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Road Transportation Systems Engineering Development in the Sub-Saharan Africa - Modern EU Master Programme & Capacity Building
ERASMUS-EDU-2023-CBHE

TASK 2 - Averaged curriculum and profile of a typical graduating engineering student

Democratic Republic of Congo (DRC)

UOR / ULPGL / UAC

GDAŃSK UNIVERSITY OF TECHNOLOGY

UNIVERSITÄT KLAGENFURT

Bauhaus-Universität Weimar

INTIME

UNIVERSITÉ DE DSCHANG
UNIVERSITY OF DSCHANG

ULPGL

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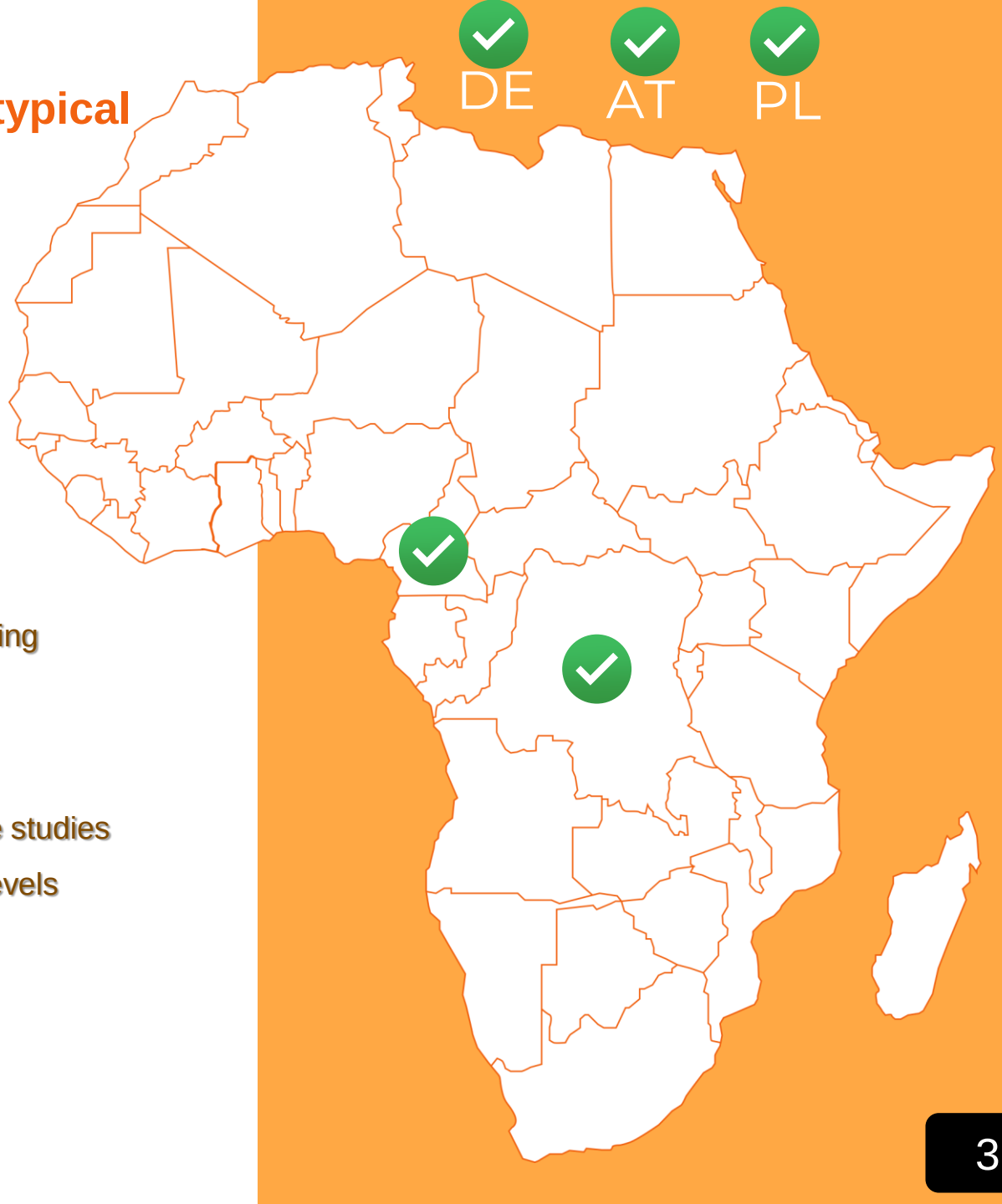

Curriculum structure in DR.Congo

New System (From 2021-2022, L1)

Licence	Maîtrise	Doctorat
Bachelor (1+3 Years)	Master (2 Years)	PhD (3 Years)

ld System (now only two classes are in old system, L1 and L2)

Graduat (1+3 Years) G1-G2-G3	Licence (2 Years) L1-L2	DEA/ Master (1-2 Years)	PhD (3 Years)

- ✓ In 1+5 Years→ Master , not in 1+6 or 1+7
- ✓ Alignment of education with the need of job market, reflecting the industry's demands.
- ✓ More Practical works, Projects, Internships, Personal research
- ✓ Focus on essential courses of the area, and practical aspects

LMD –Bachelor (Pre-polytechnic(1Year) + 3 Years)) – Master (2Years) – Doctor (from 3 Years)

- ❑ 1-Year divided in to 2 Semesters
- ❑ Course has a number of Credits according to the Volume→ 1 Credit = around 25 Hours
- ❑ Total Credits for one Year = 60 Credits (ECTS) → per semester 30 Credits (ECTS)
- ❑ One or more courses can build a Course Unit / Teaching Unit

Curriculum structure in DR.Congo

Program structure

				CMI	TD	TP	
Teaching Unit (UE)	**Courses (EC)**	**Cod**	**Course Title**	**Lecture (CMI)**	**Supervied Workshop (TD)**	**Practical Work (TP)**	**Credits** (ECTS)
Unit 1	Course 1	TRA114	**Introduction in**	30 HOURS	10 HOURS	10 HOURS	2
	Course 2	TRA116	**Management**	15 HOURS	5 HOURS	5 HOURS	1
Unit 2	Course 3	FON112	**Maths xxxxxx**	45 HOURS	15 HOURS	30 HOURS	4
Unit 3	Course 4	GCI121	**Building**				5
Unit 4	Course 5	GIN111	**Data bases ....**				3

