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The Geothermal Postgraduate Course at the University of Auckland: A Ten Years Retrospective

Sadiq J. Zarrouk

Department of Engineering Science

THE UNIVERSITY OF AUCKLAND
Te Whare Wānanga o Tāmaki Makaurau
NEW ZEALAND

ENGINEERING

GEOTHERMAL INSTITUTE

Problem Addressed

- Geothermal energy training is very specialised with only a few established courses running around the world.
- History has witnessed the demise of several geothermal training programmes around the world (New Zealand, Japan, USA and Italy) as their funding has been withdrawn.
- Diverse technical skills needed to teach this course, which are not all available within the University.
- The course is expensive to run due to the high cost of the two-week long field studies. At the same time student numbers have to be limited (25-30) for H&S reasons and for this level of applied teaching.
- The students are mostly (> 85%) international with different academic backgrounds, ages and ethnicities.

Actions Taken

- In 2007 the one-semester (60 points) PGCert course was started
- The course was reduced to a one-semester (19 week) course, which made it easier and cheaper for employers to send their staff to New Zealand.
- The course was divided into separate blocks of about six weeks. This meant that students can do the PGCert over two years in six week long blocks plus a one month short project. This was very attractive to some company-sponsored students.
- The PGCert combines both field-based and class-based teaching. The field trips (20 % of the course time) are integrated with the academic teaching to build student confidence in understanding the framework of geothermal fields: assessment, development, and utilization.
- The main teaching philosophy, which I feel to be unique to the course, is the crosslink and overlap between the two main disciplines in the geothermal industry: engineering and earth science.

Geothermal Energy Training : Worldwide

Institution	Country	Year Started	Year Stopped	Duration (months)	Funding support
Pisa	Italy	1970 1985	1985 1992	8 9	United Nations Development Program (UNDP). UNISCO
Kyushu	Japan	1970 2016	2001 Continuing	2 – 4 6	UNDP The government of Japan (JICA)
Auckland	New Zealand	1978 2007	2002 Continuing	9 4.5	UNDP and MFAT Scholarships (varying number over the years) Employer-funded students Self-supported students
Reykjavik	Iceland	1979	Continuing	6	UNDP and the Icelandic geothermal industry (UNU-GDP) Employer-funded students
Reno (NV)	USA	2011 2013 2014	2012 2013 Continuing	2 1 1-2 (weeks)	Department of Energy, US Government Employer-funded students Self-supported students

