

Tuning Africa II

CIVIL ENGINEERING GROUP

Objectives, expected outcomes and
main activities feedback

Cairo, 14 October 2015



Outline

- Introduction
- Civil Engineering undergraduate meta-profile and competences
- Proposed programme
 - Assumptions
 - Description of new programme
 - Length and level of the programme
 - Future employment options
 - Link of competences with agreed meta-profile
 - Definition and level of competences
 - Expected learning outcomes
 - Teaching and learning methods of assessment
- Implementation
- Credits
- Way forward

Introduction

- Subject Area Group – Civil engineering
- Tuning Phase I – 10 Countries with 10 Universities
- Tuning Phase II -15 Countries with 16 universities
- First step – Introduction of work done for Phase I to new partners
- Second step – do task

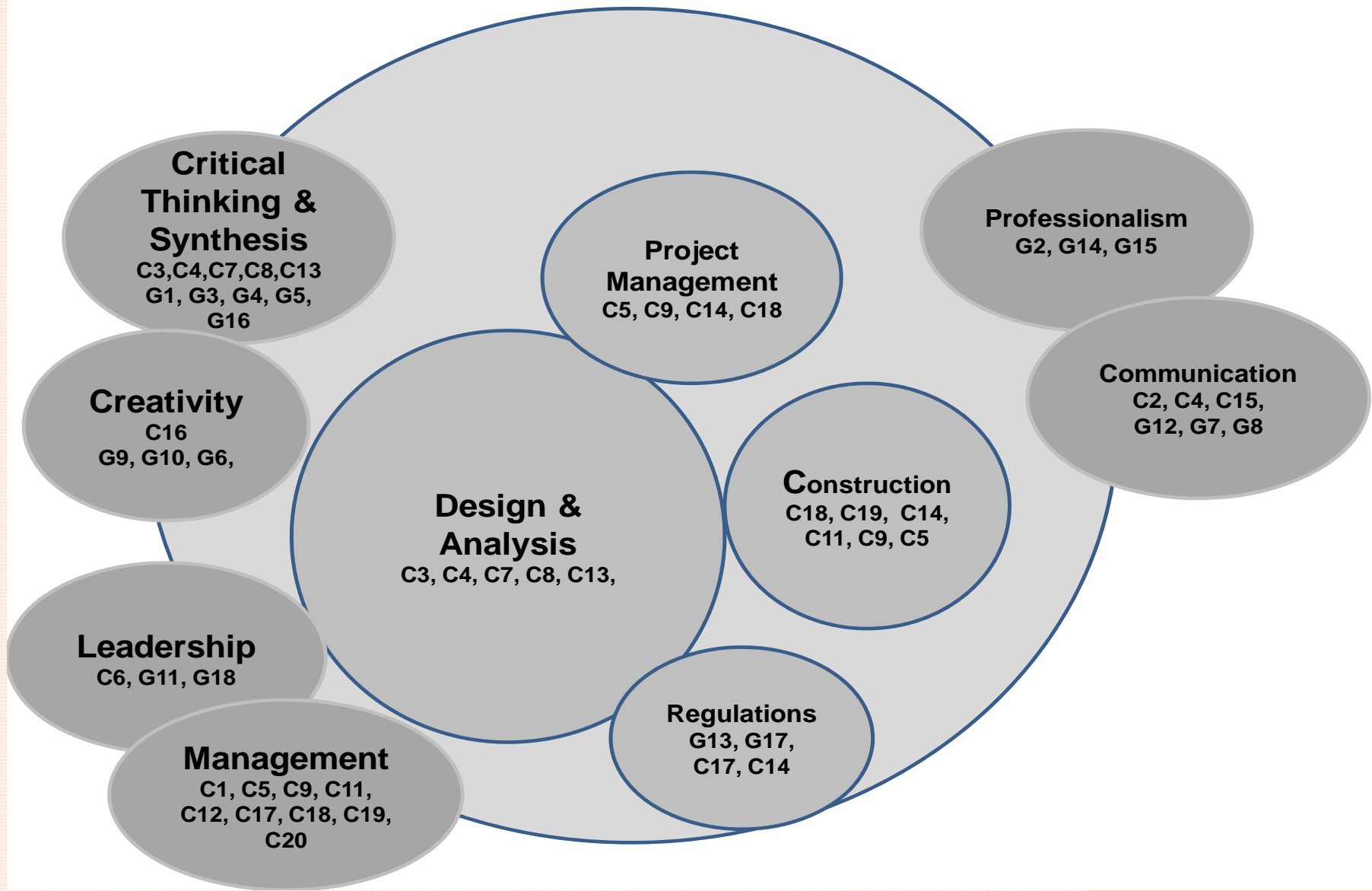
CE undergraduate generic competences

1.	Ability for conceptual thinking, analysis and synthesis.
2.	Professionalism, ethical values and commitment to Ubuntu (respect for the well-being and dignity of others; good will).
3.	Capacity for critical evaluation and self-awareness.
4.	Ability to translate knowledge into practice.
5.	Objective decision-making and practical cost-effective problem solving.
6.	Capacity to use innovative and appropriate technologies.
7.	Ability to communicate effectively in the official/national and local languages.
8.	Ability to learn how to learn and capacity for lifelong learning (continued development).
9.	Flexibility, adaptability and ability to anticipate and respond to new situations.
10.	Ability for creative and innovative thinking.
11.	Leadership, management and teamwork skills.
12.	Communication and interpersonal skills.
13.	Environmental and economic consciousness.
14.	Ability to work in an intra- and intercultural and/or international context.
15.	Ability to work independently.
16.	Ability to evaluate, review and enhance quality.
17.	Self-confidence, entrepreneurial spirit and skills.
18.	Commitment to preserve African identity and cultural heritage

CE undergraduate subject specific competences

