Joint ITU-GISFI-DS-CTIF Standards Education Workshop

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Standards-Aware Curricular Ideas

Mqhele Dlodlo, PhD

Associate Professor

University of Cape Town

mqhele.dlodlo_at_uct.ac.za

Argument

- Paradigm shifts reveal shortcomings in engineering curricula
- Revising the quantity of the technical content is continual
- Standards awareness is one such shortcoming
- UCT EBE is poised to tackle the curricular challenge

Nuanced, Dual-Model Paradigm

- Driven by economics of global markets
  More at: http://open-stand.org/
  - Improved interoperability
  - Greater simplicity
  - More competitive pricing
- UCT Internationalisation Paradigm:
  - globally competitive, locally relevant

The IEA "Graduateness" Concept

- Individually assessable outcomes
- Indicators of potential to acquire competence to practise at the appropriate level
- Exemplars of attributes from an accredited programme
- Expected capability
- Range indication

*Source: www.washingtonaccord.org/**IEA**-Grad-Attr-Prof-Competencies-v2.pdf*

Range Considerations

- Complex engineering activities:
  - Use of diverse resources
  - Resolution of significant problems - interacting, wide-ranging, conflicting
  - Creative use of engineering principles and research-based knowledge
  - Significant consequences (difficult to predict/mitigate) – range of contexts
  - Application of principles - new situations

Link to Standards-Awareness

- Improved interoperability
- Greater simplicity
- More competitive pricing
- globally competitive, locally relevant

Standards Teaching in Context

- What shall we call the new discipline?
  - Science of standards?
  - Isology? – Ken Krechmer, U of Colorado
- Knowledge, formally taught
- Scholarly journals, learned societies, academic departments/faculties
- Professional and personal attributes

Goals: Modelling Method

- To enable students to describe, explain, predict and control physical phenomena using scientific models
- To impart elementary conceptual tools for modelling physical objects and processes
- To illustrate selected elementary models as applications of "isology"
- To develop the insight as to how models fit into theories

Goals: Modelling Method

- To train students in validating scientific knowledge by correlating models to empirical data
- To develop comprehensively the skills of students in the modelling procedure for generating scientific knowledge
- To enable the students to solve constrained optimisation problems

HEQF: Bachelor's Degree

HEQF BSc/BEng

- NQF Exit Level: 8
- Min Credits Total: 480
- Min Level 8 Credits: 96
- Min Level 7 Credits: 120
- Max Level 5 Credits: 96

EBE – BSc (Eng.)

- NQF Exit Level: 8
- EBE Total: 576
- Level 8 Credits: 144
- Level 7 Credits: 144
- Level 6 Credits: 144
- Level 5 Credits: 144

ECSA Whole Qualification Standard

Knowledge Area	Minimum Credits	% Allocation
Mathematical Sciences	56	10
Basic Sciences	56	10
Engineering Sciences	168	30
Design & Synthesis	67	12
Computing and IT	17	3
Complementary Studies	56	10
Subtotal	420	75
Discretionary Studies	≥140	25
Total Credits	**≥560**	**100**

Table EE-1: Knowledge area summary for Electrical Engineering programme

576 credits	Mathematics	Basic Sciences	Engineering Sciences	Design and Synthesis	Computing and IT	Complementary Studies	Discretionary
EE One	32.0	46.4	43.2	4.8	9.6	8.0	0.0
EE Two	32.0	32.2	57.0	11.8	11.0	0.0	0.0
EE Three	0.0	4.4	71.2	33.2	3.6	19.6	12.0
EE Four	0.0	0.0	61.2	18.0	0.0	28.8	36.0
EE Degree	64.0	79.0	232.6	69.8	26.2	56.4	48.0
Required 460 credits	56.0	56.0	168.0	67.2	16.8	56.0	140.0
Var (+/-) 116 credits	8.0	23.0	64.6	2.6	9.4	0.4	

Knowledge Area Plot for EE Prog.