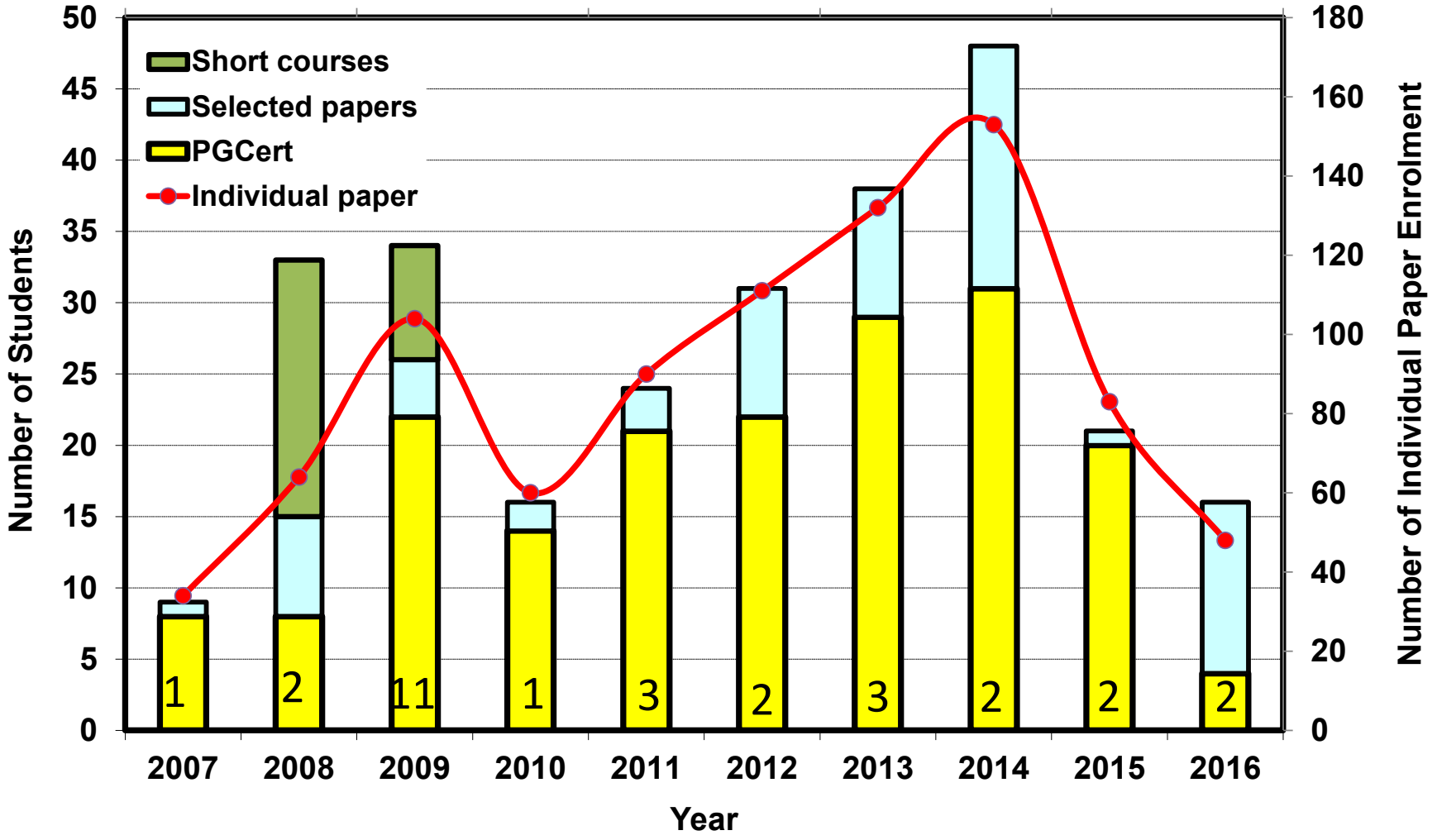
Geothermal Energy Training : Worldwide

Institution	Country	Year Started	Year Stopped	Duration	Funding support
Bicol	Philippine	2001-2002	2007-2008	BSc	Chevron and EDC
ITB	Indonesia	1985	Continuing	2 years MSc	Self-supported students Employer-funded students
Tianjin	China	2008	Continuing	2 years MSc	Natural Science Foundation of Tianjin. National High-tech R&D Program. of China National Natural Science Foundation of China.
Reykjavik	Iceland (Juliet's course)	2010	Continuing	18 months MSc	Self-supported students (50% from US) Employer-funded students
Stanford	USA	1975	Continuing	2 years MSc	Self-supported students Employer-funded students. DoE Scholarships

