



# ARC Centre for Complex Dynamic Systems and Control

*Presents Short Courses in*

## MODERN INDUSTRIAL CONTROL

16-18 April 2007

*and*

## KALMAN FILTERS

19-20 April 2007

### ***BENEFITS ?***

Modern control technology can improve productivity in the range of 2-6% of operating costs. This means a potential saving of \$1B p.a. for Australia (Warren Centre, 1991). Kalman Filters form the basis for optimal signal processing algorithms, with a wide range of applications.

### ***HOW ?***

- ❖ Improved Productivity
- ❖ Increased Quality Control
- ❖ Reduced Process Down Time
- ❖ Improved Process Yield
- ❖ New Signal Processing Algorithms
- ❖ Soft Sensing of Unmeasured Variables

### ***WHO ?***

*Engineers and Scientists with some exposure to Control and Signal Processing*

- ❖ Process
- ❖ Control
- ❖ Chemical
- ❖ Electrical
- ❖ Mechanical
- ❖ Instruments
- ❖ Automotive
- ❖ Production Managers

Short Courses 2007

The ARC Centre for Complex Dynamic Systems and Control (CDSC) integrates and extends previous outstanding research from groups in Electrical Engineering, Mathematics and Statistics. This Centre is a world class centre in analysis, design, optimisation and control of dynamic systems exhibiting complicated behaviour.

The term 'Dynamic Systems' refers to the way industrial, chemical, biomedical, environmental and mechatronic systems exhibit time dependent behaviour. Our society increasingly depends on the safe and efficient operation of such systems. Yet such systems exhibit complex, unpredictable behaviour, and therefore pose substantial challenges for analysis, design, optimisation and control.

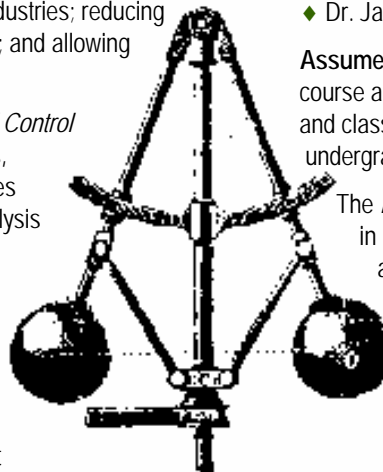
Applications of the Centre's research include: Mine production and transportation systems, process control and optimisation, operator guidance systems, advanced process control tools for industry, automotive systems, electromechanical systems including nano technology and robotics, and biomedical systems. The results of this research adds value to Australian society by enabling new technology based industries; reducing pollution; improving production and efficiency; and allowing safer operation of complex processes.

**Who should attend?** The *Modern Industrial Control* course is aimed at tertiary qualified engineers, scientists, and control practitioners. It provides practical knowledge and tools for design, analysis and implementation of both conventional and advanced control strategies. It would also be beneficial to academics or research students in gaining exposure to how modern control theory can be effectively applied to practical problems.

The *Kalman Filtering* short course is aimed at tertiary qualified engineers, scientists, and signal processing practitioners. It will also be of interest to control engineers because of the close relationship between Kalman Filters, soft sensing and system identification. The material is designed to give fundamental theory, a discussion of practical issues, case studies and simulation laboratories for Kalman Filters.

The two courses can be taken consecutively for attendees interested in feedback control and state estimation.

**How will you benefit?** Participants in the course will be exposed to a broad range of theoretical and practical issues associated with industrial control systems. A key feature of the courses is the hands-on sessions that complement the theory, where participants continually put into practice what is taught in lectures. These sessions are designed to address issues such as technical feasibility; economic justification of modern control in industry; design issues; and experience, in a simulation environment. Computer and lab facilities will be provided for the hands-on components of the courses.



**The Venue:** The course will be held at the University of Newcastle campus within the Faculty of Engineering. The campus is situated in a bushland setting approximately 15 minutes by car from the City Centre.

**Parking:** Parking is available on campus. One day permits are available from dispensing machine on arrival at the cost of \$3.00 per car per day.

**The Presenters:** The presenters are all active members in the Centre and share an interest in both high level research and applications of systems and control.

The presenters are:

- ◆ Professor Rick Middleton (FIEAust., FIEEE);
- ◆ Professor Graham Goodwin (FIEEE, Hon.FIEAust, FTSE, FAA, FRS);
- ◆ Dr. Greg Adams;
- ◆ Dr. Julio Braslavsky;
- ◆ Dr. Tristan Perez;
- ◆ Dr. Daniel Quevedo;
- ◆ Dr. James Welsh

**Assumed knowledge:** *The Modern Industrial Control* course assumes a basic understanding of control theory and classical control systems at a level typified by undergraduate engineering courses.

The *Kalman Filters* course assumes some background in linear algebra and in statistics. For both courses, a review of this background material will be presented to refresh those who might be a little rusty! Course notes and a CD ROM will be available at the time of check-in.

