

**Editor-in-Chief: Michael Wald**

**Volume 21 Number 3**

**Part I**

**Special Issue**

**Engineering Ethics, an International Overview**

**Guest Editor**

**Caroline Whitbeck**

**Case Western Reserve University**

**the Online Ethics Center for Engineering and Science**

**Part II**

**Contributions in Engineering Education Research,  
Engineering Design, Engineering Mathematics, Materials  
Science and Manufacturing Engineering**

# The International Journal of ENGINEERING EDUCATION

## Editor-in-Chief

**M. S. Wald**, Dublin Institute of Technology, Bolton Street, Dublin, Ireland  
Tel: (International) +353 27 61400; Fax: (+353 1) 4023999; E-Mail: ijee@eircom.net  
Website: <http://www.ijee.dit.ie>. Editor's direct phone: (+353 27) 61400.

## Associate Editor (USA)

**T. Kurfess**, George W. Woodruff School of Mechanical Engineering, Georgia Institute of Technology, Atlanta GA 30332, USA; E-mail: tom.kurfess@me.gatech.edu

## Associate Editors

**C. Kuo**, University of Strathclyde, 100 Montrose St., Glasgow G4 0LZ, Scotland  
Tel: (International +44-141) 552 4400; E-mail: c.kuo@strath.ac.uk

**D. McCarthy**, Dublin Institute of Technology, Bolton St., Dublin, Ireland

**M. Murphy**, Dublin Institute of Technology, Bolton St., Dublin, Ireland

**J. Turner**, Dublin Institute of Technology, Bolton St., Dublin, Ireland

## Board of Editors

**C. Y. Lam**, School of Mechanical and Production Engineering, Nanyang Technological University, Singapore 639798

**R. Natarajan**, Chairman, All India Council for Technical Education, New Delhi, India

**C. S. Slater**, Department of Chemical Engineering, Rowan College, Glassboro, NJ 08028, USA

**S. Waks**, Department of Education in Technology & Science, Israel Institute of Technology, Haifa 32000, Israel

**Augusto Belendez**, Dept. of Physics, University of Alicante, Spain

## Editorial Advisory Board

**Caroline Baillie**, Integrated Learning Centre, Faculty of Applied Sciences, Queens University, Kingston, Ontario, Canada K7L 3N6

**F. Bodendorf**, Department of Information Systems, University of Nuremberg-Erlangen, Germany

**E. Eder**, Royal Military College of Canada, Kingston, Ontario, Canada K7K 5L0

**Nesimi Ertugrul**, Department of Electrical and Electronic Engineering, University of Adelaide, 5005 Australia

**R. Felder**, North Carolina State University, Raleigh NC 27695, USA

**I. Gibson**, Industrial Engineering Department, National University of Ireland, Galway, Ireland

**Denis Gillet**, Automatic Control Laboratory, Swiss Federal Institute of Technology, CH.-1015, Lausanne EPFL, Switzerland

**Ahmad Ibrahim**, De Vry, Mississauga, Toronto, ON, Canada L5R 3W3

**J. Jawitz**, Faculty of Engineering and Built Environment, University of Cape Town, South Africa

**R. C. Jones**, World Expertise LLC, 2001 Mayfair McLean Court, Falls Church, VA 22043-1761, USA

**Paul King**, Department of Biomedical Engineering, Vanderbilt University, Nashville TN 37235, USA

**K. Mallalieu**, Electrical & Computer Engineering, University of West Indies, St. Augustine, Trinidad

**J. F. Marchman**, Aerospace & Ocean Engineering Department, Virginia Tech, Blacksburg, VA 24061, USA

**Etsuo Morishita**, Department of Aeronautics and Astronautics, University of Tokyo, Japan

**Terrance O'Brien**, Department of Curriculum and Instruction, North Carolina State University, Raleigh NC 27695, USA

**T. Owens**, Dept. of Electrical Engineering and Electronics, Brunel University, Uxbridge, UB8 3PH, UK

**S. Pomeranz**, Department of Mathematical and Computer Sciences, University of Tulsa, Tulsa, OK, USA

**Z. J. Pudlowski**, Faculty of Engineering, Monash University, Clayton, Melbourne, Vic 3168, Australia

**N. J. Salamon**, Engineering Science and Mechanics, The Pennsylvania State University, University Park, PA 16802, USA

**Sheri D. Sheppard**, Mechanical Engineering, Stanford University, Stanford, CA 94305, USA.

**P. Shiue**, School of Engineering, Christian Brothers University, Memphis TN 38104, USA

---

## 2005 Subscription Rates (including postage and insurance)

Annual institutional subscription rate £495. Personal subscription rate for those whose library subscribes £180. For North American institutional subscribers \$775. Subscription enquiries should be sent to TEMPUS Publications, Dublin Institute of Technology, Bolton St., Dublin, Ireland. Tel: (+353 1) 4023605, Fax (+353 1) 4023999.

## Back Issues

Back issues available from TEMPUS Publications.

Copyright © 2005 TEMPUS Publications

Published 6 per annum

It is a condition of publication that manuscripts submitted to this journal have not been published and will not be simultaneously submitted or published elsewhere. By submitting a manuscript, the authors agree that the copyright for their article is transferred to the publisher if and when the article is accepted for publication. However, assignment of copyright is not required from authors who work for organizations which do not permit such assignment. The copyright covers the exclusive rights to reproduce and distribute the article, including reprints, photographic reproductions, microform or any other reproductions of similar nature and translations. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, electrostatic, magnetic tape, mechanical, photocopying, recording or otherwise, without permission in writing from the copyright holder.

