POLLUTION PREVENTION FACULTY AND PROGRAMS: **ENGINEERING**

CHEMICAL ENGINEERING

183 DR. ROBERT C. AHLERT

President and Chief Engineer
RAMS Environmental Inc.
P.O. Box 1982
Ormond Beach, FL 32175-1982

Phone: (904) 676-7506
Fax: (904) 673-9269

Dr. Robert C. Ahlert, PE is a distinguished Professor of Chemical Engineering, Emeritus, Rutgers University. Currently involved in delivering lectures and consulting projects. Also is the Chair of the Environmental Subcommittee of the American Institute of Chemical Engineers Government. Dr. Ahlert's research focus is on separation and concentration of hazardous organic substances from soil, sediment, groundwater and surface water. Supercritical fluid extraction, with carbon dioxide plus cosolvents, for reasons of fire and explosion safety and minimum hazard potential, is used to separate selected toxic pollutants from environmental matrices. This study is intended to develop a database that can be used to create a process simulation model applicable to realistic cost estimation, operational and safety analyses, and scale-up criteria.

184 DR. DAVID ALLEN

Professor, Department of Chemical Engineering
University of Texas at Austin
CPE 2-8-2 26th and Speedway
Austin, TX 78712-1062

Phone: (512) 471-0049
Fax: (512) 471-7060
E-mail: allen@che.utexas.edu

Is the Henry Beckman Professor in Chemical Engineering at the University of Texas at Austin. He is the author of a compendium of course modules entitled *Pollution Prevention: Homework and Design Problems for Engineering Curricula* (published by the American Institute of Chemical Engineers). He is also the author (with Kirsten Rosselot) of a textbook entitled Pollution Prevention for Chemical Processes (to be published by Wiley in November 1996). At the University of Texas, Dr. Allen teaches a course titled *Design for Environment*, offered through the Chemical Engineering department. This course describes methods for incorporating environmental objectives into product and process designs. Serves as a member of the NPPC External Advisory Committee.

185 DR. ERIC J. BECKMAN

Associate Professor, Department of Chemical Engineering
University of Pittsburgh
Pittsburgh, PA 15261

Phone: (412) 624-9641
Fax: (412) 624-9639
E-mail: beckman@vms.cis.pitt.edu

Dr. Beckman's research group is engaged in several projects where carbon dioxide is used as an environmentally-benign, readily recyclable solvent. Current projects include extraction and recovery of heavy metals from solid and liquid matrices, extraction of biological molecules from cell culture using CO_2, and polymerization using CO_2 as both raw material and solvent. The department has recently been awarded with an NSF Training Grant in the area of environmentally-conscious manufacturing, a group effort involving seven faculty with diverse backgrounds in the Chemical Engineering Department. In addition to current research activities, Dr. Beckman has established a course in *Pollution Prevention* at the University of Pittsburgh, which covers primarily case studies in waste minimization in the chemical industry. The course covers the basic concepts on life cycle analysis, then moves to process modification for pollution prevention, followed by use of new synthetic pathways for pollution prevention.

186 DR. MARTIN BIDE

Rhode Island Center for Pollution Prevention
University of Rhode Island
Chemical Engineering Department
Crawford Hall
Kingston, RI 02881

Phone: (401) 874-2276
Fax: (401) 874-2581
E-mail: mbide@uriacc.uri.edu

Researches and teaches about textile wet processing, including preparation, dyeing, printing, and finishing. Teaches two Senior level courses, *Dyeing and Finishing* and *Textiles and the Environment*, both of which include pollution prevention techniques. In Spring 1995, taught Graduate level course, *The Environmental Effects of Textile Processing*. Currently has a research grant from EPA through the Rhode Island Department of Environmental Management to examine regulatory and non-regulatory approaches to P2 for the Rhode Island textile industry. Has carried out textile P2 audits for USAID in Tunisia and Ecuador.