1.	Ability to coordinate, manage, supervise and control construction
2.	Ability to translate and interpret data and/or drawings into actual construction
3.	Ability to design, quantify and calculate parameters and capacity to model and simulate systems, structures, projects and processes
4.	Ability to analyze, reconfigure and apply relevant drawings, data and technology and ability to transmit project requirements into sketches and to explain it to clients
5.	Knowledge to reconstruct, maintain, rehabilitate, and renovate infrastructure
6.	Skills in cost, quality and time optimisation and quality control techniques
7.	Skills in handling data or information (survey data, soil information...)
8.	Ability to identify the need for construction of any type and structure and ability to identify different options
9.	Knowledge of basic construction and programme principles
10.	Commitment to health and safety and capacity to introduce measures in construction and materials
11.	Capacity to test the quality of materials
12.	Quality management and skills to address defects and quality issues
13.	Ability to analyze (mathematical abstract background as basis for decision making)
14.	Knowledge about national and international construction standards
15.	Ability to interact effectively and professionally with other professions and reach integrated solutions
16.	Skills in developing new and appropriate construction technologies and materials
17.	Skills to finalize financial implications and identify legal responsibilities and frameworks
18.	Knowledge of plant and equipment
19.	Understanding of contractual and financial management as well as of insurance and guarantee aspects
20.	Skills in environmental and social impact assessment, knowledge about the context and the challenges of development

Civil Engineering undergraduate meta-profile



Proposed programme

1. Assumptions
2. Description of new programme
3. Length and level of the programme
4. Future employment options
5. Link of competences with agreed meta-profile
6. Definition and level of competences
7. Expected learning outcomes

