

# Maintenance management & reliability engineering



MONASH University

Ray Beebe  
(MRE Co-ordr  
from 1996)



MONASH University

- Founded 1958, merged 1990 with colleges dating from 1920s
- 8 campuses: 5 in/near Melbourne; Gippsland (at Churchill, 150km east); Malaysia, South Africa, + Centres in Prato, Italy and London, UK
- 54 000+ students: 7500 of these studying off-campus in 50 countries

# Monash Gippsland Campus:

Art & Design, Arts, Business  
& Economics, Education,  
InfoTech, Nursing, Applied  
Science, Medicine (new for  
2008), and....Engineering:

- Bachelor of Civil and  
Environmental Engineering  
(new in 2004)
- MRE postgrad  
programs.



Gippsland  
campus is in  
Latrobe Valley,  
165km east of  
Melbourne

# Monash and MRE

📄 1984 - 1998: *Centre for Machine Condition Monitoring* (many PhDs, Master's degrees).

📄 From 1985: MRE off-campus programs

📄 From 2001: PG programs in infrastructure maintenance

📄 From 1990: HV electrical condition monitoring

📄 2000: BHPBilliton-Monash Maintenance Technology Institute. Consulting and research.

📄 2003: Member of CRC for Integrated Engineering Asset Management: research and teaching contribution.

📄 From 1992: individual research projects; book#2, papers at conferences (local, China, South Africa, USA: ACSIM, ICOMS, COMADEM, MARCON, SMRP, MFPT, Clarion, IMC, etc.),

📄 PhD in MRE – first student 2006 (industry funded)

“Flexible learning is private learning based on course materials, providing access to teaching staff and two-way communication.

“Self-motivation is required, but the integration with the work scene leads to a higher capability outcome than if classroom-based”

-Townsend , P. and Cairns, L. (2003), *Developing the Global Manager using a Capability Framework*, *International Journal of Management Learning*, Vol.34(3), p.333-347

-(Ray's comment: it is NOT a correspondence course)

- Teaching staff: academics plus practising engineers (international experience):

AssocProf Yousef Ibrahim (Dr)

Dr Emile Eerens

Ray Beebe

Adrian Stephan

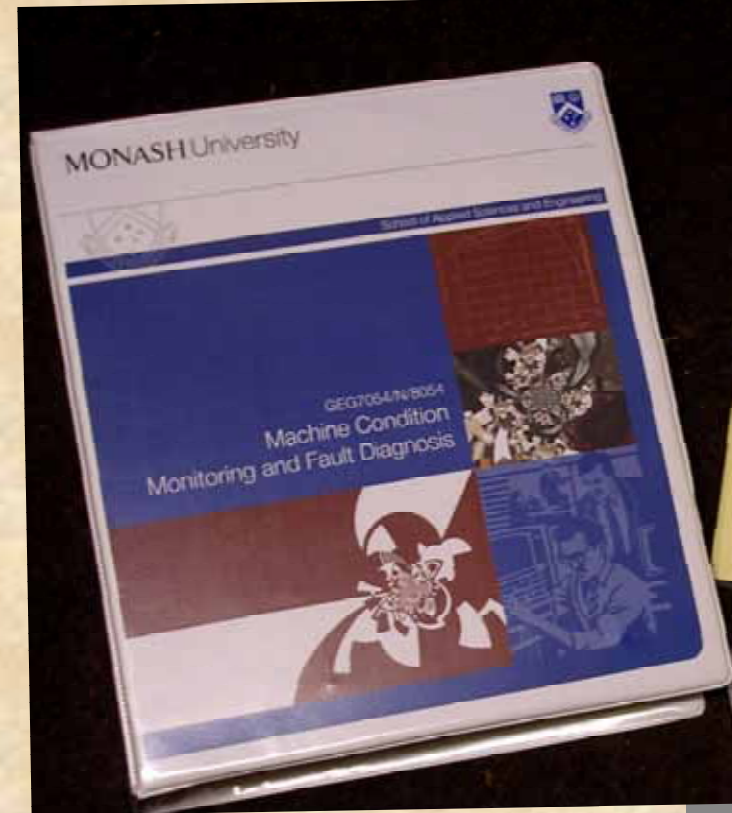
Andrew Kirkness

Dr Brian Jenney

Dr Kyoumars Bahrami

Study materials: mostly paper-based (preferred by students)