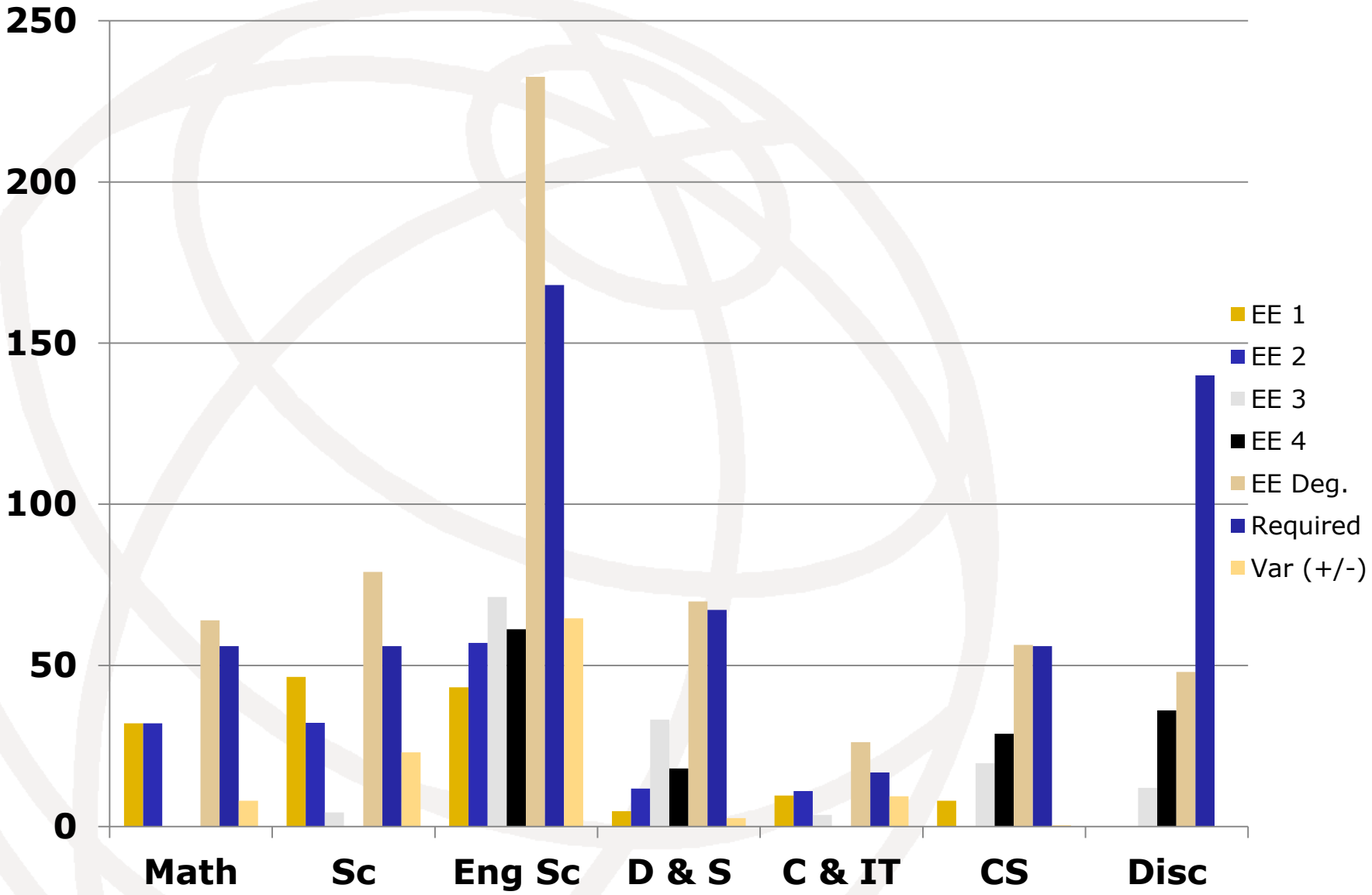


Table ME-2: Knowledge area summary for Mechatronics programme

576 credits	Mathematics	Basic Sciences	Engineering Sciences	Design and Synthesis	Computing and IT	Complementary Studies	Discretionary
ME One	32.0	46.4	43.2	4.8	9.6	8.0	0.0
ME Two	32.0	21.8	67.4	11.8	11.0	0.0	0.0
ME Three	0.0	2.4	83.2	31.2	5.6	19.6	2.0
ME Four	0.0	3.0	51.2	25.0	0.0	28.8	36.0
ME Degree	64.0	69.6	247.0	74.8	26.2	56.4	38.0
Required 460 credits	56.0	56.0	168.0	67.2	16.8	56.0	140.0
Var (+/-) 118 credits	8.0	13.6	79.0	7.6	9.4	0.4	

Knowledge Area Plot for ME Prog.