1. Assumptions

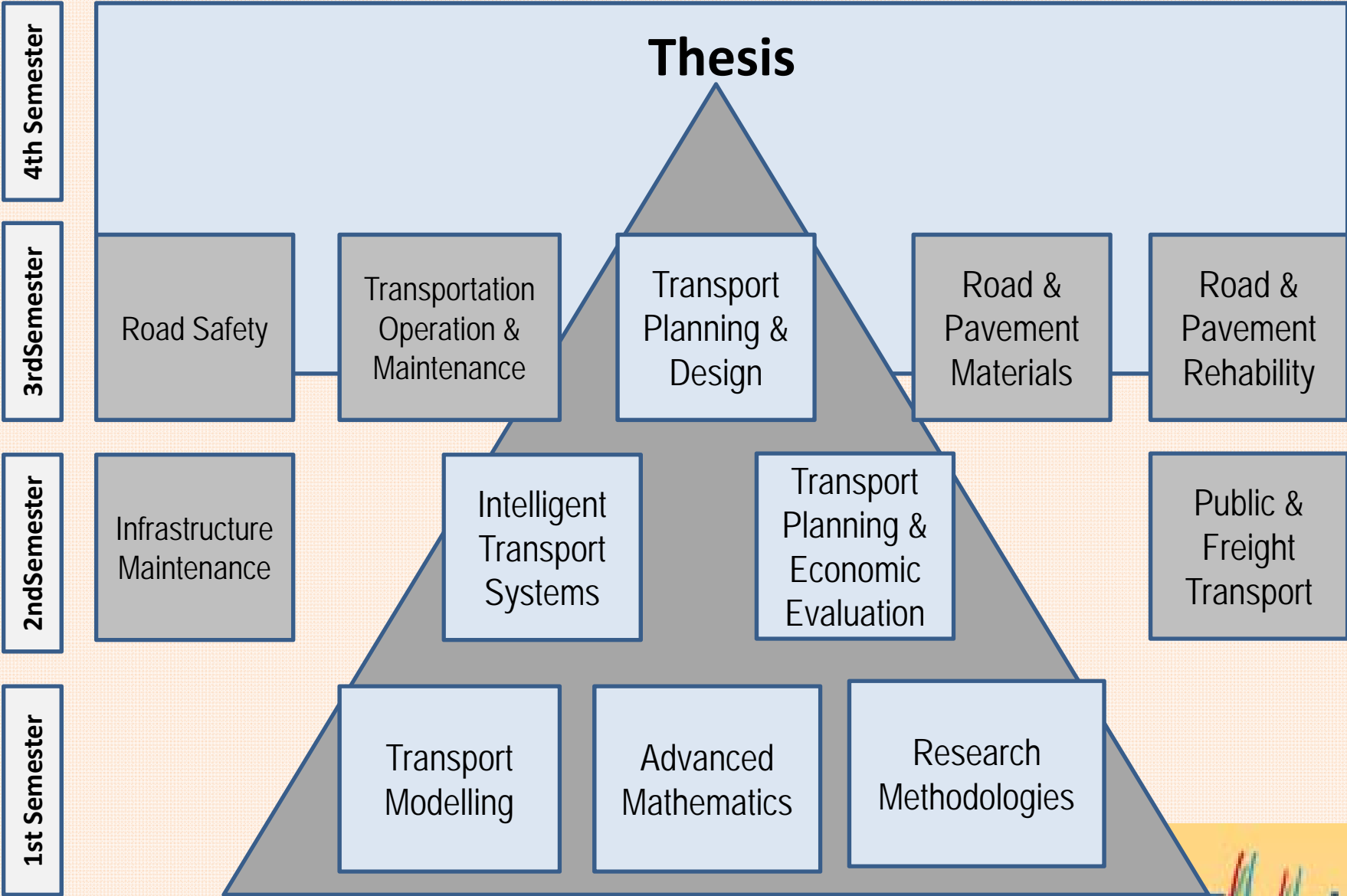
- Implementation of programme at individual universities is a lengthy process
- Buy in and approval from numerous stakeholders required
- Chosen programme on Masters level – consensus that it will be easier to implement on this level (Speciality)
- Specialist fields are not available at ALL the universities therefore the programme is NOT just between two universities

2. Description of new programme

MSc. (Transportation Engineering)

- The transportation engineering MSc. programme aims to produce engineers who can design and operate highways, airports, railroads, ports and harbors and public transits
- The programme also aims to insure a safe and efficient movement of people and goods.