187 DR. CAROLYN L. BOLTON

Research Assistant Professor, Department of Chemical Engineering
Associated Faculty, School of the Environment
University of South Carolina
Swearingen Engineering Center
Columbia, SC 29208

Phone: (803) 777-7219
Fax: (803) 777-8265
E-mail: bolton@sun.che.sc.edu

Environmental education is integral to the undergraduate and graduate programs. The emphasis is pollution prevention, not merely end-of-pipe remediation, treatment, and control. The existing courses are infused with environmental material. Additionally, a key interdisciplinary course, accessible to seniors and graduate students, was added recently. This course in *Environmentally Conscious Manufacturing* includes the following topics: legal and regulatory framework, design for the environment philosophy, pollution prevention and waste minimization, decisions based on relative risk, life cycle analysis, total cost assessment and global competitiveness, and management of technological change. This course is part of a new paradigm for education of doctoral students supported by the National Science Foundation Graduate Research Traineeships in Environmentally Conscious Manufacturing.

188 DR. YORAM COHEN

Professor and Vice Chair, Department of Chemical Engineering
University of California—Los Angeles
School of Engineering
405 Hilgard Avenue
Los Angeles, CA 90024

Phone: (213) 825-8766
E-mail: yoram@seas.ucla.edu

Teaches and conducts research in multimedia transport of pollutants, multipathway exposure analysis, and evaluation of P2 strategies. Also involved with the National Center for Intermedia Transport Research. An important aspect of Dr. Cohen's environmental research is aimed at the development of predictive models for describing the dynamic partitioning of toxic chemicals in the environment and models for assessing the exposure of human and ecological receptors to chemical pollutants. Projects in this area deal with theoretical studies of intermedia transport processes and their incorporation into multimedia pollutant transport, exposure, and risk assessment models. Computer software packages developed by Dr. Cohen's research group are now in wide-spread use both in the United States and abroad.

189 DR. ROBERT M. COUNCE

Department of Chemical Engineering
University of Tennessee
Knoxville, TN 37996-2200

Phone: (423) 974-5318
E-mail: counce@utkux1.utk.edu

Professor Counce is an industrial separation specialist. He is especially active in the design and modification of industrial processes for pollution prevention. His research is typically industrially funded and involves advancing fundamental knowledge while focusing on providing solutions to industrial needs. Each spring semester, he directs several honors process design teams, who address real industrial design needs while satisfying the capstone design requirement of the Chemical Engineering curriculum. He consistently chairs sessions at professional meetings on topics of capstone education, industrial gas absorption and stripping, and pollution prevention. He is involved in a wide variety of activities in the industrial pollution prevention area and in industrial separations, including development of environmentally-friendly industrial washing and degreasing technology, and recovery and recycle of various process materials.

190 DR. MICHAEL B. CUTLIP

Department of Chemical Engineering
University of Connecticut
Box U-222
Storrs, CT 06269-3222

Phone: (203) 486-0321
Fax: (203) 486-2959
E-mail: mcutlip@uconnvm.uconn.edu

Interested in the use of numerical methods in the solution of engineering problems. Co-author of POLYMATH, which allows user-friendly interactive solution of a variety of problems involving Simultaneous Ordinary Differential Equations, Simultaneous Linear and Nonlinear Algebraic Equations, and Polynomial, Multiple Linear and Nonlinear Regressions. POLYMATH is currently in use by over 120 Chemical Engineering Departments. This software finds wide application in fundamental unit operations, reactor design, process control, process dynamics and process design calculations. It enables more realistic problems to be easily and effectively solved in engineering and scientific coursework. Most research is in chemical reaction engineering and includes catalytic and electrochemical fuel cell systems. Catalysis interests are interdisciplinary and are pursued with faculty in chemistry. Current work involves adsorption, gettering, photocatalysis, and steady state/transient catalysis over new materials which are characterized by a variety of surface science instrumentation. The fuel cell work involves very detailed modeling of fuel cell electrodes as well as the study of multi-component electrocatalyst systems and fundamental properties of electrode systems.