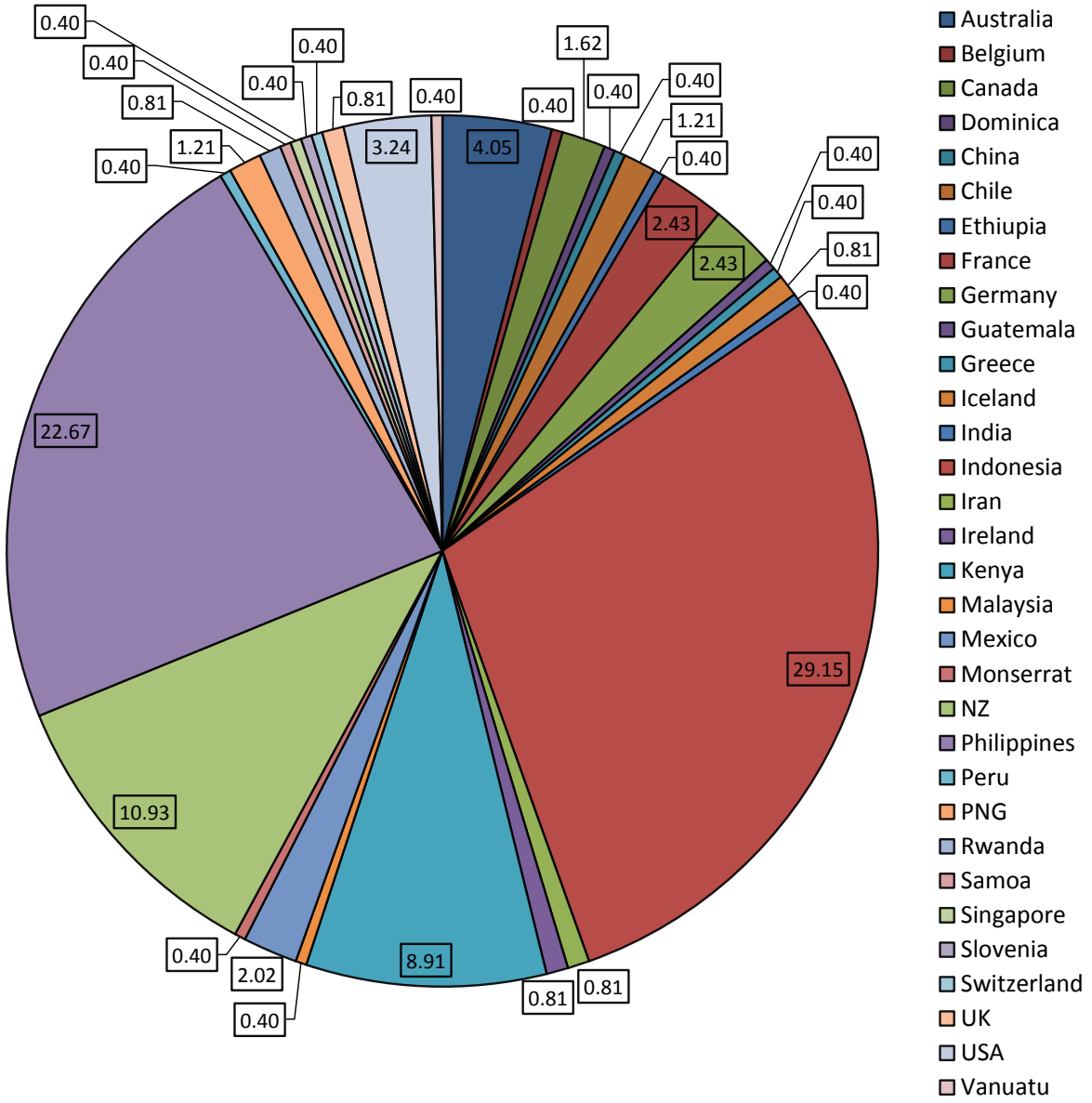
Geothermal Energy Training : Worldwide

Institution	Country	Year Started	Year Stopped	Duration	Funding support
El Salvador	El Salvador	2010	Continuing	5 month Diploma	Nordic Development Fund (NDF) and the Inter-American development bank (IDB). The United Nations University-Geothermal Training Programme (UNU-GTP) from 2016
Dedan Kimathi	Kenya	2015	Continuing	2 years MSc)	The Local Geothermal Industry . The United Nations University-Geothermal Training Programme (UNU-GTP)?