3. Length and level of the programme



MSc (Transportation Engineering)



3. Length and level of the programme

1. Algeria
2. Botswana
3. Cameroon
4. DRC
5. Ethiopia
6. Kenya
7. Nigeria
8. Tanzania
9. South Sudan

Partners



3. Length and level of the programme

MSc. (Transportation Engineering) - Year 1

Common courses (To be done at home university)

- Transport Modelling
- Advanced Mathematics
- Research Method
- Transportation Planning and Economics
- Infrastructure Maintenance Management
- Public Transport
- Intelligent Transport Systems

3. Length and level of the programme

MSc. (Transportation Engineering) – Year 2

Specialized courses

Highway
(all universities)

- Transportation Planning and design
- Transportation Operation and maintenance
- Road and pavement material
- Pavement Rehabilitation
- Road safety
- Thesis

Railway (Ethiopia, Tanzania and DRC)

- Railway Transportation Planning and design
- Railway Transportation Operation and maintenance
- Railway materials
- Railway safety
- Thesis

Port and harbor
(Cameroon, DRC, Tanzania)

- Port and harbor planning and design
- Nautical safety and port environment
- Operation and maintenance of port and harbor
- Thesis

Airport
(Cameroon, Tanzania, DRC, Nigeria)

- Airport planning and design
- Airport operation and maintenance
- Airport safety
- Thesis

4. Future employment options

MSc. (Transportation Engineering)

•Potential employers:

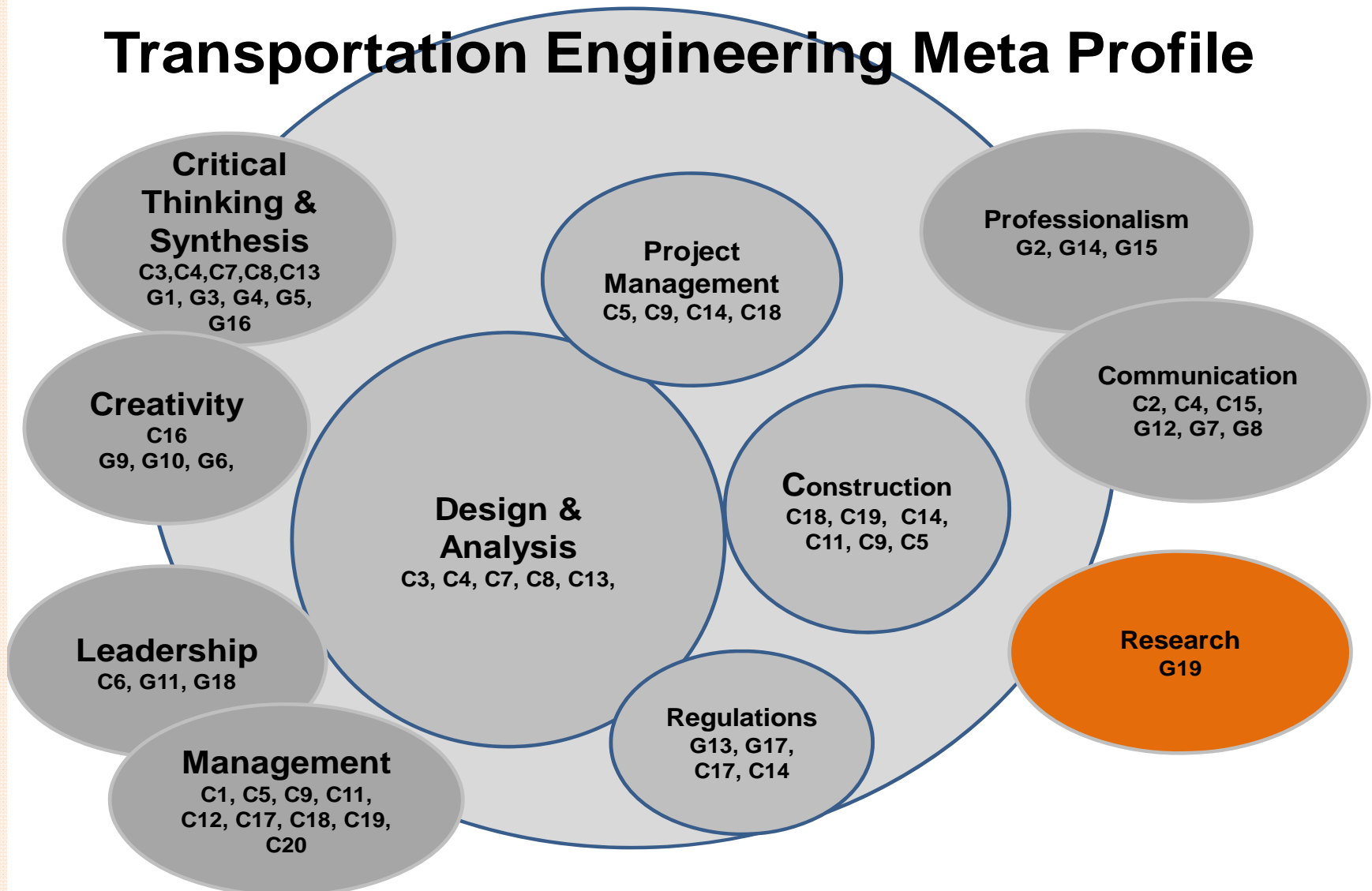
- Public sector: Ministries concerned with transport infrastructure, Municipalities, Local Authorities, Contractors, Consultants, Universities, Research institutions, Standards Organisations