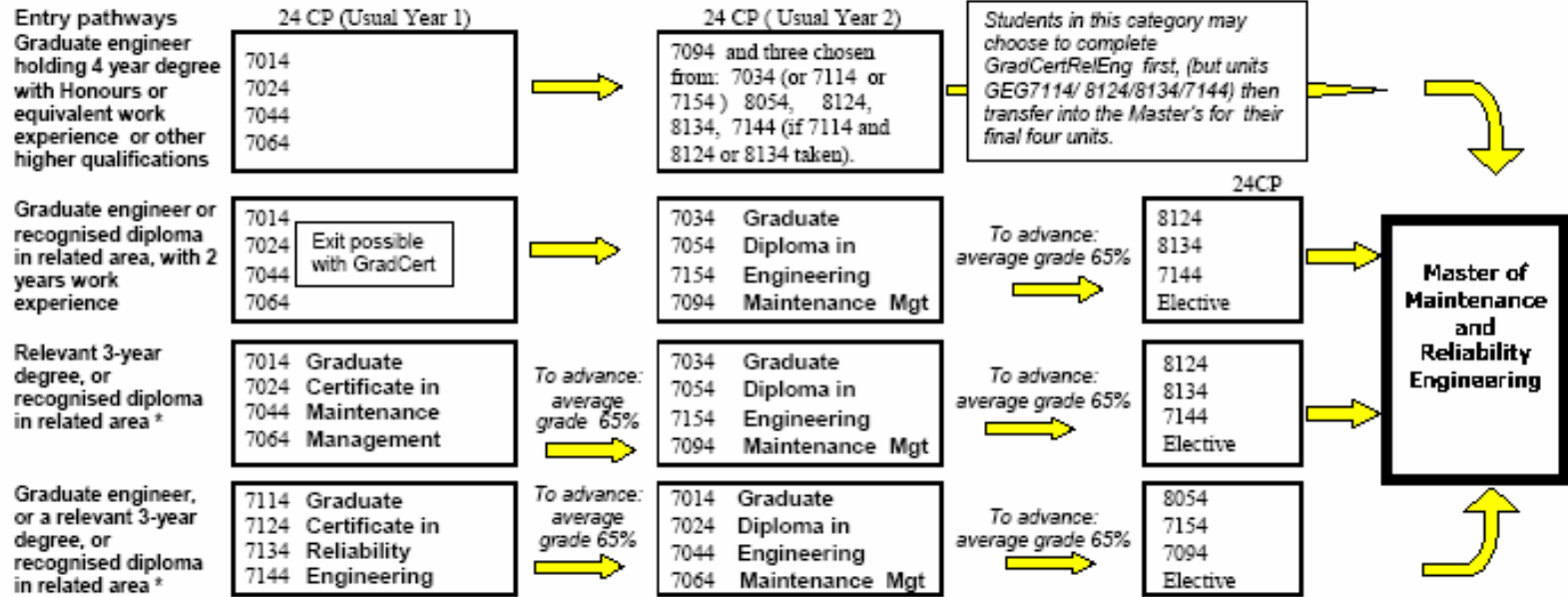
- Unit Guide: outline, admin details
- Unit Book: Study Guides
- Reader (some units): selected papers.
- Textbook (some units)
- Some units – CD or DVD.



- Access to Library resources: continuing additions to on-line stuff (ebooks and ejournals).
- Assessment by assignment and examinations (run anywhere)
- Contact between students and staff is mostly via e-mail, sometimes by phone. (All need to remember time zones!)

## Monash University - Master's degree and other postgraduate programs in Maintenance Management & Reliability Engineering by off-campus learning in 2006

All these programs are ALL run only in the off-campus mode. All study units ("courses" in North America) are of 6 Credit Points (CP), with unit codes "GEGxxxx" for North America only, unit codes end with "N" :e.g. "GEGxxxxN". All units run over Full Year, starting 27 Feb 2006. Usually, students study 4 units per year, but a lesser load is possible. Variation in unit choice is possible on request. Examinations are run anywhere in the world.

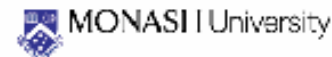


### Unit titles:

\* Except for North America via UT, people without a degree or diploma can study one or two units on "not-for-degree" basis. Two units passed with grades of 65%+ entitle admission into the relevant Graduate Certificate program with full credit in the next year.

GEG7014 Terotechnology and life cycle costs  
 GEG7024 Maintenance management  
 GEG7044 Industrial techniques in maintenance management  
 GEG7064 Maintenance techniques  
 GEG7034 Quantitative techniques for asset management  
 GEG7054/8054 Condition monitoring and fault diagnosis  
 GEG7094 Maintenance & Reliability Engineering Project  
 GEG7114 Basic quantitative skills for reliability engineering  
 GEG7124/8124 Understanding reliability  
 GEG7134/8134 Advanced reliability  
 GEG7144 Reliability applications  
 GEG7154 Risk Engineering

Elective: approved postgraduate management or computing unit  
 [Refer website and UT Catalog for full details]



School of Applied Sciences and Engineering  
 Churchill Victoria 3842  
 Australia

[www.gippsland.monash.edu.au/science/mre](http://www.gippsland.monash.edu.au/science/mre)

In collaboration for North America with







University of Tennessee

[www.engr.utk.edu/mrc/dislear.htm](http://www.engr.utk.edu/mrc/dislear.htm)

# Graduate Certificate in Reliability Engineering

- ☞ 4 units: 1 year (but can do as few as one a year)
- ☞ Entry available to graduates, TAFE diplomates, others on gaining 65%+ in two units “not-for-degree” (not in North America)
- ☞ NO residential component.
- ☞ PdM etc. NOT included – is in other programs

# Units in the Graduate Certificate in Reliability Engineering

-  Basic quantitative skills for reliability engineering
-  Understanding reliability
-  Reliability applications
-  Advanced reliability





# Graduate Certificate in Maintenance Management

☞ 4 units - 1 year (same content as first year of GradDip and the usual Master's degree choices)

☞ Entry open to non-graduates on passing of two units not-for-degree with 65%+, with advanced standing (i.e. units done are credited).