- FON: Teaching Unit - fundamental sciences for engineers
- TRA=Cross-disciplinary subjects Teaching Unit
- GCI= Teaching units in the Civil Engineering field
- GIN= Teaching units in the Computer Science field
- GEL= Teaching units in the Electrical Engineering field
- GME=Teaching units in the Mechanical Engineering field
- STA= Internship-based teaching units
- MEM=Thesis or Final Project
- UE=Course Unit / Teaching Unit

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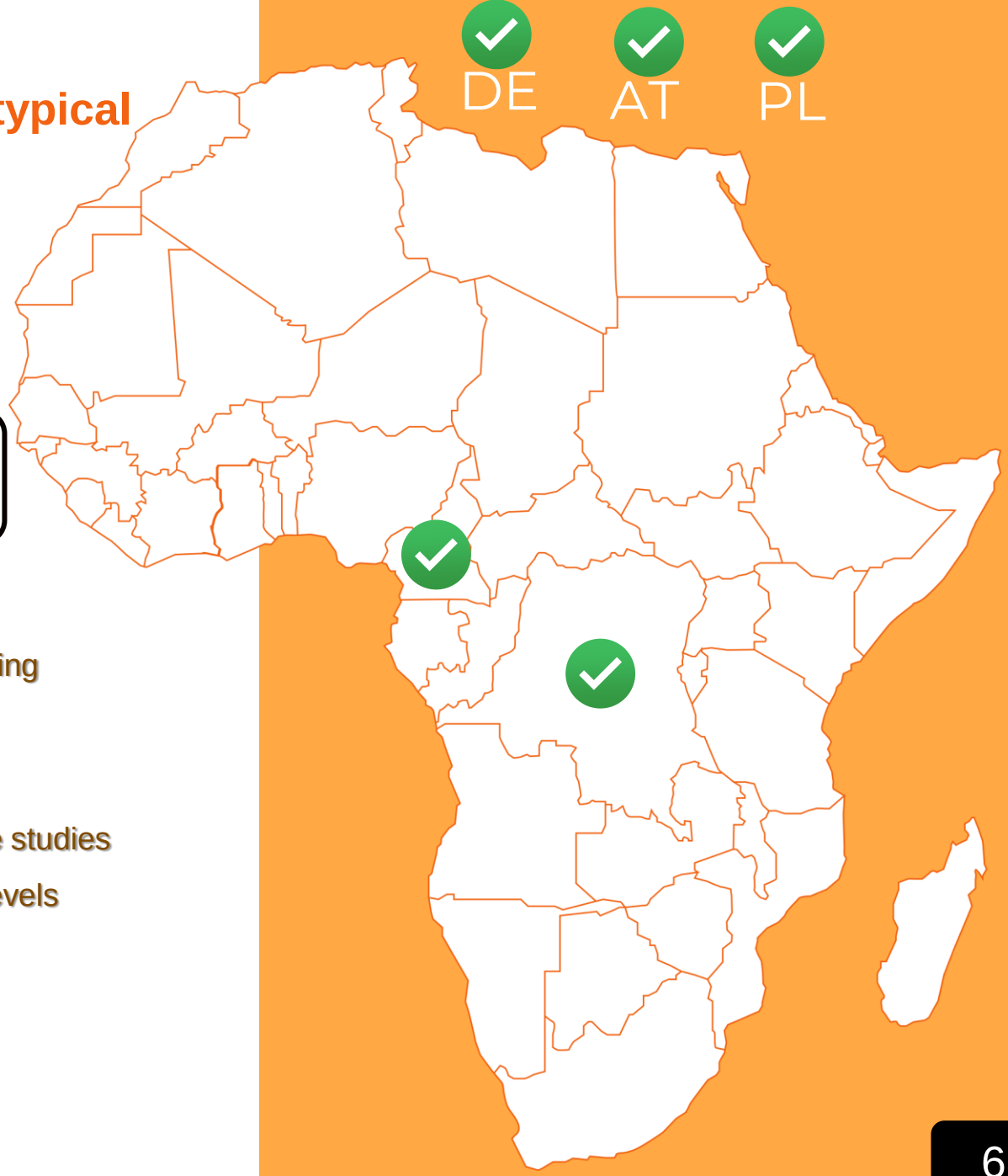

Core subjects in civil engineering Practical skills and theoretical knowledge (Bachelor Year 1)

Course Unit	Course	Cod	Semester	Course Title	Interactive Lecture	Supervised Workshops	Practical Work	(ECTS) CREDITS
1		TRA111	1	Citizenship Education & Health and Safety at Work	Hours	Hours	Hours	
	1		1	Citizenship Education	10	5	0	1
	2		1	Health and Safety at Work	10	0	5	1
2	3	TRA112	1	Oral and Written Expression in French	25	25	0	3
3	4	TRA121	2	Technical English 1	25	25	0	3
4	5	FON114	1	Linear Algebra and Vector Mathematics	60	60	10	8
5	6	FON122	2	Infinitesimal Analysis and Differential Geometry	60	45	25	8
6	7	FON123	2	General Chemistry	45	30	25	6
7	8	FON115	1	General Physics	60	35	30	8
8	9	FON111	1	Technical Drawing	20	15	15	3
9	10	FON112	1	Informatics	30	0	35	4
10	11	FON113	1	Logic	20	10	0	2
11	12	GME121	2	Rational Mechanics I	45	35	0	5
12	13	FON121	2	Applied Statics	45	35	0	5
15	16	PRO121	2	First-Year Project	0	0	50	3
		Total			**455**	**320**	**195**	**60**

- FON: Teaching Unit fundamental sciences for engineers
- TRA=Cross-disciplinary subjects Teaching Unit

Total Theory	Hours 455
Total Practical:	Hours 515

Year 1

Core subjects in civil engineering Practical skills and theoretical knowledge

BACHELOR Year 2

Course Unit	Course	Cod	Semester	Course Title	Interactive Lecture	Supervised Workshops	Practical Work	(ECTS) CREDITS
1		TRA221		Technical English 2	25	15	0	3
2		FON211		Advanced Mathematics	40	40	20	6
3		GME211		Solid state Mechanics	45	30	15	6
4		FON212		Algorithmics and Programming	30	15	20	4
5		FON213		Probability and Statistics	35	30	0	4
6		GEL211		General Electricity	35	30	10	5
7		GME221		Rational Mechanics II	35	30	0	4
8		FON221		Mesures et Instrumentation	30	0	30	4
9		FON222		Fluid mechanics	30	20	15	4
10		FON223		Applied Thermodynamics	40	25	15	5
11		GCI211		Elements of Geology and Petrology	25	10	10	3
12		GCI221		Computer aided modeling Building	15	15	30	4
13		GME222		Machine Construction Elements	45	35	0	5
		PRO201		Project - Year 2	0	0	50	3
		Total			430	295	215	**60**
					Hours	Hours	Hours	