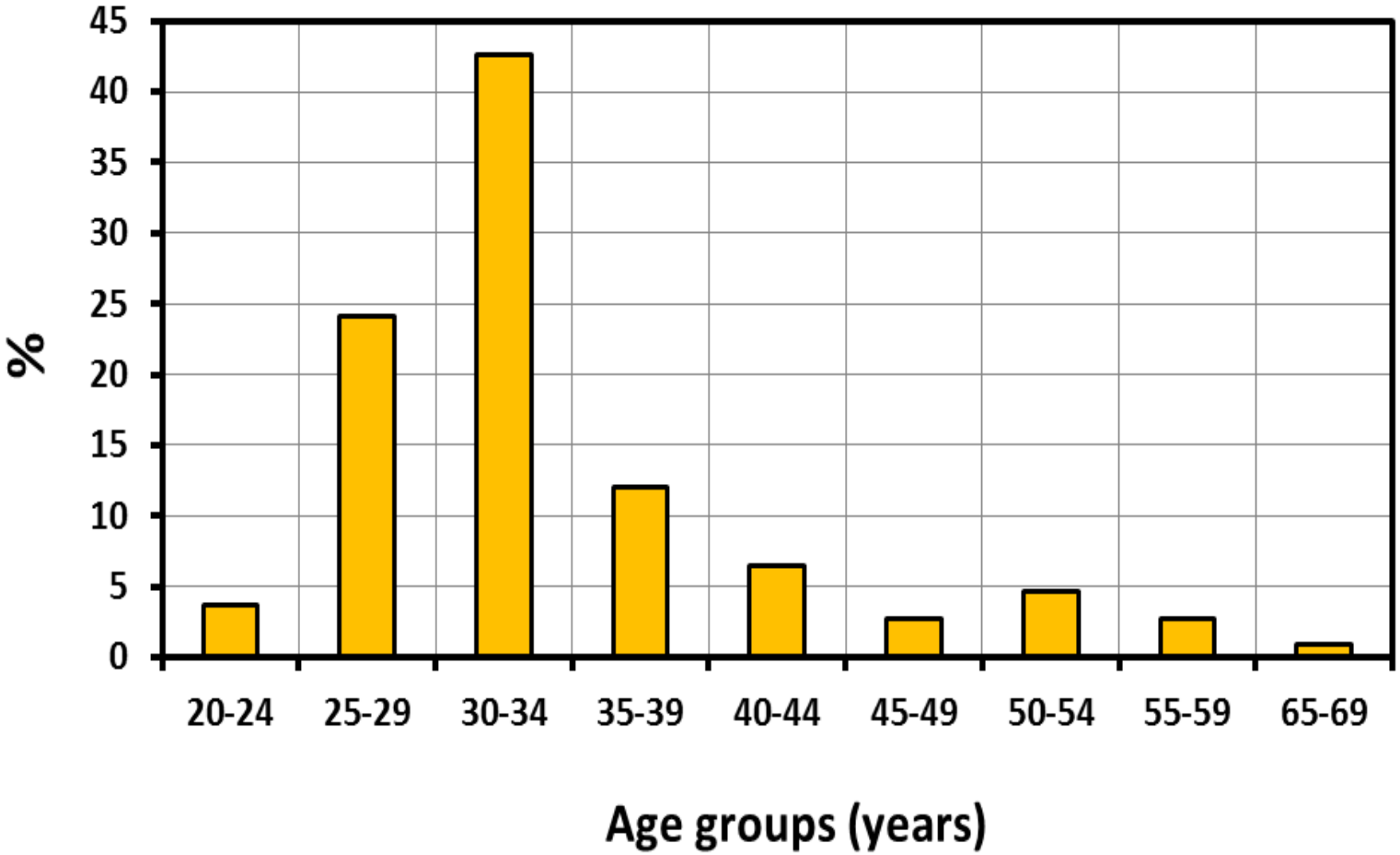
Enrolment


Short courses
Selected papers
PGCert
Individual paper
Number of Students
Number of Individual Paper Enrolment
Year
0
5
10
15
20
25
30
35
40
45
50
0
20
40
60
80
100
120
140
160
180
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
1
2
11
1
3
2
3
2
2
2

