300 ECTS credits)



Engineering education in Romania after the implementation of Bologna process, starting with the academic year 2005 - 2006

Degree courses in civil engineering and related fields offered by the Romanian universities 2011-2012

Field	Degree course	UNIVERSITY																	
		TUCE B	TUI	UPT	TUC N	UO C	UTB	UO	UP	UC	UDJ G	UAI	NUB M	UAVM B	UAVM I	UAVM T	UAVM CN	MTA	P A
First cycle degree courses in civil engineering field																			
CE	CIAB	x	x	x	x	x		x		x							X		
CE	RRB	x	x	x	x			x											
CE	CF																		x
CE	HS	x	x	x	x	x													
CE	Min																		x
CE	SANEP	x	x																
CE	LRRD		x	x		x													
CE	CE																		x
CE	UERD	x	x			x		x											
CE	IMT	x																	
CE	CEEn	x	x	x		x													
CE	CEFr	x	x																
CE	CEGe																		x
First cycle degree courses in other related engineering fields																			
IE	BS	x	x	x															
IE	IEAP	x																	
IE	BSFP																		
IE	BSFr	x																	
GE	GLC	x	x	x	x			x	x		X ^{1*}	x	x	x	X		X*	X ^{1*}	
EE	EE																		x
ME	EMTRC	x																	
EM	EEC					x		x											

Legend: **TUCEB** - Technical University of Civil Engineering Bucharest; **TUI** - Technical University "Gheorghe Asachi" Iași; **UPT** - University Politehnica Timișoara; **TUCN** - Technical University Cluj-Napoca; **UOC** - University "Ovidius" Constantza; **UTB** - University "Transilvania" Brașov; **UO** - University Oradea; **UP** - University Petroșani; **UAVMB** - University for Agricultural and Veterinary Medicine Bucharest; **UC** - University Craiova; **MTA** - Military Technical Academy Bucharest; **PA** - Police Academy "Alexandru Ioan Cuza" Bucharest; **UAI** - University „1 DECEMBRIE 1918" ALBA IULIA; **NUBM** – North University BAI A MARE; **UAVMCN** - University for Agricultural and Veterinary Medicine Cluj Napoca; **UDJG** – University „DUNĂREA DE JOS" GALAȚI; **UAVMT** - University for Agricultural and Veterinary Medicine TIMIȘOARA; **UAVMI** - University for Agricultural and Veterinary „ION IONESCUL DE LA BRAD" IASI

1* - provisional authorization

**The change from the
integrated 5-year programme to the new 4-year programme,
in quantitative terms at TUCEB**

Programmes Item	5-year (until 2004-2005)	4-year		
		2005-2006	2006-2007	2010-2011
Duration	10 semesters	8 semesters	8 semesters	8 semesters
Contact hours	251 hours	236 hours	218 hours	218hours
Diploma project	In the 10 th semester	In summer, following the 8th semester	In summer, following the 8th semester	4 weeks in the 8th semester
Final examination	End June	End September	End September	End June

Structure of the 4-year curriculum

No	Group of subjects <i>The "backbone"</i>	Contact hours/ % from total	
		2005 - 2006	2006 - 2007
1	Basic subjects	42 h (17.8 %)	38 h (17.4 %)
2	General technical education	53 h (22.5 %)	55 h (25.2 %)
3	General engineering education	52 h (22 %)	46 h (21.1 %)
4	General economic and technological education	16h (7.2 %)	10h (4.6 %)
5	Foreign languages, social sciences, humanities	12 h (5.1 %)	14 h (6.4 %)
	Total	175 h / 74%	163 h / 74.7%
6	The specialization	61 h (26 %)	55h (25.3 %)
	Grand total	236 h (100 %)	218 h (100%)

Two relevant factors regarding the new 4-year programme

1. The degree awarded after the completion of the 4-year programme has all chances to be relevant for the labour market on appropriate level of qualifications. A programme in which $\frac{3}{4}$ of the contact hours is reserved to “core subjects”, i.e. subjects common to the entire field, regardless of specialization, is aimed at educating a “generalist” type of civil engineer.
2. The qualification *inginer* (engineer) is the designation written on the diploma received by the graduates of the first cycle.

**Second cycle degree programmes offered for the first time
in 2009-2010**

Field	Universities				
	TUCEB	TUI	UPT	TUCN	UOC
CE	9	9	6	7	2
IE	3	1	1	1	
GE	3		1		
EM	1			1	2
Total	16	10	8	9	4

Some features of the Master programmes at TUCEB

Most of them are of “vertical” type, representing a continuation of the “*licenta*” programme

Narrow “*licenta*”, followed by just one Master:

- Urban Engineering and Regional Development
- Transport infrastructure
- Hydraulic structures

Board “*licenta*” programme followed by several Master programmes:

Civil, Industrial and Agricultural Buildings – 4 Master

Building Services – 3 Master

But also master of “*transversal type*”:

Geotechnical engineering

Sustainable development

Bologna process means more than the action Line 2:

The impact of Bologna on:

- Student mobility
- Accreditation of engineering programmes

Conclusions

The Bologna process led to profound changes in the Romanian system of higher education, including civil engineering education. The former 5-year integrated programmes were split in two-tier programmes, with a First cycle degree of 4 year (240 ECTS) and a Second cycle degree of 1.5 – 2 years (90 – 120 ECTS). The former 3-year programmes, more practically oriented, were dismantled.

The concept of “learning outcomes” is gradually gaining territory, as reflected in activities related to the development of the National Framework for Qualifications in Higher Education or to the accreditation of engineering programmes.

Only 2 years have passed since the first cohort graduated from the new 4-year (Licenta) programmes and 6 months since the first cohort graduated at TUCEB from the new 1.5 year master programmes. This is too short a period to judge the results of the reform, but sufficient to appreciate that the potentiality of the Bologna process has not yet been fully exploited. New actions and more efforts are needed, with the participation of all stakeholders. EUCEET Association, well represented in Romania, has an important role to play in this process.