- FON: Teaching Unit fundamental sciences for engineers
- GCI= Teaching units in the Civil Engineering field
- TRA=Cross-disciplinary subjects Teaching Unit

Total Theory	Hours 430
Total Practical:	Hours 510

Year 2

Core subjects in civil engineering Practical skills and theoretical knowledge

BACHELOR Year 3

Course Unit	Course	Cod	Semester	Course Title	Interactive Lecture	Supervised Workshops	Practical Work	ECTS CREDITS
1	1	TRA321		Introduction to Entrepreneurship	30	30	0	4
2	2	FON311		Applied Mathematics	40	20	20	5
3	3	FON322		Topography and Geodesy	30	0	30	4
4	4	GCI311		Structural Analysis I	45	35	0	5
5	5	GEL322		Technology Elements	35	30	0	4
6	6	GEL323		Machines for Energy Transformation	35	25	10	4
7	7	GCI315		Architecture and Concepts of Urban Planning	30	20	30	5
8	8	GCI322		Roads and Bridges	50	20	30	6
9	9	GCI312		Wood Construction	30	20	15	4
10	10	GCI313		Hydrology	25	15	10	3
11	11	GCI314		Technology and Physics of Concrete	40	25	15	5
12	12	GCI321		Soil and Rock Mechanics	35	15	30	5
13	13	PRO302		Final Project	0	0	100	6
		Total			**425**	**255**	**290**	**60**
					Hours	Hours	Hours	

- FON: Teaching Unit fundamental sciences for engineers
- GCI= Teaching units in the Civil Engineering field

Total Theory	Hours	425
Total Practical:	Hours	545

Year 3

Core subjects in civil engineering Practical skills and theoretical knowledge

PRE-POLYTECHNIC (1 Year)

Course Unit	Course	Cod	Semester	Course Title	Interactive Lecture	Supervised Workshops	Practical Work	ECTS CREDITS
1	1	FON012		Mathematical Analysis				6
2	2	FON014		Algebra	45		45	6
3	3	FON015		Analytical Geometry	60		30	6
4	4	FON016		Numerical Computing	30		45	5
5	5	TRA011		English	30		30	4
6	6	TRA012		French	30		15	3
7	7	FON017		Descriptive Geometry	30		15	3
8	8	FON018		Trigonometry	15		30	3
9	9	FON019		Office Computing				3
10	10			Computer-Aided Design				4
11	11			Technical drawing	30		15	3
12	12			General Chemestry	45		60	7
13	13			General Physics	45		60	7
		TOTAL						**60**
					Hours	Hours	Hours	

- FON: Teaching Unit fundamental sciences for engineers
- TRA=Cross-disciplinary subjects Teaching Unit

Pre-Polytechnic

Master Program (Post-Graduate) → Two orientations

Core subjects /Specialised courses, Shared subjects

Master Year 1 (M1)

Course Unit	Course	Cod	Course Title	ECTS CREDITS
		TRA411	Study and Management of Projects and Procurement	
	1		Study and Management of Projects	2
1	2		Procurement	1
		TRA421	Economic, Legal, and Psychological Issues	
	3		Economic Issues	3
	4		Legal Issues	2
2	5		Psychological Issues	1
3	6	GCI411	Reinforced concrete 1	4
		GEL415	Electrical Installations and Electrical Machines	
	7		Electrical Installations	3
4	8		Electrical Machines	4
5	9	GCI412	Urban Hydraulic Engineering, Underground Hydraulics,	5
6	10	GCI413	Bridges	4
7	11	GCI421	Metal Constructions	5
8	12	GCI422	Work Execution Control & Public Works Machinery	4
		GCI401	River and Maritime Hydraulics	
	13		River Hydraulics	4
9	14		Maritime Hydraulics	4
		GCI423	Applied Hydraulics and Hydraulic Engineering	
	15		Applied Hydraulics	6
10	16		Hydraulic Engineering	3
11	17	PRO401	Project M1	5
		Total		**60**

M1-Hydraulics and Hydraulic Constructions

Course Unit	Course	Cod	Course Title	ECTS CREDITS
		TRA411	Study and Management of Projects and Procurement	
	1		Study and Management of Projects	2
1	2		Procurement	1
		TRA421	Economic, Legal, and Psychological Issues	
	3		Economic Issues	3
	4		Legal Issues	2
2	5		Psychological Issues	1
3	6	GCI411	Reinforced concrete 1	4
		GEL415	Electrical Installations and Electrical Machines	
	7		Electrical Installations	3
4	8		Electrical Machines	4
5	9	GCI412	Urban Hydraulic Engineering, Underground Hydraulics,	5
6	10	GCI413	Bridges	4
7	11	GCI421	Metal Constructions	5
8	12	GCI422	Work Execution Control & Public Works Machinery	4
9	13	GCI414	Structural analysis II	4
10	14	GCI415	Tropical Architecture	3
		GCI424	Reinforced Concrete 2 and Steel Structures	
	15		Reinforced Concrete 2	4
11	16		Steel Structures	3
12	17	GCI425	Railways and Tunnels	3
13	18	PRO401	Project M1	5
		Total		**60**

Shared courses by both

Specialised courses

M1-Structures and Civil Engineering Works

- FON: Teaching Unit fundamental sciences for engineers
- TRA=Cross-disciplinary subjects Teaching Unit
- GCI= Teaching units in the Civil Engineering field

Core subjects /Specialised courses → Red (17 ECTS CREDITS)

Shared subjects to all civil engineering →Black

Master Program (Post-Graduate) → Two orientations

Core subjects /Specialised courses, Shared subjects

Master Year 2 (M2)