☞ Residential School (3.5 days).

# Units in the Graduate Certificate in Maintenance Management

-  Terotechnology and life cycle costs
-  Maintenance management
-  Industrial techniques in maintenance management
-  Asset management techniques

# Graduate Diploma in Engineering Maintenance Management

📄 8 units - 2 years (first year same as a GradCert and Master's)

📄 Entry available to new BE graduates (without Hons), TAFE diplomates, holders of either Graduate Certificate who gained 65% grades (4 more units only, 1 Res School)

📄 2 Residential Schools - 1 each year (2 in total)

# Units in the Graduate Diploma in Engineering Maintenance Management

- ☞ First 4 units same as for GradCertMaintMgt and Master's. (RelEng pathway also)
- ☞ Machine condition monitoring and fault diagnosis
- ☞ Quantitative techniques for asset management
- ☞ Risk Engineering
- ☞ MRE Project

# Master of Maintenance and Reliability Engineering

☞ 8 units for Honours graduates (or BE + Hons equivalent experience). Units usually same as either GradCert, then MRE Project plus choice of 3 others.

☞ 12 units for other engineers, and for those who gained the GradDipEngMaintMgt with 65% average grades.

☞ Maximum of 2 Residential Schools (one per year).

# Monash MRE today

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86 Master's graduates

266 Graduate Diploma

135 GradCertMaintMgt

63 GradCertRelEng.

*In 2005, we had 150 students from 14 countries. Most came from Australia, 37 in North America. For 2006, 198!*

*First PhD student, 2006*

# Offshore - North America

- ☞ Collaboration Agreement with University of Tennessee, Maintenance & Reliability Center
- ☞ UT do local marketing & promotion, enrolment processing, handle fees.
- ☞ Locally-organised Residential School at Knoxville (4 days), led by Monash staff, supported by UT people
- ☞ Steady growth from 2000 start
- ☞ Approaches from China, Egypt, Malaysia

# Web-enhanced

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- ☐ Monash University Studies On-line (MUSO): with the WebCT VISTA platform
- ☐ All MRE units have *web-enhanced* delivery (mixed success reported in world with fully online studies)
- ☐ Responses to Learning Activities given in print Unit Book
- ☐ Self-assessment Tasks done on MUSO, with answers (but not graded).
- ☐ Home page for a unit – next slide

- ☒ All assignments are submitted by email (except one done by handwriting, faxed or scanned and emailed).
- ☒ Standard filename protocol used
- ☒ Unit Adviser gives feedback and grading via email; some papermail back to student
- ☒ All units but three have an examination


# Residential Schools


- ☰ Arrangements regularly reviewed
- ☰ Seen as essential, but Web-enhanced method can give some of the benefits
- ☰ Every School does not have specific unit content; not all staff necessarily take part.


# Res Schools



# What our MRE students say....

 *Without my qualifications from your course I would not have achieved this career move*

 Just being enrolled was enough to help me get my latest job

 *The Graduate Certificate .... was instrumental in helping me become Production Supervisor at a new plant. A great opportunity for further advancement, apart from about \$40K increase in salary"*

☞ *"Within the two years from enrolment I have gone from a project 2IC co-ordinator to a maintenance superintendent, adding around \$35K to my salary. Your masters program has been a big contributor to this. The content is the underlying factor with which individuals can build the confidence needed to take the next step".*

☞ *I won a position as Reliability Specialist at X based on my experience, and also because of my proposal for reliability improvement based heavily on my studies*

*“The need is there, the time is now!”*  
(Dupont 2000)



**MONASH** University

in collaboration for North America with



University of Tennessee

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Visit for full details and  
Application form for 2007

[www.gippsland.monash.edu.au/science/mre](http://www.gippsland.monash.edu.au/science/mre)

In North America

[www.engr.utk.edu/mrc/dislear.htm](http://www.engr.utk.edu/mrc/dislear.htm)




**MONASH** University

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# GEG7054 - Machine condition monitoring and fault diagnosis

School of Applied Sciences and Engineering



[Syllabus](#)  
Unit Information




[Policies and Procedures](#)



[Online Study Materials](#)



[Self Assessment](#)



[Assignments](#)  
Details as in Unit Guide. Submit as an attachment to Ray via normal email, not within MUSO



[Resource Links](#)

GEG7054/N and GEG8054/N have the same content, but differ in assessment.

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WebCT Vista is the software MUSO uses, so whenever "WebCT" appears on this site, read this as "MUSO"