191 DR. DIANNE DORLAND

Department of Chemical Engineering
University of Minnesota—Duluth
231 Engineering Building
10 University Drive
Duluth, MN 55812

Phone: (218) 726-7127
Fax: (218) 726-6360
E-mail: ddorland@d.umn.edu

The Department of Chemical Engineering has a new program that addresses chemical engineering aspects of P2 in junior and senior level courses. Emphasizes planning for waste reduction, especially in the design component of engineering and urges students to reassess how we currently handle processes. Course delivery includes WWW access with links to environmental regulations and information. Funded to conduct P2 opportunity assessments for small businesses and industry.

192 DR. SHELDON DUFF

Industrial Research Chair, Forest Products Waste Management
Associate Professor, Department of Chemical Engineering
University of British Columbia
2216 Main Mall
Vancouver, British Columbia
CANADA V6T 1Z4

Phone: (604) 822-9485
Fax: (604) 822-6003
E-mail: sduff@chml.ubc.ca

Research on process stream treatment and recycling and integration of pollution prevention and industrial ecology concepts into water and air pollution control courses. Beginning Fall 1996, offering a new course titled *Pollution Prevention and Waste Minimization Engineering for Chemical and Process Industries*.

193 DR. MAHMOUD EL-HALWAGI

Associate Professor, Chemical Engineering Department
Auburn University
Auburn, AL 36849

Phone: (334) 844-2064
Fax: (334) 844-2063
E-mail: mahmoud@eng.auburn.edu

Developing integrated methods for cost effective, energy efficient pollution prevention. The methods are based on systematic and generally applicable chemical engineering principles.

194 DR. REX T. ELLINGTON

Faculty Associate and Professor Emeritus, Chemical Engineering
University of Oklahoma
Science and Public Policy Program
100 E. Boyd, Room S206
Norman, OK 73019

Phone: (405) 325-2554
Fax: (405) 325-7695
E-mail: ellingto@gslan.offsys.uoknor.edu

Curriculum and course development for engineering and business undergraduate, graduate, honors, and continuing education students on pollution prevention toward sustainable development with total economic, environmental, energy use, and product quality. Research focuses on total system and total life-cycle-plus-management, including organizational effects. Works on the development of improved methods of analysis and decision making to help business people. Is preparing a book on management. For more information, visit WWW site at http://www.uoknor.edu/spp/.

195 DR. ROBERT M. ENICK

Associate Professor, Department of Chemical and Petroleum Engineering
University of Pittsburgh
1249 Benedum Hall
Pittsburgh, PA 15261

Phone: (412) 624-9649
Fax: (412) 624-9639
E-mail: enick@engrng.pitt.edu

Professor Enick's research has been related to high pressure phase behavior. Initially, much of his work was related to petroleum engineering problems. A current research project involves lab-scale experiments on a plastics recycling project. In this study, liquid carbon dioxide is used to separate mixed flakes of shredded HDPE, LDPE and PP containers into three streams of high purity. Because they can be used in a wider variety of applications, the value of the sorted streams, an HDPE stream, an LDPE stream, and a PP stream, is much greater than the initial mixture of HDPE/LDPE/PP. Currently, Dr. Enick is developing a pilot-scale apparatus for this technology.

196 DR. CHENG-SHEN FANG

Department of Chemical Engineering
University of Southwestern Louisiana
Box 42251
Lafayette, LA 70504

Phone: (318) 231-5350
Fax: (318) 231-6688

Teaching and research focus is in the areas of petrochemical waste treatment/minimization and P2. The bulk of the work is in end-of-pipe treatment, primarily because the region is heavily regulated by the EPA, and industry funding is concentrated in meeting its short term needs. Some state funds are available for the study of the local photochemical smog (despite low automobile densities) and atmospheric emission surveys. Also interested in CO_2 recovery from coal-fired power plants.