Course Unit	Course	Cod	Course Title	ECTS CREDITS
		TRA521	Entrepreneurship, Accounting & Ethics, and Professional Ethics	
	1		Entrepreneurship	2
	2		Accounting	2
1	3		Ethics, and Professional Ethics	1
2	4	FON521	Life cycle engineering	4
3	5	GCI511	Prestressed Concrete and Reinforced Concrete 3	5
4	6	GCI512	Hydraulic Structures	5
5	7	GCI513	Foundations and Retaining Structures	4
6	8	GCI521	Operation of Transport Means	4
7	9	GCI523	Land Improvement and Environment	4
		GCI524	Dams and Hydroelectric power Facilities	
	10		Dams	4
8	11		Hydroelectric Power Plants	2
10	13	STA511	Civil Engineering Internship	3
11	14	MEM501	Civil Engineering Thesis	20
		Total		**60**

M2-Hydraulics and Hydraulic Constructions

Course Unit	Course	Cod	Course Title	ECTS CREDITS
		TRA521	Entrepreneurship, Accounting & Ethics, and Professional Ethics	
	1		Entrepreneurship	2
	2		Accounting	2
1	3		Ethics, and Professional Ethics	1
2	4	FON521	Life cycle engineering	4
3	5	GCI511	Prestressed Concrete and Reinforced Concrete 3	5
4	6	GCI512	Hydraulic Structures	5
5	7	GCI513	Foundations and Retaining Structures	4
6	8	GCI521	Operation of Transport Means	4
		GCI514	Prefabrication and Steel-Concrete Composite Constructions	
	9		Prefabrication	1
7	10		Steel-Concrete Composite Constructions	2
8	11	GCI522	Supplementary Structural Analysis	3
9	12	GCI525	Special Bridges	4
10	13	STA511	Civil Engineering Internship	3
11	14	MEM501	Civil Engineering Thesis	20
		Total		**60**

Shared courses by both

Specialised courses

M2-Structures and Civil Engineering Works

- FON: Teaching Unit fundamental sciences for engineers
- TRA=Cross-disciplinary subjects Teaching Unit
- GCI= Teaching units in the Civil Engineering field

Core subjects /Specialised courses → Red (13 ECTS – Credits)

Shared subjects to all civil engineering →Black

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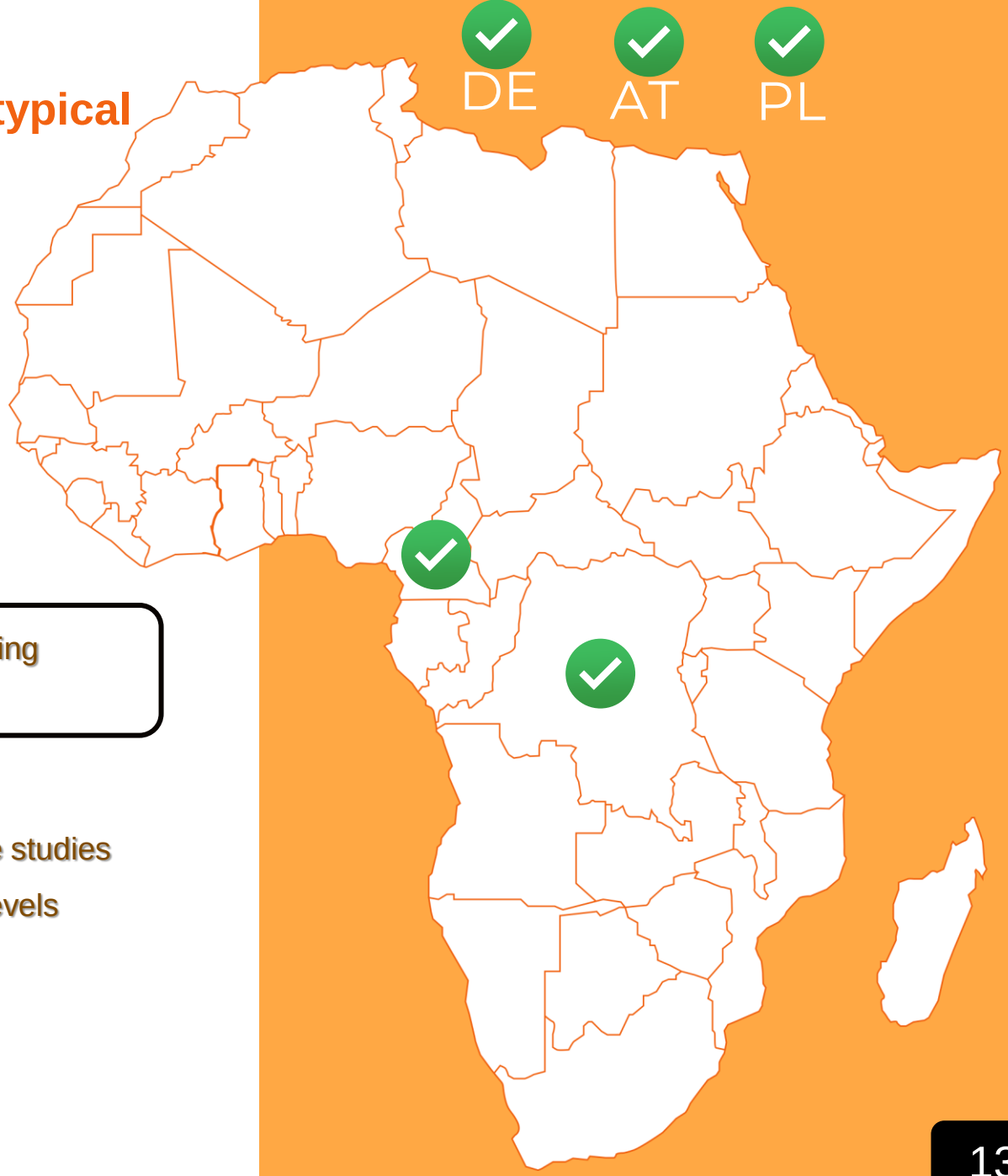
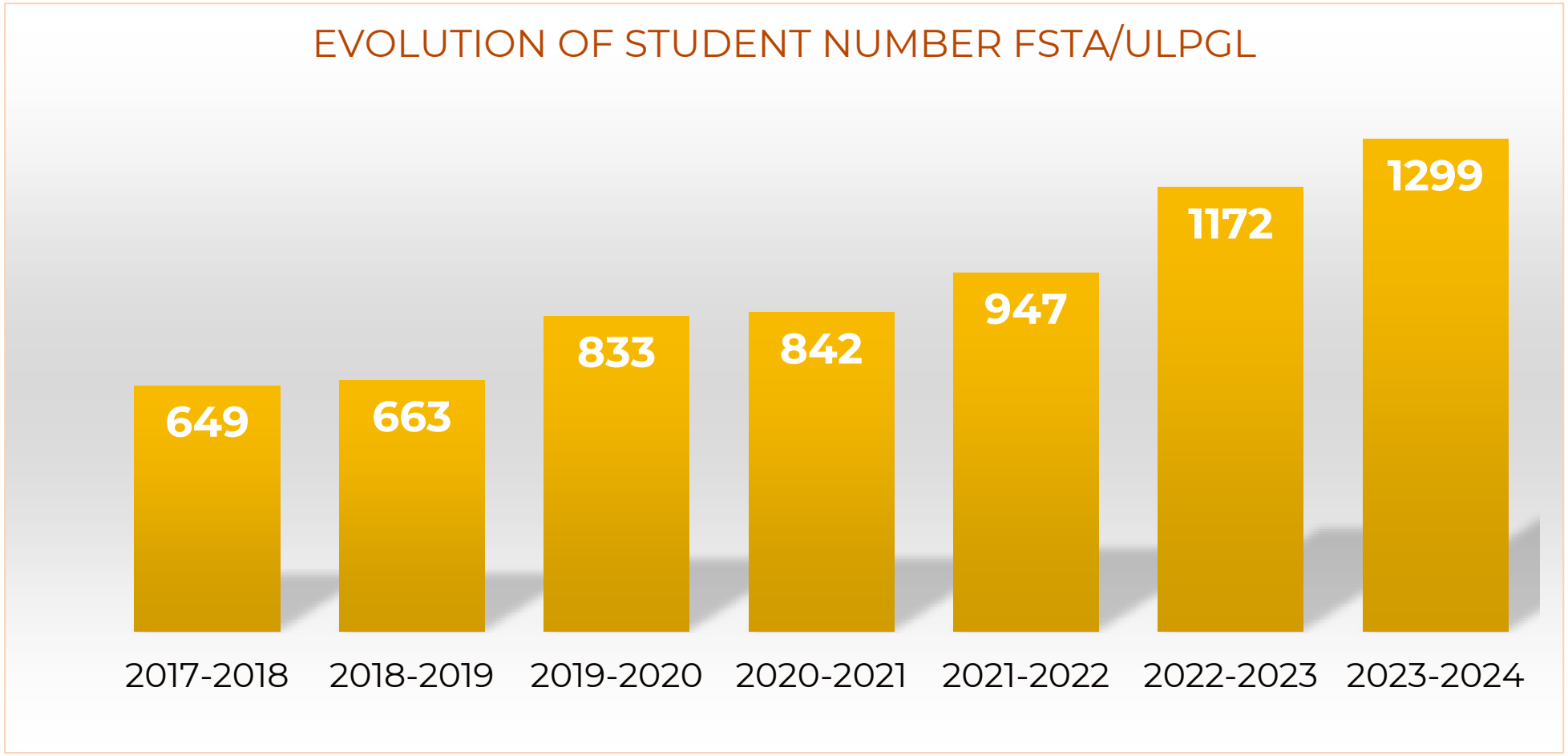