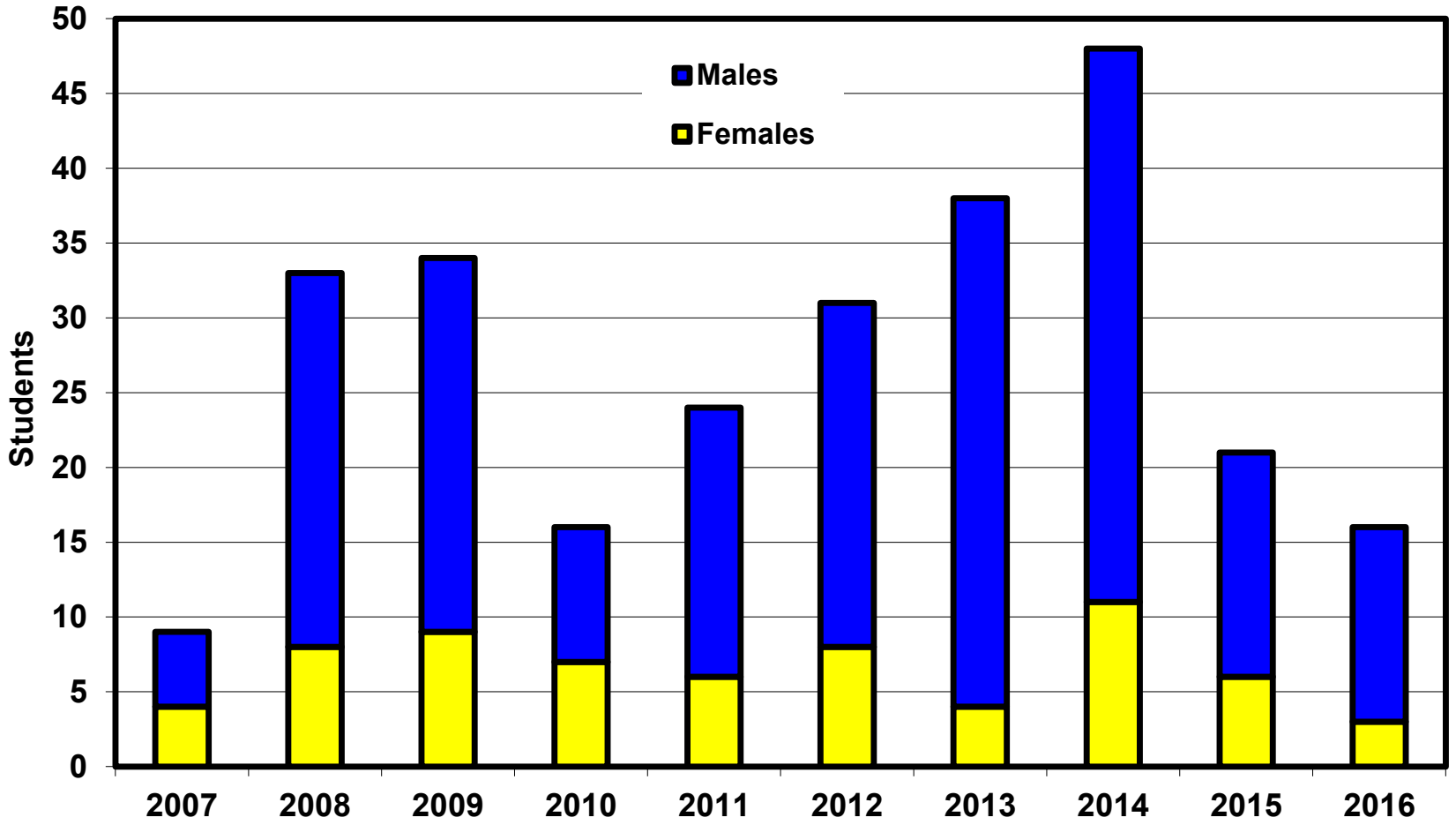
~85 % International Students



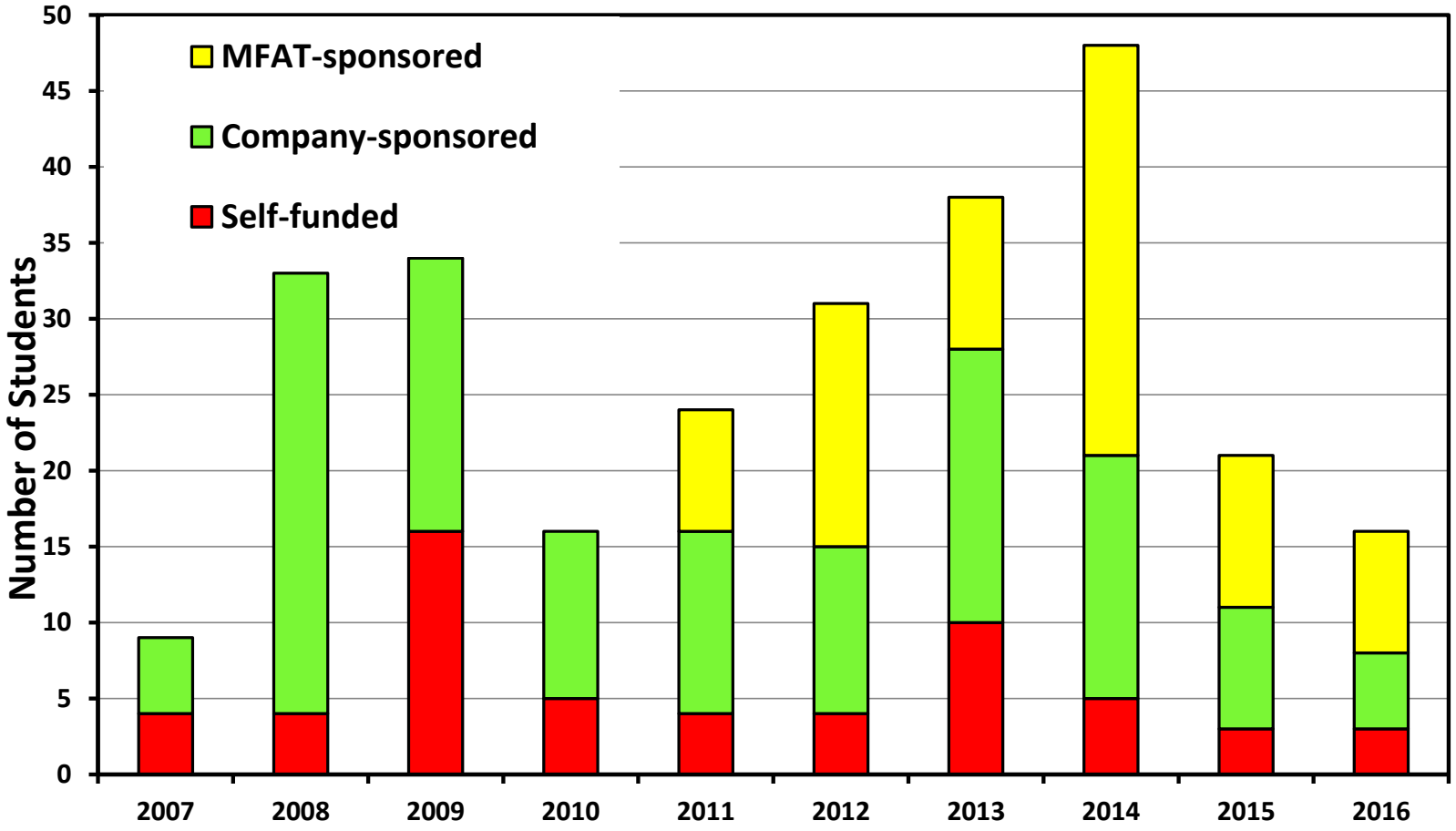
Age Groups


45
40
35
30
25
20
15
10
5
0
%
20-24
25-29
30-34
35-39
40-44
45-49
50-54
55-59
65-69
Age groups (years)

Gender Distribution



Funding


MFAT-sponsored
Company-sponsored
Self-funded
Number of Students
50
45
40
35
30
25
20
15
10
5
0
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016