**Course fees\*:** All course fees quoted include GST. (Registration form page 4).

Modern Industrial Control: \_\_\_\$1800  
 Kalman Filters: \_\_\_\_\_\$1200  
 Both courses: \_\_\_\_\_\$2400

**Students and Industrial Affiliates\* receive 50% discount.**

The fee includes printed lecture notes, CD ROM, lunch, morning and afternoon tea, and a dinner on Tuesday evening. Please note that the cost of alcoholic beverages is *not* included in the fees. **To ensure availability of course notes and access to computers, registration must be received no later than Thursday 5 April 2007.**

**Additional Information and Course Bookings:** Further information regarding the course, including preliminary course outline, can be obtained from:

Dianne Piefke or Jayne Disney  
 ARC Centre for Complex Dynamic Systems and Control  
 The University of Newcastle  
 Callaghan, NSW 2308  
 Tel: 2 49 217072 or 2 49 217378  
 Fax: 2 49 601712  
 email: [dianne.piefke@newcastle.edu.au](mailto:dianne.piefke@newcastle.edu.au)  
<http://www.cdsc.newcastle.edu.au/index.shtml>

\* Ask about our Industrial Affiliates Programme.



## Presenters' Profiles

**Rick Middleton** was born on 10th December 1961 in Newcastle Australia. He received his B.Sc. (1983), B.Eng. (Hons-I)(1984) and Ph.D. (1987) from the University of Newcastle, Australia. He has had visiting appointments at the University of Illinois at Urbana-Champaign, the University of Michigan and the Hamilton Institute (National University of Ireland Maynooth). In 1991 he was awarded the Australian Telecommunications and Electronics Research Board Outstanding Young Investigator award. In 1994 he was awarded the Royal Society of New South Wales Edgeworth-David Medal, and the M.A. Sargent Award from the Electrical College of Engineers Australia in 2004. He has served as an associate editor of the IEEE Transactions on Automatic Control, the IEEE Transactions on Control System Technology, and Automatica, as Head of Department of Electrical and Computer Engineering at the University of Newcastle and as a panel member and sub panel chair for the Australian Research Council. He was elected to the grade of Fellow of the IEEE starting 1999. He is currently a Professor in the School of Electrical Engineering and Computer Science at the University of Newcastle; Director of the ARC Centre for Complex Dynamic Systems and Control; and Vice President (Conference Activities) of the IEEE Control System Society. His research interests include a broad range of Control Systems Theory and Applications.



**Graham Goodwin** obtained a B.Sc (Physics), B.E (Electrical Engineering), and Ph.D from the University of New South Wales. He holds Honorary Doctorates from Lund Institute of Technology, Sweden and the Technion Israel. From 1970 until 1974 he was a lecturer in the Department of Computing and Control, Imperial College, London. Since 1974 he has been with The University of Newcastle, Australia where he is currently Professor of Electrical Engineering. He is the co-author of eight monographs: *Control Theory*, Oliver and Boyd (1970), *Dynamic System Identification*, Academic Press (1977), *Adaptive Filtering, Prediction and Control*, Prentice Hall (1984), *Digital Control and Estimation*, Prentice Hall (1989), *Sampling in Digital Signal Processing and Control*, Birkhauser (1996), *Fundamental Limitations in Filtering and Control*, Springer (1997), *Control System Design*, Prentice Hall, (2001), *Constrained Control and Estimation*, Springer, (2004). He is also the author of four edited volumes, and many technical papers. Graham is the recipient of Control Systems Society 1999 Hendrik Bode Lecture Prize, a Best Paper award by IEEE Trans. Automatic Control, a Best Paper award by Asian Journal of Control, and 2 Best Engineering Text Book awards from the International Federation of Automatic Control. Graham is a Fellow of IEEE; an Honorary Fellow of Institute of Engineers, Australia; a Fellow of the Australian Academy of Science; a Fellow of the Australian Academy of Technology, Science and Engineering; a Member of the International Statistical Institute; a Fellow of the Royal Society, London and a Foreign Member of the Royal Swedish Academy of Sciences.



**Julio Braslavsky** was born in Resistencia, Argentina, in 1962. He received his Ingeniero Electrónico degree from the National University of Rosario, Argentina (1989), and his PhD from the University of Newcastle, Australia (1996). He has held research positions at the University of Newcastle, the Catholic University of Louvain, Belgium, and the University of California, Santa Barbara. From 1999 to 2002, he was Adjoint Investigator with CONICET and Associate Professor at the National University of Quilmes in Argentina. Since 2002, Braslavsky is a Research Academic with CDSC at the University of Newcastle, where he acts as CDSC Industry Programme Deputy Leader, and Project Leader for the Optimisation Based Operator Guidance Project.