197 DR. JIM FERRELL

Pollution Prevention Research Center
North Carolina State University
Chemical Engineering Program
Raleigh, NC 27695-7905

Phone: (919) 515-1818
Fax: (919) 515-3465

Based in the Chemical Engineering Department, the Pollution Prevention Research Center (PPRC) is currently active in research related to P2 in petroleum refining and silicon chip manufacturing. Has in the past offered a course on industrial waste reduction. The Center itself is not involved with educational aspects of P2, but individual researchers deal with P2 in many of their classes. For more information on people involved with the Pollution Prevention Research Center, see record number 106 (Overcash).

198 DR. MARVIN FLEISCHMAN

Industrial Assessment Center
University of Louisville
Department of Chemical Engineering
Louisville, KY 40292

Phone: (502) 852-6357
Fax: (502) 852-6355
E-mail: mofleio1@ulkyvm.louisville.edu

Teaches *Pollution Prevention, Waste Treatment, and Disposal*, an elective non-traditional course focusing on concepts, applications, and issues, exemplified by real life examples based on assessments at various manufacturing plants. Course includes a class P2 assessment at a local plant. The Industrial Assessment Center does combined full facility quantitative energy and multi-media waste minimization assessments at

manufacturing facilities using students and faculty. These assessments include a waste characterization/ audit, identification of waste prevention and minimization opportunities, and a preliminary technical and economic assessment of waste minimization options. In collaboration with the Kentucky Pollution Prevention Center (state program), the Center also offers short courses and lectures in P2 and waste minimization. Through the Center, one course in industrial waste management and one in P2 and waste minimization are offered as part of the Chemical Engineering curriculum. These broad and diverse courses include guest speakers, field trips, and a class project at a local manufacturing facility. Dr. Fleischman has written problems and materials taken from waste minimization assessments for use in waste management or materials balance courses.

199 DR. WILLIAM JAMES FREDERICK

Head of Chemical Engineering Department
Oregon State University
Gleeson 103
Corvallis, OR 97331

Phone: (503) 737-2496
Fax: (503) 737-4600
E-mail: frederiw@ccmail.orst.edu

Teaches a course on waste minimization and pollution prevention to senior and graduate level engineering students. Currently, introducing both these concepts into senior design and freshman chemical engineering courses. Conducting and directing research in industrial waste minimization in microelectronics and pulp and paper manufacture. Also conducts waste minimization audits for local industry.

200 DR. JEANETTE GARR

Assistant Professor, Department of Chemical Engineering
Youngstown State University
Youngstown, OH 44555

Phone: (216) 742-1737
Fax: (216) 742-1567

Teaches *Industrial Pollution Control, Wastewater Treatment,* and *Accident and Emergency Management* with heightened awareness of pollution prevention. Research interests include air pollution from fossil fuel combustion and steel industries and BUSTR program for fuel storage. Dr. Garr is a fellow of the US DOE/ PETC.

201 DR. RAKESH GOVIND

Department of Chemical Engineering
University of Cincinnati
697 Rhodes Hall (ML 171)
Cincinnati, OH 45221

Phone: (513) 556-2761
Fax: (513) 556-3473

Teaches concepts of waste minimization and P2 through process synthesis/optimization. Research interest is in efficiency through detailed computer analysis of plants. Dr. Govind is interested in developing P2 courses, which can only be developed through research.