Analysis of number of students graduating from engineering programs annually

Faculty of Applied Sciences and Technologies/ULPGL Goma

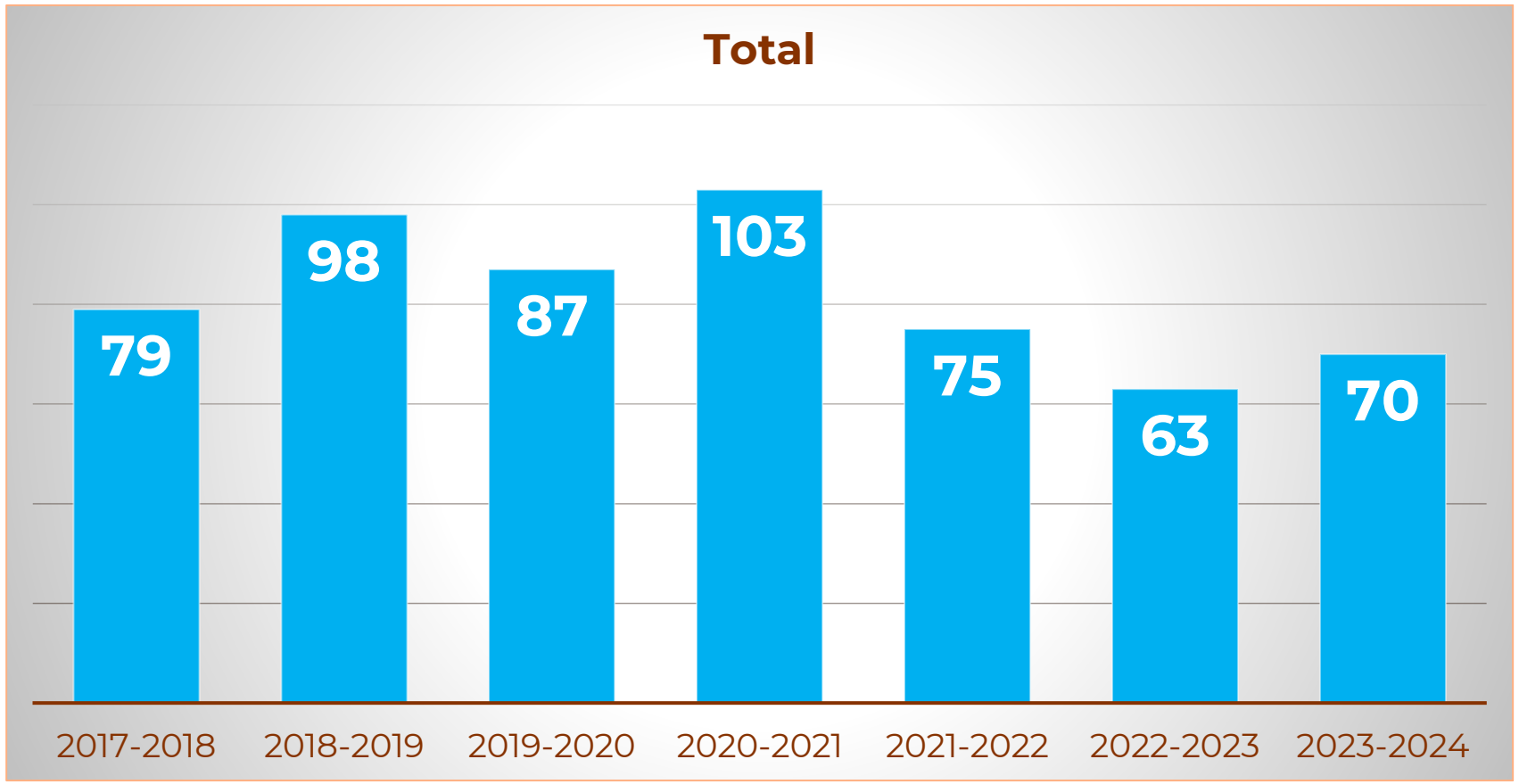


3 Departments:

- ❑ Electrical Engineering
- ❑ Computer Sciences Engineering
- ❑ Civil Engineering