**Tristan Perez** Tristan Perez was born in Argentina in 1972. He completed his Electronic Engineering degree (6-year course) at the National University of Rosario, Argentina. He moved to Australia in 1999, and completed a Ph.D degree in the area of Control Engineering at The University of Newcastle in 2003. Since then he has specialised in applications of control and signal processing to marine systems. During 2002, he worked as a technical officer in naval architecture for ADI-Limited Australia in the area of seakeeping (analysis of ship performance in waves). From Nov 2003 until May 2004, he was a research fellow at the Mechatronics Research Centre, University of Wales, United Kingdom; where he worked on control and fault detection of thrusters for underwater vehicles. Since June 2004, he has been working as a researcher at the Centre for Ships and Ocean Structures (CeSOS) and as lecturer in marine control systems at the Norwegian University of Science and Technology (NTNU), Norway. He has participated in several industry research programs, and he is a member of the IFAC (International Federation of Automatic Control) Technical Committee in Marine Systems. He has also published a book "Ship Motion Control", Springer (2005).



**Greg Adams** received his B.E.(Hons 1)(1990), M.E.(1993) and Ph.D.(1995) from The University of Newcastle, Australia. He has worked in both industry and in university research positions. Greg has been involved in developing and presenting several industrial short courses and tutorials over the last thirteen years. His background involves industrial consulting for a wide range of projects involving process modelling, system analysis, control and signal processing; clients include BHP Billiton, Hicom, Ricegrowers Cooperative, WMC (Olympic Dam Operations), and IAS. Greg also has extensive software development expertise, with programming experience for scientific and engineering applications (control, system identification and optimisation) and more general applications. His current position is Project Leader for research and development of software tools for control and system identification, in a joint project between Matrikon's Newcastle office and CDSC.



**Daniel Quevedo** received Ingeniero Civil Electrónico and Magister en Ingeniería Electrónica degrees from the Universidad Técnica Federico Santa María, Valparaiso, Chile in 2000. During his time at the university he was supported by a full scholarship from the alumni association and upon graduating received several university-wide prizes. In 2005, he received the Ph.D. degree from The University of Newcastle, Australia, where he is currently a research academic. Dr. Quevedo also has working experience at the VEW Energie AG, Dortmund, Germany and at the Cerro Tololo Inter-American Observatory, Chile. He received the IEEE Conference on Decision and Control Best Student Paper Award in 2003 and was also a finalist in 2002. In 2003, he was awarded the University of Newcastle Faculty of Engineering and Built Environment Prize for the Best International Conference Paper. His main research interests cover several areas of automatic control, signal processing and communications.



**James Welsh** was born in Maitland, Australia, in 1965. He received the B.E. degree (Hons. I) in electrical engineering from The University of Newcastle, Callaghan, NSW, Australia, in 1997. Dr. Welsh received his Ph.D in 2004, which studied ill-conditioning problems arising in system identification, from the same university. He gained industrial experience from 1981 to 1997 with Bloomfield Collieries, AES, and TYP Pty. Ltd., Australia. During the last several years, he has been actively involved in research projects which include, Powertrain Control, Model Predictive Control and System Identification Toolboxes, with the Centre for Complex Dynamic Systems and Control, the University of Newcastle. His research interests include auto-tuning, system identification, and process control. Dr Welsh is currently employed as a Lecturer in the School of Electrical Engineering and Computer Science at the University of Newcastle. He was awarded the University of Newcastle, Faculty of Engineering and Built Environment Prize for the Best International Journal Paper published by a postgraduate in 2003. In 1997, he won the Institute of Engineers Australia National Undergraduate Thesis Prize in Automation, Control, and Instrumentation. I





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School of Electrical Engineering and Computer Science  
The University of Newcastle  
University Drive  
Callaghan, NSW 2308

**Registration Form:**

Please retain a copy of this form as this is your

**"TAX INVOICE"**

ABN 970 007 10074  
(TUNRA)

Please print this document and send by facsimile or email to:

**Dianne Piefke**  
Centre for Complex Dynamic Systems and Control  
The University of Newcastle  
University Drive  
Callaghan, NSW 2308, Australia

Telephone: (61) 02 4921 7072  
Facsimile: (61) 02 4960 1712  
Email: [dianne.piefke@newcastle.edu.au](mailto:dianne.piefke@newcastle.edu.au)

*Please ask about our Industrial  
Affiliates Programme.*

**Delegate Details:**

Surname:.....

Given Name:.....

Preferred name on badge: .....

Organisation:.....

Postal Address: .....

Telephone:..... Facsimile: .....

Email: .....

Special dietary requirements: .....

**Please indicate if you will be attending the dinner on**

**Tuesday night.**     Yes     No

Type	Modern Industrial Control only	Kalman Filters only	Modern Industrial Control and Kalman Filters	Per day
Standard	\$1,800	\$1,200	\$2,400	\$600
Industrial Affiliate (50% discount)	\$900	\$600	\$1200	\$300
Student	\$900	\$600	\$1200	\$300

**Payment details:**     Bankcard     Mastercard     Visa

Cheque made payable to "TUNRA".    \$ \_\_\_\_\_ (includes GST)  
(If paying by cheque, please indicate via email/fax and mail cheque to Dianne at the above address).

Card Number: \_\_\_\_\_ Name on Card: \_\_\_\_\_

Expiry Date: \_\_\_\_\_ Cardholder Signature: \_\_\_\_\_

Amount: \$ \_\_\_\_\_ (includes GST)

**\*\*\* This document will be a Tax Invoice for GST when payment is made \*\*\***