Private Sector: Contractors, Consultants, Universities, Research Institutions, Testing Laboratories,

- NGOs

5. Link of competences with agreed meta-profile

Transportation Engineering Meta Profile



5. Link of competences with agreed meta-profile

SSC No.	Competence	Link to
1.	Ability to coordinate, manage, supervise and control construction	Construction & Project Management
2.	Ability to translate and interpret data and/or drawings into actual construction	Design & Analysis
3.	Ability to design, quantify and calculate parameters and capacity to model and simulate systems, structures, projects and processes	Design & Analysis Construction Project Management
4.	Ability to analyze, reconfigure and apply relevant drawings, data and technology and ability to transmit project requirements into sketches and to explain it to clients	Design & Analysis
5.	Knowledge to reconstruct, maintain, rehabilitate, and renovate infrastructure	Construction
6.	Skills in cost, quality and time <u>optimisation</u> and quality control techniques	Project Management
7.	Skills in handling data or information (survey data, soil information...)	Design & Analysis Construction Project Management
8.	Ability to identify the need for construction of any type and structure and ability to identify different options	Construction Project Management
9.	Knowledge of basic construction and <u>programme principles</u>	Construction Project Management
10.	Commitment to health and safety and capacity to introduce measures in construction and materials	Design & Analysis Regulations

5. Link of competences with agreed meta-profile

	Generic competences
1.	Ability for conceptual thinking, analysis and synthesis.
2.	Professionalism, ethical values and commitment to Ubuntu (respect for the well-being and dignity of others; good will).
3.	Capacity for critical evaluation and self-awareness.
4.	Ability to translate knowledge into practice.
5.	Objective decision-making and practical cost-effective problem solving.
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13.	Environmental and economic consciousness.
14.	Ability to work in an intra- and intercultural and/or international context.
15.	Ability to work independently.
16.	Ability to evaluate, review and enhance quality.
17.	Self-confidence, entrepreneurial spirit and skills.
18.	Commitment to preserve African identity and cultural heritage
19.	Ability to conduct research

Research
 Ability to formulate ,design and conduct a research with an outcome relevant to the field (Level 3)



6. Definition and level of competences

Process:

- Subject specific competence was divided into 3 levels
- Each course in the programme was rated using SSC levels
- Assume that competences have been developed to Level 1 and/or 2 on a undergraduate degree

Level 1

Transference of knowledge
Theory and calculations

Level 2

Ability to apply knowledge gained in Level 1 to simple elements
Subjects are divided to facilitate the explanation of engineering concepts INDIVIDUALLY