Students Surveys

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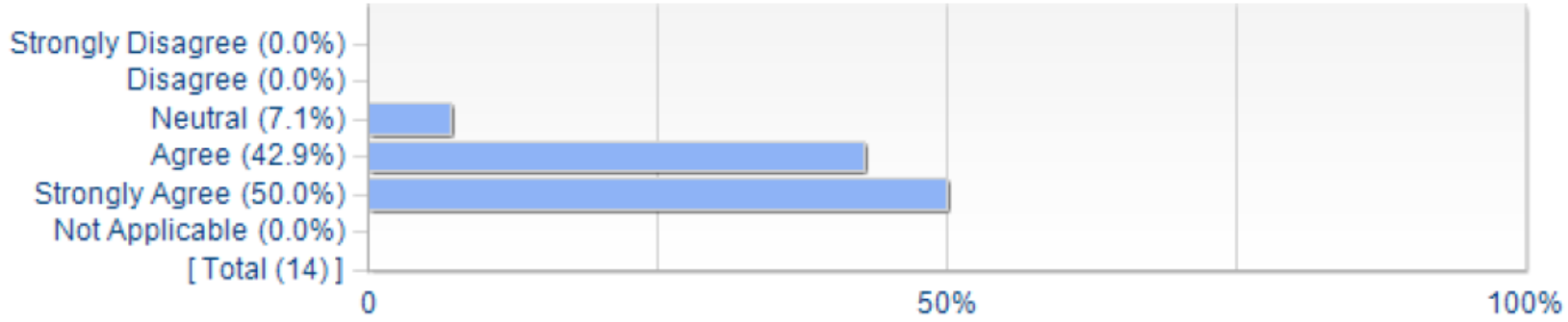
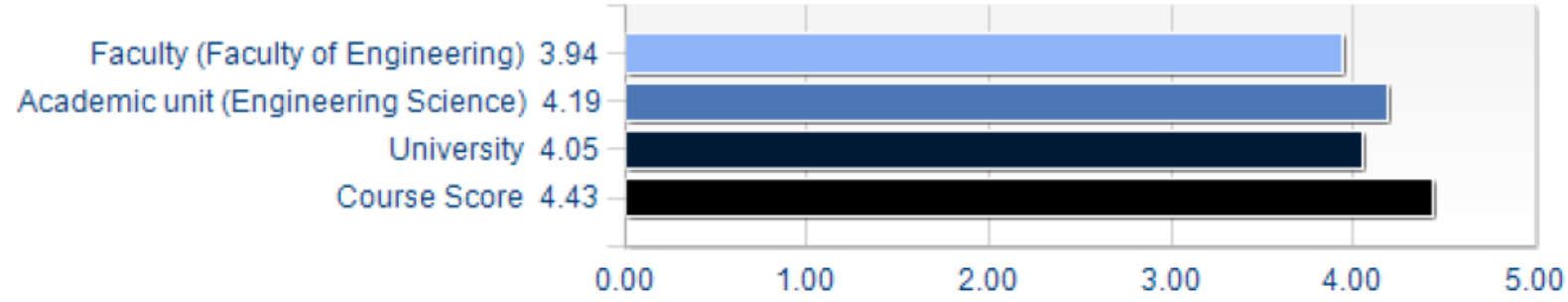
10. **Overall, I was satisfied with the quality of this course**