Analysis of number of students graduating from engineering programs annually

Faculty of Applied Sciences /UOR

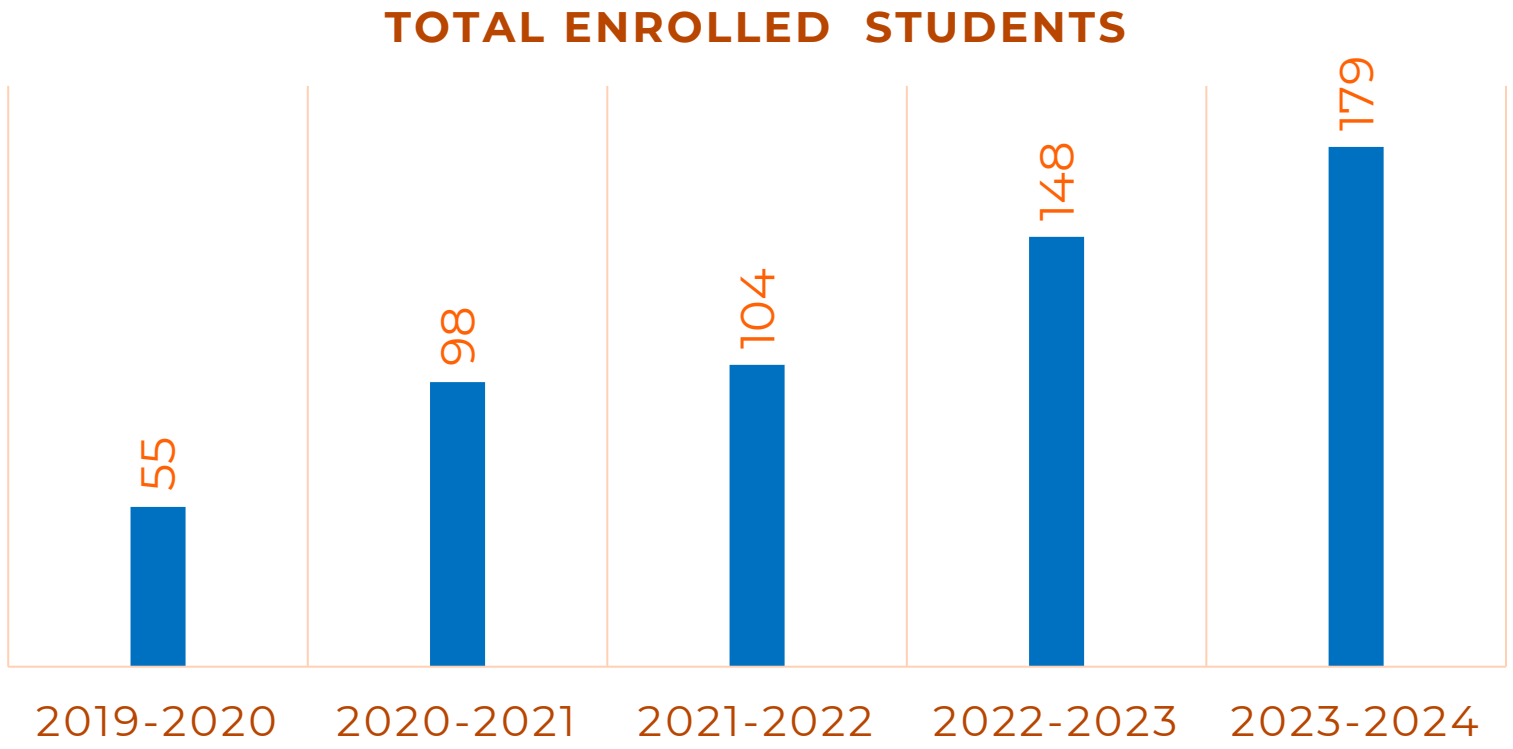


3 Departments:

- ❑ Civil Engineering
- ❑ Electrical Engineering
- ❑ Computer Science Engineering
- ❑ Pre-Polytechnic