202 DR. CHRISTINE S. GRANT

Associate Professor, Department of Chemical Engineering
North Carolina State University
Box 7905
Raleigh, NC 27695-7905

Phone: (919) 515-2317
Fax: (919) 515-3465
E-mail: grant@eos.ncsu.edu

Teaches *Advances in Pollution Prevention: Environmental Management for the Future* at North Carolina State University. The course is a graduate level course for chemical and non-chemical engineers focusing on the development of strategies for pollution prevention and waste minimization. Review of P2 policies, regulation in addition to case studies to address the implementation of research in pollution prevention. The course focuses on the design of industrial processes which minimize or eliminate chemical waste production. The first part of the course describes the regulations and the organization of pollution prevention efforts. The class conducts case studies to illustrate the important aspects of these efforts. The second portion of the course describes current research efforts in the area of waste minimization and pollution prevention. The third portion covers life cycle analysis and the design of more efficient processes. The subsequent design of new processes and improvement of existing processes is conducted using ASPEN Model Manager. In addition, the course has speakers from industry that will address the problems associated with pollution prevention.

203 DR. WILLIAM HECKER

Department of Chemical Engineering
Brigham Young University
350 CB
Provo, UT 84602

Phone: (801) 378-6235
Fax: (801) 378-7799
E-mail: hecker@byu.edu

Has developed a comprehensive Undergraduate air pollution control course in which P2 concepts are introduced. His research is in the area of catalytic converters as an end-of-pipe treatment method for NOx reduction.

204 DR. J. R. HOPPER

Department of Chemical Engineering
Lamar University
P.O. Box 10053
Beaumont, TX 77710

Phone: (409) 880-8784

A simulation of the Sohio process for the production of acrylonitrile from the catalytic ammoxidation of propylene has been performed, using published kinetic and thermodynamic data to illustrate the concepts of P2 by process modification. The study has determined the reaction parameters which will minimize the production of by-products while maintaining the conversion of propylene above 80%. The reaction parameters studied were reactor type, reaction temperature, residence time, and entering feed temperature. The minimum byproducts were produced in an FBR operating at 450° at a residence time of 7 seconds for a conversion of 81%. Also teaches Graduate course called *Waste Minimization.*

205 DR. KRISTIINA IISA
Assistant Professor, Chemical Engineering
Oregon State University
Gleeson 103
Corvallis, OR 97331
Phone: (503) 737-2346
Fax: (503) 737-4600
E-mail: iisam@ccmail.orst.edu

Teaches a graduate/undergraduate course in air pollution control with emphasis on pollution prevention.

206 DR. RALPH KUMMLER
Hazardous Waste Management Program
Wayne State University
Department of Chemical Engineering
Detroit, MI 48202
Phone: (313) 577-3800
Fax: (313) 577-3810

Wayne State University's Hazardous Waste Management Program (HWMP) taught 400 engineers over the past two years in P2 strategies in the course Waste Minimization. Provides interns to small businesses in Michigan for waste reduction management. Works directly with industry to provide technical assistance. Operates with part-time faculty and uses case studies from the automobile industry.

207 DR. GENNARO J. MAFFIA
Associate Professor and Chairman, Department of Chemical Engineering
Widener University
One University Place
Chester, PA 19013-5792
Phone: (215) 499-4089
Fax: (215) 499-4059
E-mail: pfgjaffia@cyber.widener.edu

Teaches pollution prevention concepts as part of a Senior design courses and also as part of short courses outside the University. Offers a freshman seminar on P2 for engineering and non-engineering students. Has developed a few interactive models that he uses in class. These models run on the True Basic language. Periodically works on projects, contests, and proposals involving P2. Develops case studies which develop unsteady models for common/real world events.

208 DR. VASILIOS MANOUSIOUTHAKIS
Director, Pollution Prevention Fellowship Program
Professor, Chemical Engineering Department
University of California—Los Angeles
5531-J Boelter Hall
Los Angeles, CA 90095
Phone: (310) 825-9385
Fax: (310) 206-4107
E-mail: vasilios@seas.ucla.edu

Teaches a course on pollution prevention. The main theme of the course is pollution prevention as a synthesis activity. Also directs Ph.D. fellowship and summer internship programs on pollution prevention. Is preparing a textbook on pollution prevention. Dr. Manousiouthakis's activities are supported by NSF and DOEd.