Level 3

Ability to apply knowledge gained in Level 1 and Level 2 to complex structures and problems
Subjects incorporate ALL Level 1 and 2 knowledge and competences and apply this globally

6. Definition and level of competences

Common Courses	Semester	Generic Competences (GC Level)	Subject Specific Competences (SSC Level 3)	Intended Learning Outcomes A graduate of this course should have the
Transport Modelling	1	G1, G2 (3), G3 (3), G4 (3), G5 (3), G6 (3), G9 (3), G10 (3), G11 (3), G12 (3), G15 (3), G16 (3), G19 (2)	SSC2, SSC3, SSC4, SSC7, SSC8, SSC13, SSC17	2. Ability to translate and interpret data e.g. for modelling and planning 3. Capacity to model and simulate transportation systems 4. Ability to analyze, reconfigure and apply relevant data and technology for transportation modelling 7. Skills in handling data or information (survey data, soil information...) 8. Ability to identify the need for construction of any type and structure and ability to identify different options 13. Ability to analyze (mathematical abstract-background as basis for decision-making) 17. Skills to finalize financial implications and identify legal responsibilities and frameworks
Advanced Mathematics	1	GC1, GC3, GC4, GC5, GC15	SSC3, SSC 6, SS13	3. Ability to quantify and calculate parameters and capacity to model and simulate transportation systems, structures, projects and processes 6. Skills in cost, quality and time optimization and quality control techniques 13. Ability to analyze (mathematical abstract background as basis for decision making)

6. Definition and level of competences

Common Courses	Semester	Generic Competences (GC Level)	Subject Specific Competences (SSC Level 3)
Transport Modelling	1	G1, G2 (3), G3 (3), G4 (3), G5 (3), G6 (3), G9 (3), G10 (3), G11 (3), G12 (3), G15 (3), G16 (3), G19 (2)	SSC2, SSC3, SSC4, SSC7, SSC8, SSC13, SSC17
Advanced Mathematics	1	GC1, GC3, GC4, GC5, GC15	SSC3, SSC 6, SS13
Research Methodologies	2	GC1, GC2, GC3, GC4, GC5, GC6, GC7, G-19	SSC2, SSC3, SSC7, SSC13
Transportation Planning and Economics	2	GC5, GC9, GC10, GC11, GC13, GC15, GC16, GC17	SSC1, SSC 6, SSC7, SSC8, SSC17, SSC19
Infrastructure Maintenance	2	GC3, GC4, GC5, GC6, GC9, GC10, GC11, GC16	SSC 1, SSC 5, SSC6, SSC 10, SSC11, SSC12, SSC14, SSC15, SSC16, SSC 18, SSC19, SSC 20
Public and Freight Transport	1	GC1, GC3, GC4, GC5, GC6, GC9, GC10, GC13, GC14, GC15	SSC5, SSC14, SSC 15, SSC 17
Intelligent Transport Systems	2	GC1, GC3, GC4, GC5, GC6, GC9, GC10, GC13, GC15, GC16	SSC6, SSC7, SSC13, SSC15, SSC16, SSC20
Highways			
Transportation Planning and Design	3	GC1, GC2, GC3, GC4, GC5, GC6, GC7, GC9, GC10, GC11, GC12, GC13, GC15, GC16, GC17	SSC2, SSC3, SSC4, SSC6, SSC7, SSC10, SSC13, SSC14, SSC15, SSC19, SSC20
Transportation Operation and Maintenance	3	GC1, GC2, GC3, GC4, GC5, GC6, GC7, GC9, GC10, GC11, GC12, GC13, GC15, GC16, GC17	SSC1, SSC2, SSC4, SSC5, SSC6, SSC8, SSC9, SSC10, SSC11, SSC12, SSC14, SSC15, SSC16, SSC18, SSC19, SSC20
Road and Pavement Materials	3	GC1, GC3, GC4, GC5, GC6, GC9, GC10, GC13, GC15, GC15	SSC7, SSC11, SSC12, SSC14, SSC16
Pavement Rehabilitation	3	GC1, GC2, GC3, GC4, GC5, GC6, GC7, GC9, GC10, GC11, GC12, GC13, GC15, GC16, GC17	SSC5, SSC6, SSC10, SSC11, SSC12
Road Safety	3	GC1, GC2, GC3, GC4, GC5, GC6, GC7, GC9, GC9, GC10, GC11, GC12, GC13, GC15, GC16, GC17	SSC3, SSC10, SSC14, SSC19, SSC20
Thesis	3 and 4	G1, G2 (3), G3 (3), G4 (3), G5 (3), G6 (3), G9 (3), G10 (3), G11 (3), G12 (3), G15 (3), G16 (3), G19 (2)	