Analysis of number of students graduating from engineering programs annually

Faculty of Applied Sciences /UAC



5 Departments:

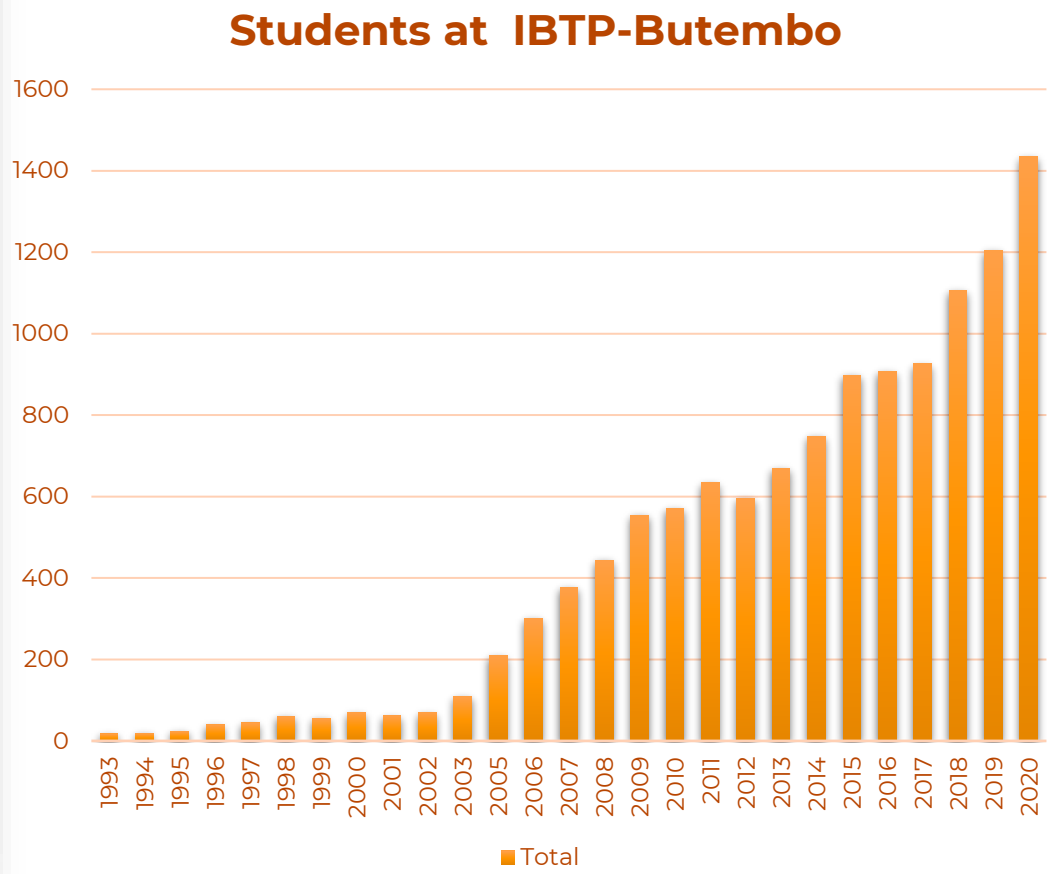
- ❑ Architecture
- ❑ **Civil Engineering**
- ❑ Electrical Engineering
- ❑ Computer Science Engineering
- ❑ Mechanical Engineering
- ❑ Pre-Polytechnic

Year	Pre-polytechnic	Architecture	Civil Engineering	Electrical Engineering	Computer Sciences	Mecanical Engineering	Total
2019-2020	55						55
2020-2021	54	4	20	8	12	0	98
2021-2022	39	4	24	15	18	4	104
2022-2023	68	7	31	9	30	3	148
2023-2024	60	16	32	16	44	11	179

Analysis of number of students graduating from engineering programs annually

Institute of Buildings and Public Works/IBTP-Butembo

Year	Preparatory	Year 1(G1)	Year 2(G2)	Year 3(G3)	Year4(Ir1)	Year5(Ir2)	Total
1993	18						**18**
1994	7	12					**19**
1995	11	6	7				**24**
1996	11	12	10	7			**40**
1997	17	8	11	8			**44**
1998	30	13	8	9			**60**
1999	17	20	13	6			**56**
2000	24	20	13	13			**70**
2001	19	17	15	11			**62**
2002	29	16	12	13			**70**
2003	52	20	22	15			**109**
2005	84	63	43	20			**210**
2006	136	67	58	40			**301**
2007	132	126	71	48			**377**
2008	140	132	124	48			**444**
2009	180	120	140	114			**554**
2010	157	164	119	131			**571**
2011	213	154	159	108			**634**
2012	178	150	139	129			**596**
2013	266	136	128	111	28		**669**
2014	248	215	114	120	30	21	**748**
2015	310	254	171	116	23	24	**898**
2016	243	288	183	145	27	22	**908**
2017	224	211	254	171	39	27	**926**
2018	333	208	219	255	41	51	**1107**
2019	440	254	197	195	77	42	**1205**
2020	470	394	223	186	93	69	**1435**