209 MR. JIM McCUNE

Instructor, Chemical Engineering
Fullerton College
Anaheim Higher Education Center
100 Anaheim Avenue
Anaheim, CA 92805

Phone: (714) 563-0866
Fax: (714) 563-0189

Instructor for pollution prevention and chemical engineering courses. Has conducted Pollution Prevention Planning for the plastics and plating industries.

210 MR. JEFFREY MENSINGER

Department of Chemical Engineering
Wayne State University
Detroit, MI 48202

Phone: (313) 577-1200
Fax: (313) 961-5603

Teaches a course which provides students with understanding of the overall management requirements for conducting waste minimization and pollution prevention assessments and insights to achieve the implementation of proposed programs. Course includes case histories of successful programs.

211 DR. SUSAN MONTGOMERY

Assistant Professor, Chemical Engineering Department
University of Michigan
3074 Dow Building
Ann Arbor, MI 48109-2136

Phone: (313) 936-1890
Fax: (313) 763-0459
E-mail: smontgom@umich.edu

Involved in the development of multimedia materials for pollution prevention education. Represents the American Society for Engineering Education (ASEE) on the NPPC External Advisory Committee. Serves as a Mentor for the NPPC Internship Program.

212 DR. JAMES NOBLE

Department of Chemical Engineering
Tufts University
4 Colby Street
Medford, MA 02155

Phone: (617) 628-5000 x2089
Fax: (617) 627-3991

Has developed a course, *Hazardous Waste Treatment Technologies* for chemical and civil engineers. The course introduces pollution prevention concepts focusing on pollution control and waste treatment.

213 DR. S. TED OYAMA

Professor, Department of Chemical Engineering
Virginia Polytechnic Institute & State University
Blacksburg, VA 24061-0211

Phone: (540) 231-5309
Fax: (540) 231-5022
E-mail: oyama@vt.edu

Teaches a course for sophomore level students entitled *Environmental Issues in Technology*. Research interest is in the area of environmental catalysis and includes the subjects of: cleanup of petroleum feedstocks, utilization of carbon dioxide, selective oxidation with ozone, and conversion of chlorofluorocarbons.

214 DR. VITO PUNZI

Department of Chemical Engineering
Villanova University
800 Lancaster Avenue
Villanova, PA 19085

Phone: (610) 519-4946
Fax: (610) 519-7354

Teaches a technical elective course in industrial wastewater and hazardous waste handling and minimization open to chemical engineering juniors and seniors. Feels that engineering students must have a good background in chemistry and unit operations to understand and spot opportunities for waste reduction. Engineering decisions are driven by the bottom-line economic amelioration, and P2 may be best worked into a course from that viewpoint. Research includes treatment and recovery of heavy metals from industrial waste waters and environmental application of reverse osmosis.

215 DR. CHRISTIAN ROY

Department of Chemical Engineering
Université Laval
Ste-Foy, Québec
CANADA G1K 7P4

Phone: (418) 656-7406
Fax: (418) 656-2091
E-mail: croy@gch.ulaval.ca

Teaches a pollution prevention course designed for junior and senior undergraduate chemical engineering students. Personal notes as well as materials available from EPA and other government agencies are provided as course materials. One part of the course deals with pyrolysis process since this is the strength of the research team lead by Dr. C. Roy. Several articles published in scientific literature form the core of the material provided to the students. Two videotapes are available, one of which has been produced by Beyond 2000 from Australia on vacuum pyrolysis process.

216 DR. DALE F. RUDD

Professor Emeritus, Chemical Engineering Department
University of Wisconsin—Madison
Madison, WI 53706

E-mail: rudd@engr.wisc.edu

Research interests include pollution prevention in the chemical process industries, process design, and catalysis industrial development.