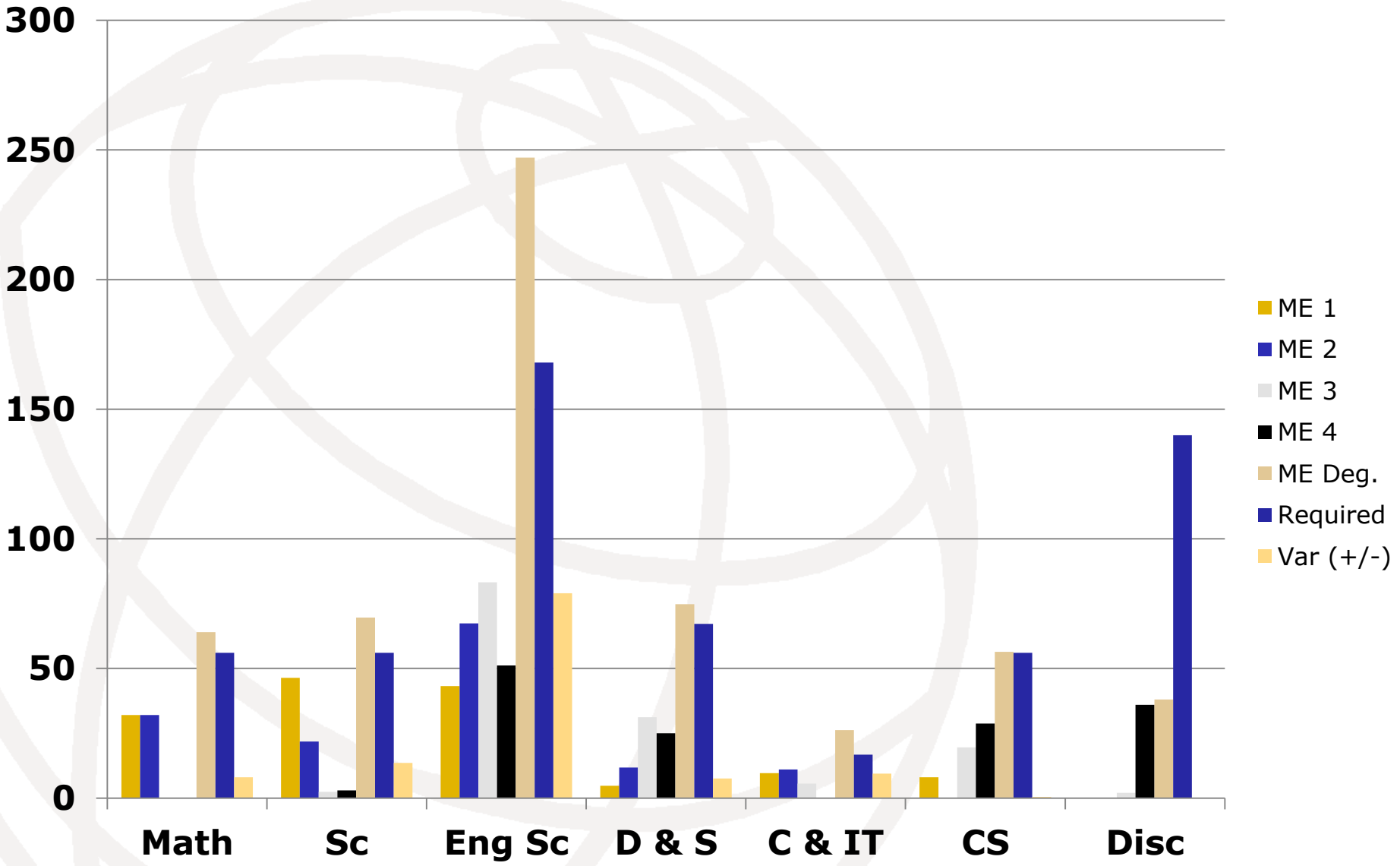
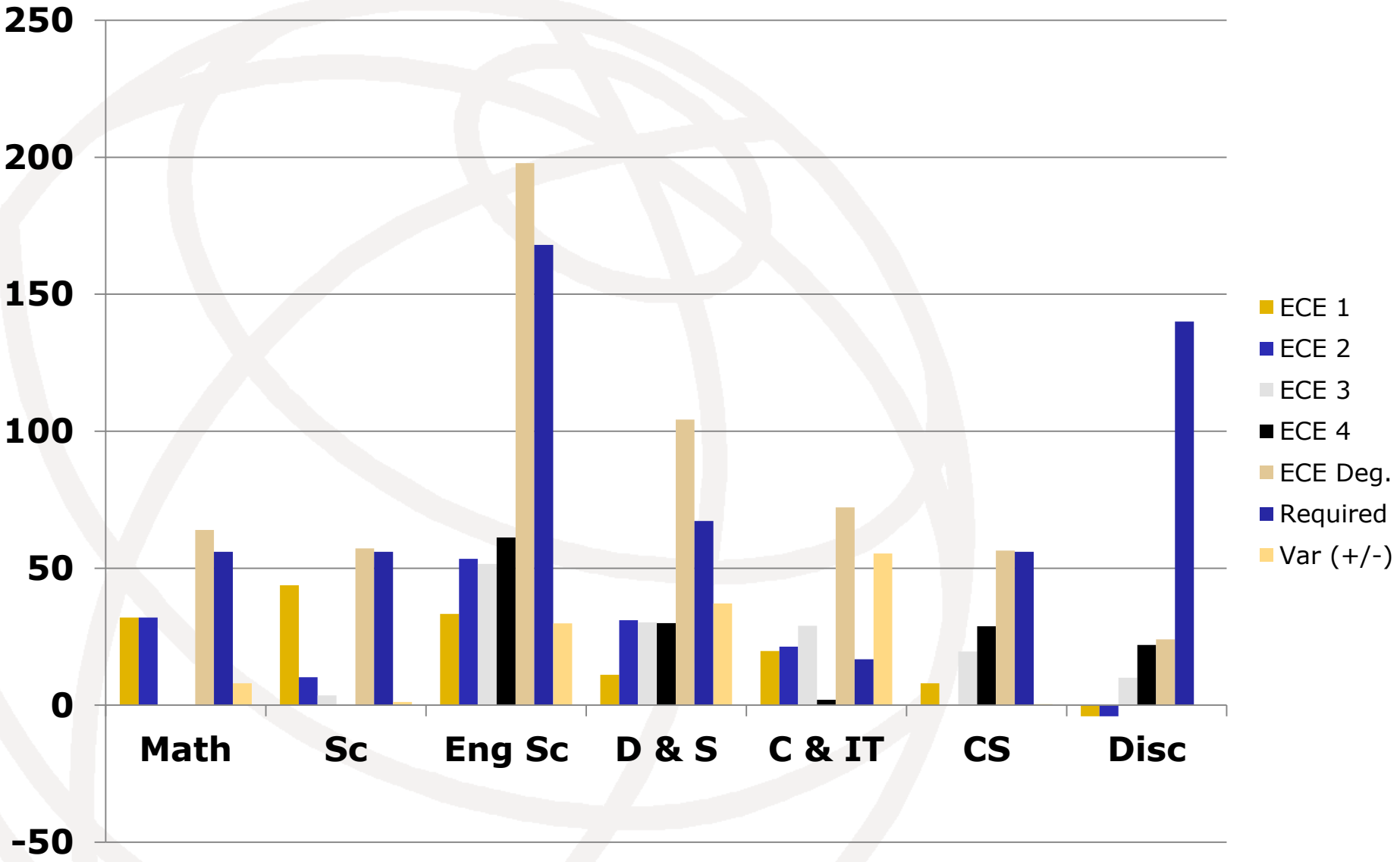


Table EC-1: Knowledge area summary for Electrical & Computer Engineering

576 credits	Mathematics	Basic Sciences	Engineering Sciences	Design and Synthesis	Computing and IT	Complementary Studies	Discretionary
ECE One	32.0	43.8	33.3	11.1	19.8	8.0	-4.0
ECE Two	32.0	10.2	53.4	31.0	21.4	0.0	-4.0
ECE Three	0.0	3.6	51.6	30.2	29.0	19.6	10.0
ECE Four	0.0	0.0	61.2	30.0	2.0	28.8	22.0
ECE Degree	64.0	57.2	197.9	104.3	72.2	56.4	24.0
Required 460 credits	56.0	56.0	168.0	67.2	16.8	56.0	140.0
Var (+/-) 132 credits	8.0	1.2	29.9	37.1	55.4	0.4	

ECE Prog. Knowledge Area Plot



Conclusions and Recommendations

Standard Framework

- Standardisation
- CHE – NQF – HEQF
- ECSA Exit Level Outcomes Requirements
- IEA Guidelines

Rationale

- Winning some buy-in
- State Accreditation
- Professional Accreditation
- Competence within globally dispersed groups