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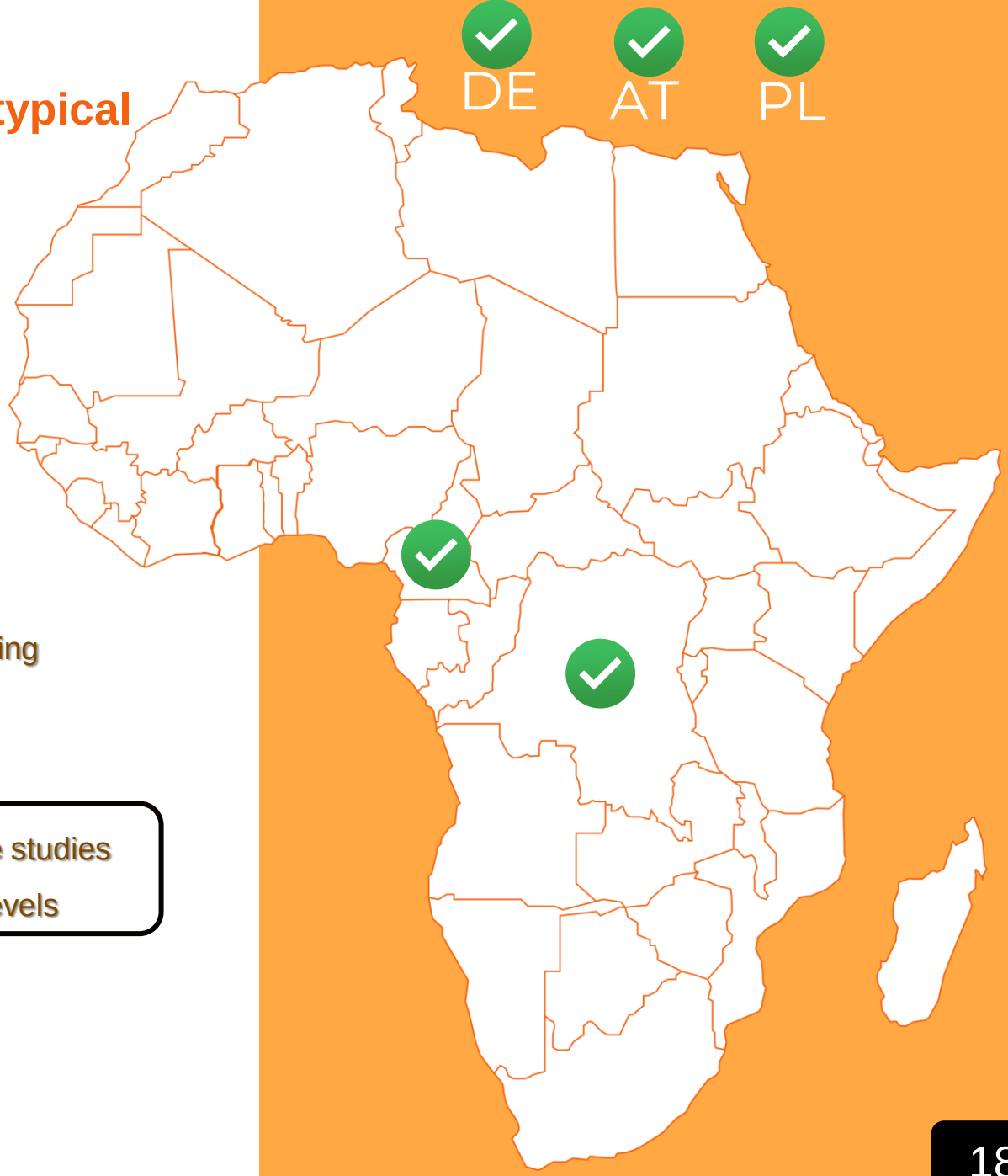
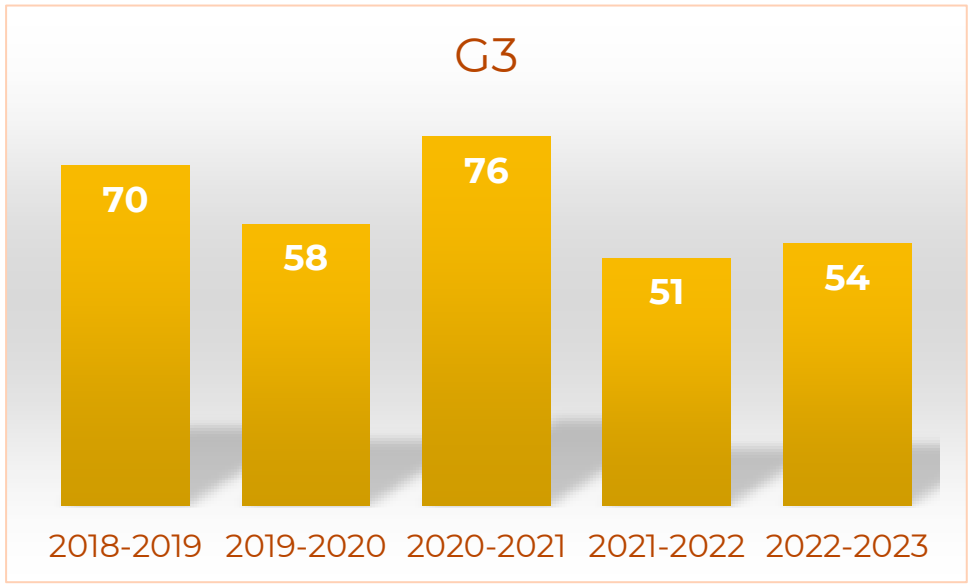


Potential interest of students in pursuing master's degree studies based on statistical data, Current enrolment for higher Levels



Pre-polytechnic + 3Years

Final Years Only

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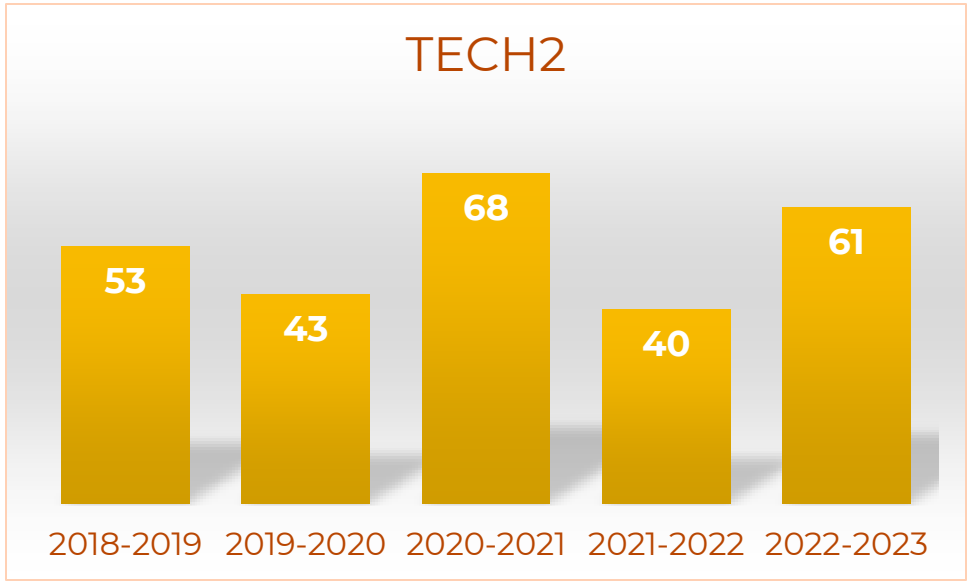

Pre-polytechnic + 5Years

1 Department:

- ❑ Electrical Engineering
- ❑ Computer Sciences Engineering
- ❑ **Civil Engineering**

Potential interest of students in pursuing master's degree studies based on statistical data, Current enrolment for higher Levels

Institute of Buildings and Public Works / IBTP-Butembo

Year	Preparatory	Year 1(G1)	Year 2(G2)	Year 3(G3)	Year4(Ir1)	Year5(Ir2)	Total
1993	18						**18**
1994	7	12					**19**
1995	11	6	7				**24**
1996	11	12	10	7			**40**
1997	17	8	11	8			**44**
1998	30	13	8	9			**60**
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Summary

- **Curriculum Structure:** Implementation of the LMD system (Bachelor-Master-PhD) with an allocation of 60 credits (ETCS) per year, integrating both theoretical and practical competencies
- **Undergraduate Program Uniformity:** Presentation of the core courses and practical work required for all Civil Engineering undergraduate students.
- **Master's Courses Details:** Overview of core and specialized courses for the Master's programs in Hydraulic and Structures
- Based on these two Master Programs in civil engineering, a new Program such as Road and Traffic Engineering can be developed
- Report of a high potential interest of students in pursuing master's degree based on enrolled numbers
- **Proposal for New Program:** new Master's program in Road and Traffic Engineering, motivated by high student enrolment interest.
- In the next presentation, more emphasis will be placed on the Program "Transportation systems and communication infrastructure »

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AfroTrans project

Thank you for your attention !

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