217 DR. HENRY SHAW

Department of Chemical Engineering, Chemistry, and Environmental Science
New Jersey Institute of Technology
University Heights
138 Warren Street
Newark, NJ 07102

Phone: (201) 596-2938
Fax: (201) 802-1946
E-mail: shaw@admin.njit.edu

Responsible for teaching graduate and undergraduate courses in air pollution control, global environmental problems, catalysis, diffusional systems, and process and plant design. Engineering and economic aspects of P2 are covered in the plant design course. Research includes incineration of hazardous substances, effect of catalyst poisons on catalytic oxidation of VOCs, soot/NOx control in Diesel engines using a rotating fluidized bed reactor, absorption of acid gases, absorption of NOx in strongly oxidizing aqueous media, scale-up of organic processes in multiphase aqueous systems in order to avoid using polluting solvents as an approach to P2, and COx greenhouse effect assessments. Directed the NJIT initiative to establish the Emissions Reduction Research Center, an NSF Industry/University Cooperative Research Center for Pollution Prevention Technology with MIT, Ohio State, and Penn State.

218 DR. DAVID R. SHONNARD

Assistant Professor, Department of Chemical Engineering
Michigan Technological University
1400 Townsend Drive
Houghton, MI 49931

Phone: (906) 487-3468
Fax: (906) 487-3213
E-mail: drshonna@mtu.edu

Teaches an upper-division undergraduate course to Chemical and Environmental Engineers on the fundamentals of assessing the environmental effects of pollution released from industry (fate and transport calculations) and on established methods of pollution prevention in the chemical industry. Students apply fundamental chemical engineering principles of mass and energy balances, thermodynamics, transport phenomena, reaction kinetics/reactor design, and process design to environmental problems both within chemical processes and in the natural environment. Software for determining the fate of man-made chemicals released to the environment is used to assess environmental and human health impacts. Strategies for evaluating and implementing pollution prevention strategies within the chemical process industry are reviewed and several successful case studies are analyzed. Pollution reductions and economic costs and benefits are quantified for changes made to existing chemical processes.

219 DR. DILIP SINGH

Department of Chemical Engineering
Youngstown State University
Youngstown, OH 44555

Phone: (216) 742-1737
Fax: (216) 742-1998

Teaches industrial pollution control, wastewater treatment, and accident and emergency management with heightened awareness of P2. Research interests include application of artificial intelligence and neural network methodologies to process dynamics and control. Environmental policy decisions are based on a myriad of factors covering a wide range of disciplines. Is currently exploring the application of neural networks to model decision-making processes.

220 MR. WIBOWO M. H. SURJOWIDJOJO
Head, Microbiology and Bioprocess Engineering Lab
Faculty Member, Department of
Chemical Engineering
Institut Teknology Bandung
Jalan Ganesha 10
Bandung INDONESIA 40132

Phone: (62) 22 250 6454
(62) 22 250 0989 x331
Fax: (62) 22 250 1438
E-mail: wibowo@bandung.wasantara.net.id

Currently, incorporating general concepts of pollution prevention into teaching and research. Working to establish courses in pollution prevention and environmental management.

221 DR. LOUIS THEODORE
Department of Chemical Engineering
Manhattan College
Bronx, NY 10471

Phone: (718) 920-0185
Fax: (212) 920-0819

Offers a graduate three credit engineering course entitled *Pollution Prevention*. The course devotes considerable time to the overall philosophy and the economic issues of P2. Introduces students to equipment and process calculations. Developed a US EPA training course (including slides) titled *Pollution Prevention*. Directed an NSF Pollution Prevention Workshop in 1992-93 for college faculty. Co-authored a 1992 Van Nostrand Reinhold graduate level text book called, Pollution Prevention. Also published a tutorial entitled *Pollution Prevention*, with sixty problems dealing with topics from energy conservation to domestic issues (ETS Theodore Tutorial, Roanoke, VA, 1994, (800) 424-7184). A *P2 Problems and Solutions* test was published in 1994 (Gordon and Breach, Newark, NJ). A non-technical text keying on pollution prevention titled, Fifty Major Environmental Issues Facing the 21st Century, was published in 1996 by Prentice-Hall.