7. Expected learning outcomes

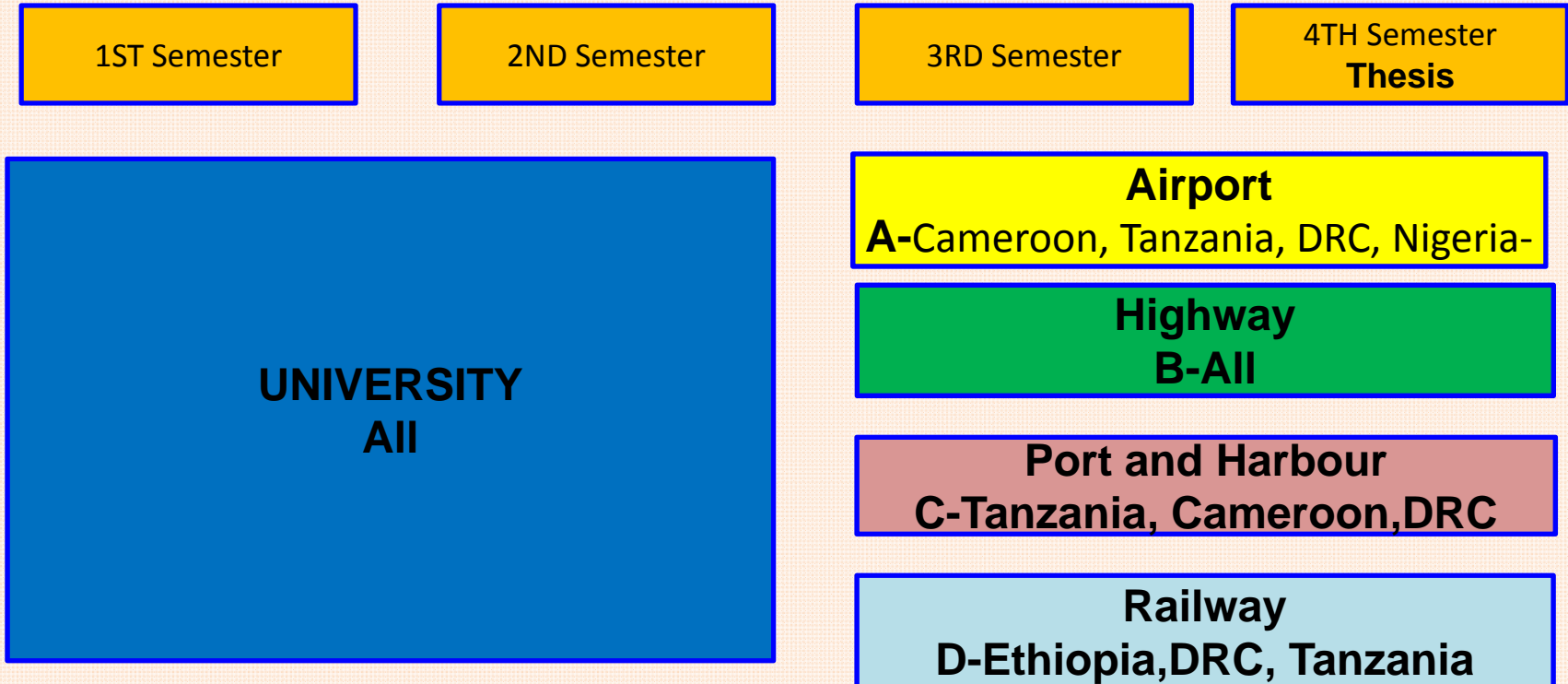
Common Courses	Sem	Intended Learning Outcomes A graduate of this course should have the
Transport Modeling	1	<ul style="list-style-type: none"> 2. Ability to translate and interpret data e.g. for modeling and planning 3. Capacity to model and simulate transportation systems 4. Ability to analyze, reconfigure and apply relevant, data and technology for transportation modeling 7. Skills in handling data or information (survey data, soil information...) 8. Ability to identify the need for construction of any type and structure and ability to identify different options 13. Ability to analyze (mathematical abstract-background as basis for decision-making) 17. Skills to finalize financial implications and identify legal responsibilities and frameworks
Advanced Mathematics	1	<ul style="list-style-type: none"> 3. Ability to quantify and calculate parameters and capacity to model and simulate transportation systems, structures, projects and processes 6. Skills in cost, quality and time optimization and quality control techniques 13. Ability to analyze (mathematical abstract background as basis for decision making)
Research Methodologies	2	<ul style="list-style-type: none"> 2. Ability to collect and interpret data 3. Ability to quantify and calculate parameters and capacity to model and simulate transportation systems 7. Skills in handling data or information 13. Ability to analyze (mathematical abstract background as basis for decision-making)
Transportation Planning and Economics	2	<ul style="list-style-type: none"> 1. Ability to coordinate, manage, supervise and control construction 6. Skills in cost, quality and time optimization and quality control techniques 7. Skills in handling data or information 8. Ability to identify the need for construction of any type and structure and ability to identify different options 17. Skills to finalize financial implications and identify legal responsibilities and frameworks 19. Understanding of contractual and financial management as well as of insurance and guarantee aspects
Infrastructure Maintenance	2	<ul style="list-style-type: none"> 1. Ability to coordinate, manage, supervise and control maintenance of transport infrastructure 5. Knowledge to reconstruct, maintain, rehabilitate, and renovate transport infrastructure 6. Skills in cost, quality and time optimization and quality control techniques 10. Commitment to health and safety and capacity to introduce measures in construction and materials 11. Capacity to test the quality of materials 12. Quality management and skills to address defects and quality issues 14. Knowledge about national and international construction standards 15. Ability to interact effectively and professionally with other professions and reach integrated solutions 16. Skills in developing new and appropriate construction technologies and materials 18. Knowledge of plant and equipment

