



Advanced Topics in Digital Signal Processing

16–19 July 2007

Presenter: Prof. fred harris

The Conference Centre,
Mawson Lakes, SA

Course Topics:

- Introduction
- Digital Filters
- Channelizers
- Filter Design Techniques
- Digital Broadband Transmission
- Pre- and Post-Signal Conditioning
- Sigma-delta converters
- Carrier Centered Modulation and Demodulation
- Synchronization
- Adaptive Filters
- Modern Structures

The course will be conducted from 9.00am to 5.00pm. Morning tea will be available at approximately 10.00am to 10.30am, lunch from 12.30pm to 1.30pm and afternoon tea at approximately 3.00pm to 3.30pm.

Registration Fee:

AU\$2640 (including GST)

Early bird rates: AU\$2244 (incl. GST)
register before 4th April 2007

Group and PhD student discounts available. Please enquire.

For details of further courses please see our web site:

www.nicta.com.au/short_courses

or contact the NICTA Industry Education Manager.

About Advanced Topics in Digital Signal Processing

(An Examination of DSP in Modern 4th Generation Modems)

This **four-day** course is designed for communication systems engineers, programmers, implementers and managers who need to understand current practice and next generation Digital Signal Processing techniques for upcoming communication systems. DSP is more than mapping legacy analog designs to a DSP implementation. To avoid compromise solution appropriate for an earlier time period, we return to first principles to learn how to apply new technology capabilities to the design of next generation communication systems.

About NICTA

National ICT Australia (NICTA) is Australia's ICT Centre of Excellence and was established to drive innovation through high quality research, research training and technology transfer. As a world-class research institute NICTA uniquely combines excellence in research, education, commercialisation and collaboration. We are working to ensure that Australia is well placed to benefit from the significant opportunities that ICT research delivers.

NICTA is funded by the Australian Government as represented by the Department of Communications, Information Technology and the Arts and the Australian Research Council through Backing Australia's Ability and the ICT Centre of Excellence program. NICTA members are the Australian Capital Territory Government, the New South Wales Government, the University of New South Wales and the Australian National University.

About NICTA short courses

In July 2005 NICTA boosted its education by taking on the short course business of the Cooperative Research Centre for Sensor Signal and Information Processing (CSSIP) and Wedgetail Training, Research and Development Centre (Wedgetail TRDC).

The education model established by CSSIP and Wedgetail TRDC provided scope for delivering in-house programs tailored to specific needs of organizations. NICTA, with its extensive network of world-class researchers, is now offering a greater variety of short courses in an increasing number of locations in Australia and sometimes internationally. NICTA short courses connect research with industry by providing practical information from experts on how to solve key problems in industry and government. The Program offers scientists, engineers and managers technical training with a leading edge in areas such as telecommunications, transport, security, defence, logistics, e-government, mining, finance and biotechnology.

Course Topics

Introduction: an examination of past, present, and future digital modulation systems

Digital Filters: FIR filters, re-sampling filters, interpolators and decimators, half-band filters, cascade-integrator-comb (CIC) filters, Hogenauer filters, multi-rate IIR filters

Channelizers: modulation and demodulation, design techniques, workload comparisons.

Filter Design Techniques: window designs and performance considerations, equiripple designs, system considerations, options to improve system performance, finite arithmetic

Digital Baseband Transmission: Nyquist filter, excess bandwidth, matched filters, square-root Nyquist filter, shaping and up-sampling filters

Pre- and Post-Signal Conditioning: analog filters, timing jitter, direct digital synthesizers, CORDIC processors, digital oscillators, interpolating and decimating filters in A-to-D and D-to-A, AGC, DC cancelling, I-Q balancing

Sigma-delta Converters: A-to-D, D-to-A, D-to-D, multi-loop and wide-band converters, system considerations

Carrier Centered Modulation and Demodulation: shaping and interpolation, QPSK, QAM, Digital IF options, OFDM, legacy analog modulation and demodulation in DSP. FM modulation and demodulation

Synchronization: phase locked loop, proportional plus integral loops, phase recovery, band edge filters in frequency recovery, timing recovery, polyphase filters in timing recovery.

Adaptive Filters: LMS algorithm, RLS algorithm, lattice filters, linear and adaptive equalization, decision feedback equalizers, constant modulus (blind) equalizers

Modem Structures: wireline, cable, satellite, and terrestrial modems and considerations.

There will be ample opportunities for discussion and questions and answers. Morning and afternoon tea/coffee and a light lunch will be provided. Extensive workshop materials will be made available to participants.

Instructor: Professor fred harris

fred harris (sic) teaches at San Diego State University where he occupies the CUBIC Signal Processing Chair. His teaching and research areas include Digital Signal Processing, Multirate Signal Processing, Communication Systems, Source Coding and Modem Design. He has extensive practical experience in communication systems, high performance modems, sonar and advanced radar systems and high performance laboratory instrumentation. He holds a number of patents on MSP for Satellite and Cable Modems and lectures throughout the world on DSP applications. He consults for organizations requiring high performance, cost effective DSP solutions and has contributed to a number of textbooks and handbooks on various aspects of signal processing.

Please complete the registration form and send it together with your fee, if appropriate, **by no later than 4th April 2007** for early bird registration or **by no later than 2nd July 2007** to

Anne-Marie Eliseo,
Industry Education Manager,
NICTA, SPRI Building,
Mawson Lakes Boulevard,
Mawson Lakes, South Australia, 5095.
Telephone: (08) 8302 3928
Facsimile: (08) 8302 3115
Email: anne-marie.eliseo@nicta.com.au

Registration Form and Tax Invoice* ABN 62 102 206 173

*Upon completion of this form, including the relevant payment, this form will become a Tax Invoice.

Please register me for Advanced Topics in DSP on 16-19 July 2007.

PLEASE PRINT

Date: _____

Title: _____ First Name: _____ Surname: _____

Position: _____ Organisation/Division: _____

Postal Address: _____

Telephone No: _____ Facsimile No: _____ Email: _____

Dietary preference: _____

Course Fees: Early bird fees: AU\$2244 (incl. GST)
(Please register before **Apr 4th**.)

Full fees: AU\$2640 (incl. GST)
(Please register before **Jul 2nd**.)

Method of Payment (please tick)

Cheque (payable to National ICT Australia Ltd)

Please forward cheque and a copy of THIS Registration Form to the NICTA Industry Education Manager.

Credit Card: Credit Card No.: _____ Expiry Date: _____

Visa Master Card Name on card: _____

Amount: AU\$ _____ Signature: _____ Tick if receipt required

Electronic Funds Transfer

BANK Commonwealth Bank of Australia

Please advise by email to Annette Van Bramer

ACCOUNT NAME National ICT Australia Limited

annette.vanbramer@nicta.com.au

BSB 062 900

when payment is made

ACCOUNT NUMBER 1032 4576

REFERENCE NUMBER 030707

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- Send an email to comments@nicta.com.au or
- Phone NICTA's Communications Manager on +61 2 9209 4743.