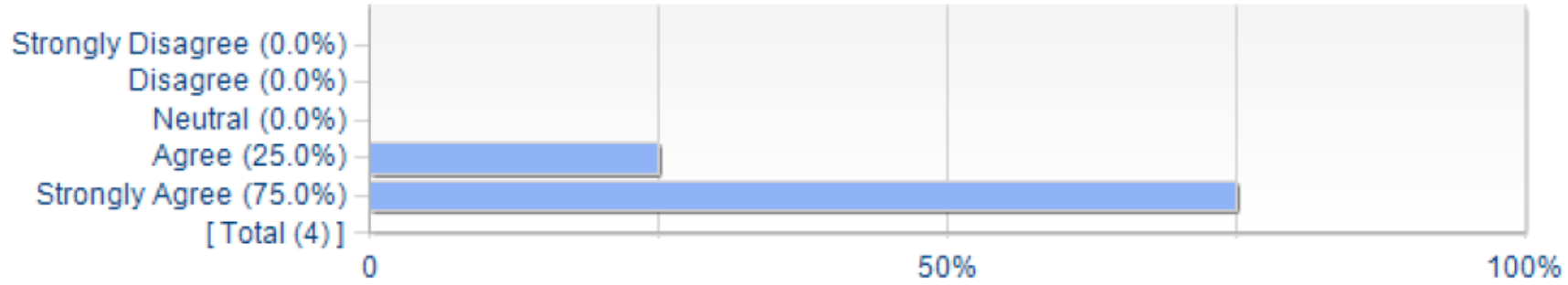


Statistics	Value
Mean	4.43
Standard Deviation	+/-0.65
% GA	92.9%

Overall, I was satisfied with the quality of the course - comparative

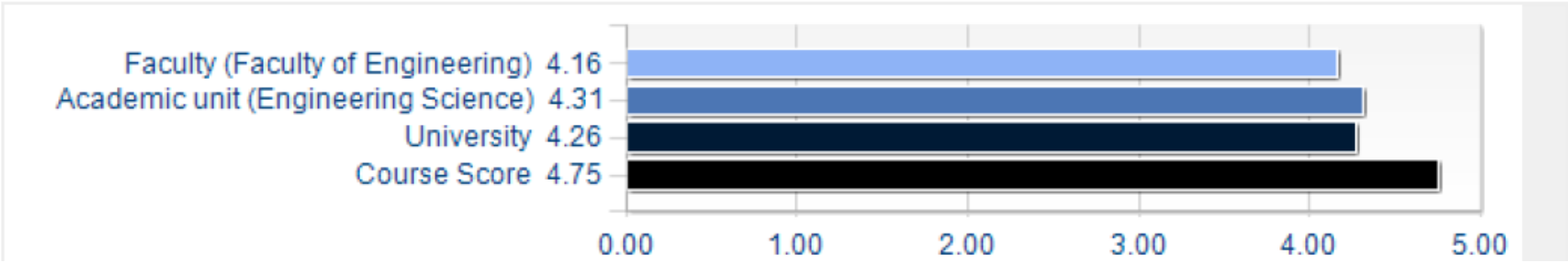


Students Surveys



Statistics	Value
Mean	4.75
Standard Deviation	+/-0.50
% GA	100.0%

Overall, I was satisfied with the quality of the teacher - comparative



Students Surveys

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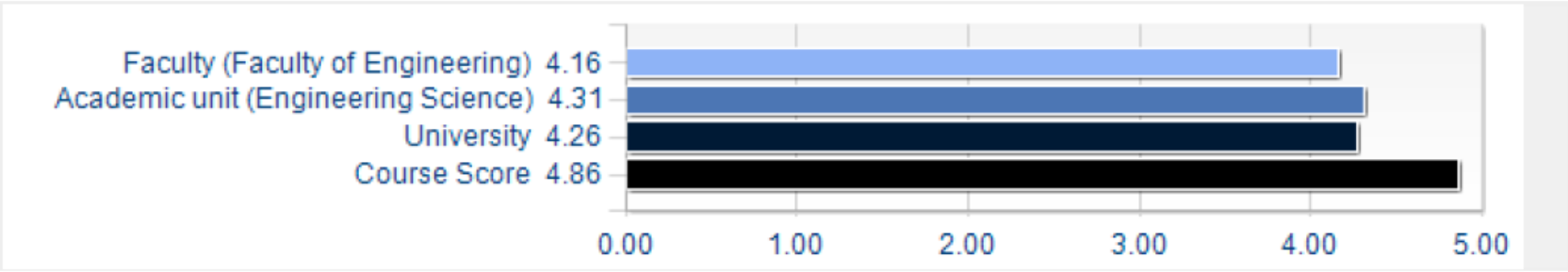
Teacher questions - detailed results (continued)

7. Overall, the teacher was an effective teacher

Statistics	Value
Mean	4.86
Standard Deviation	+/-0.36
% GA	100.0%

Overall, I was satisfied with the quality of the teacher - comparative



Findings, impacts and outstanding issue

- A sustainable geothermal PGCert training course was designed with a strong cross-disciplinary focus and a balance between class work and field work.
- Learning from past experience, the new geothermal PGCert course is structured in a way to ensure its sustainability, by reducing the number of full-time academic staff while contracting most of the remaining lecturers and experts from the industry. However, to ensure a consistent and structured delivery of the different courses, a strong cross-disciplinary understanding together with research and field experience, is needed when organising such a course.
- The PGCert provides training for engineers and scientists involved in geothermal development and at the same time, delivers a constant stream of Masters and PhD research students.
- Insuring there are ~25-30 students a year is an on going challenge.
- It is not possible to run a self sustained geothermal course without (partial or full external funding).

Thank you

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TE PŪ AO

Mercury

Waikato
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Bay of Plenty
REGIONAL COUNCIL

LAKES DISTRICT HEALTH BOARD

Polynesian Spa
Hot Mineral Bathing & Spa Therapies

DRILLFORCE

Tenon
Wood Solutions to the World

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