8. Teaching and learning methods

- Presentation and seminars
- Lab work
- Lectures /self study/Tutorials
- Peer- group discussion
- Virtual e-courses
- Company site visits
- Continuous assessment method
- Projects attached to real work.....
- **Assessment**
- *Assignment, group work, thesis*

Implementation

MODEL



Implementation

Resources required

Financial resources

- Development of teaching materials
- Trainings, travel cost (coordination meetings), teaching equipment (incl. audio and video conference equipment) and teaching materials (incl. software and laboratory materials)
- Mobility costs for teaching staff (travel, accommodation and board) / Salaries for visiting scholars
- Mobility costs for students
- Scholarships (incl. expenses for research)
- Travel costs for examinations
- Excursion costs
- Administrative expenses (Overhead costs)
- Advertisement and Marketing costs

Implementation

Resources required

Academic resources

- Host for E-Learning courses (e.g. African Virtual University)
- Staff Development Programme
- Accreditation costs

Proposed Credits

Credits and distribution

(30 each semester) (60 Common)

(30 specialisation - 30 thesis)

Way forward

- Each member will go back to his university and propose this programme and get feedback to be incorporated in report
- Feedback to include:
 - Level of execution readiness for programme
 - Additions to proposed programme
 - Additions to members to proposed programme
- Stanley Shitote - Coordinator
- Oagile Kanyeto – Co-coordinator