## Photocopying Information for Users in the U.S.A.

The Item-fee Code for this publication indicates that authorization to photocopy items for internal or personal use is granted by the copyright holder for libraries and other users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service provided the stated fee for copying beyond that permitted by Section 107 or 108 of the United States Copyright Law, is paid. The appropriate remittance of \$3.00 per copy per article is paid directly to the Copyright Clearance Center Inc., 27 Congress Street, Salem, MA 01970, USA.

## Permission for Other Use

The copyright owner's consent does not extend to copying for general distribution, for promotion, for creating new works, or for resale. Specific written permission must be obtained from the publisher for such copying.

The Item-fee Code for this publication is: 0949-149X/92 \$3.00 + 0.00.

# The International Journal of ENGINEERING EDUCATION

## Aims and Scope

This journal serves as an international interdisciplinary forum and source of reference for engineering education. A balance between papers on developments in educational methods and technology, case studies, laboratory applications, new theoretical approaches, educational policy and survey papers is aimed for. Comprehensive coverage of new education schemes and techniques makes the journal a unique source of ideas for engineering educators who are keen to keep abreast with latest developments in educational applications in all fields of engineering. The journal will cover engineering education news and open debates on engineering education policy related topics of transnational interest.

Some of the areas covered more extensively in recent issues are: CAD, CAE, computer applications in teaching thermodynamics, materials science, electrical engineering, new courses and curricula, engineering management, control engineering, mechanical engineering, engineering design, student evaluation and institutional accreditation.

Special issues on topics such as computer-aided engineering, engineering thermodynamics and engineering design are published periodically.

## Notes for Contributors

Papers for inclusion in the Journal should be submitted for refereeing to the Editor-in-Chief. The Editor-in-Chief should be informed by the authors of any submission made directly to a member of either Board.

The papers should include detailed information on relevance of the material to engineering education. Only papers not previously published will be accepted and, once accepted for the Journal, must not be published elsewhere.

Technical Notes, Letters-to-the-Editor and Book Reviews may also be submitted.

Papers should be submitted as A Word for Windows format and E mailed as an attachment to the editor at [ijee@eircom.net](mailto:ijee@eircom.net). Papers over 5 MB in size should be submitted on a CD-ROM.

Images and figures should be included in the Word document or transmitted as separate GIF files. Hardcopies may be requested for improving the resolution of the print version. All published papers are available in print and online form.

News items of transnational interest, including courses and workshops, should be submitted to the Editor-in-Chief, **Dr. Michael Wald** [ijee@eircom.net](mailto:ijee@eircom.net)

Full contents Papers and Journal information are available on World Wide Web on <http://www.ijee.dit.ie>.

Access to current volumes is for subscribers only using ID password of IP identification. Current page charge rates for publication are posted on our website [www.ijee.dit.ie](http://www.ijee.dit.ie) under Important Announcement for Authors.

### **Papers must be submitted in English.**

A brief summary (not more than 100 words) of the scope of each paper must be sent with the manuscript.

Authors are requested to submit a brief biographical sketch of up to 100 words for each author.

Biographical sketches will be published with the paper unless requested otherwise.

Captions for figures and tables must be given on a separate sheet and included at the end of the manuscript.

Page charges are calculated according to the final number of published pages.

### **The journal follows Le Systeme International d'Unites.**

All Greek characters and unusual symbols must be identified by name in the margin the first time they appear.

References in the text to published literature should be given by numbers in square brackets on the line and the references should be listed at the end of the paper in numerical order.

### **Journal references should be arranged thus:**

1. L. A. Pipes, Matrix analysis of heat transfer problems. *J. Franklin Inst.* **263**, 195–206 (1957).

### **Book references should be given as:**

2. P. H. Parkin and H. R. Humphreys, *Acoustics, Noise and Buildings*, p. 84. Faber, London (1961).

Abbreviations of journal titles will follow *World List of Scientific Periodicals*.

Proofs will be sent to the first-named author for correction, unless otherwise specified.

Corrections must be restricted to printer's errors only. Other than these, any substantial changes may be charged to the author.



*A selection of papers accepted for publication*

**Madeira et al.**—Teaching Laminar Flow Reactors: From Experimentation to CFD Simulation

**Stanley et al.**—Traffic Monitoring Using a Three-Dimensional Object Tracking Approach

**Anderson et al.**—Implementing and Assessing Computer-Based Active Learning Materials In Introductory Thermodynamics

**Hochstenbach**—Quantitative Modeling of an Air Conditioning Problem

**Maglaya**—Development of a Waste Heat Recovery Mechanical Dryer

**Xuefeng, Ram**—Teaching Intelligent Agents to Industrial Engineering Majors

**Woods**—Estimation of Light Speeds Using PC/Windows Networked computers

**Zhang**—Theory, Practice, and Systems—A New Approach to Teaching Electronic Communications with MATLAB

**Sabah**—Contribution of International Environmental Design Competitions in Raising the Profile of Environmental Education in Engineering Students

**Ogot**—Integrating Systematic Creativity into First-Year Engineering Design Curriculum

**Steif, Dollar**—Reinventing the Teaching of Statics

**Al-Jibouri et al.**—Use of a Simulation Model as a Game for Teaching Project Management

**Mougharbel et al.**—Remote Lab Experiments Models: A Comparative Study

**Scott et al.**—Learning How to Teach Continuum biomechanics

**Padmaperuma et al.**—Opportunities and Challenges in Instructional Design for Teaching the Flexure Formula Using a Revised Bloom's Taxonomy

**Wankat**—Teaching Prospective Engineering Faculty How to Teach

**Kolari et al.**—Improving student learning in an environmental engineering program with a research study project

**Hamrita et al.**—Robotics, Microcontroller, and Embedded Systems Education Initiatives—an Interdisciplinary Approach

**Sebastian**—Evaluating Online Testing Technology