222 DR. EDWARD M. TRUJILLO
Associate Professor, Department of Chemical and Fuels Engineering
University of Utah
3290 Merrill Engineering Building
Salt Lake City, UT 84112

Phone: (801) 581-4460
Fax: (801) 581-8692
E-mail: edward.trujillo@m.cc.utah.edu

Conducting research on minimizing pollution effects from mining operation. Developing a course on pollution prevention for the Department of Chemical and Fuels Engineering at the University of Utah. Developing mathematical models of acid mine drainage. Served on the committee which sponsored *Conference on Pollution Prevention Across the Curriculum at Sundance Resort*, UT, 11-13 August 1994. Is also the Executive Committee member of the Environmental Engineering Program at the University of Utah.

223 DR. DEAN ULRICHSON
Department of Chemical Engineering
Iowa State University
Sweeney Hall
Ames, IA 50011

Phone: (515) 294-6944
Fax: (515) 294-2689
E-mail: dlulrich@iastate.edu

Teaches safety, health, and environmental topics in process simulation and design. Also teaches a Senior elective course that introduces P2 concepts in the same topics. Coordinating development of an environmental engineering curriculum.

224 DR. MARGRIT VON BRAUN

Department of Chemical Engineering
University of Idaho
Buchanan Engineering Lab 315
Moscow, ID 83844-1025

Phone: (208) 885-6113
Fax: (208) 885-7462
E-mail: cdixon@uidaho.edu

Has built P2 concepts into chemical engineering courses entitled *Advanced Plant Design and Hazardous Chemical Waste*. The courses are open to Senior and Graduate students. Also teaches courses in added classes in P2, environmental audits, and hazardous waste management open to junior, senior, and graduate students.

225 DR. JOHN W. WALKINSHAW

Professor, Chemical Engineering
University of Massachusetts—Lowell
One University Avenue
Lowell, MA 01854

Phone: (508) 934-3159
Fax: (508) 934-3047

Research focuses on the problems dealing with the recycling of paper and paper products for the re-manufacture of paper goods. Dr. Walkinshaw has worked with 1st year students on a design module for the manufacture of paper and cleaning of printed recycled pulps.

226 DR. GREGORY YAWSON

Department of Chemical and Metallurgical Engineering
Wayne State University
Detroit, MI 48202

Phone: (313) 577-3848
Fax: (313) 577-3810

Currently teaches pollution prevention as part of a Graduate level course as well as a pre-college program. Major thrust is research in industrial and agricultural waste recycling, recovery, and reuse. Directs an EPA funded source reduction internship program for Michigan residents. Also involved in developing a two-year associate degree program related to P2. Member of UNEP/IED contact list of experts on cleaner production, and the International Association for Clean Technologies and Global Network for Low and Non-Waste Technologies.

CIVIL AND ENVIRONMENTAL ENGINEERING

227 DR. PAUL ANDERSON

Department of Chemical and Environmental Engineering
Illinois Institute of Technology
10 West 33rd Street
Chicago, IL 60616

Phone: (312) 567-3531
Fax: (312) 567-8874
E-mail: enveanderson@minna.iit.edu

Has developed a one semester course to expose engineering students to quantitative aspects of pollution prevention.

228 DR. C. ROBERT BAILLOD

Civil and Environmental Engineering
Michigan Technological University
1400 Townsend Drive
Houghton, MI 49931

Phone: (906) 487-2520
E-mail: baillod@mtu.edu

Education in pollution prevention at Michigan Tech is built upon knowledge created in two ongoing efforts. The first of these is the Center for Clean Industrial and Treatment Technologies (CenCITT), a multi-million dollar Exploratory Research Center sponsored by the EPA. The second is a three year curriculum development project, *Educating Engineers for the Environment* (E3), sponsored by the Westinghouse Foundation and Hughes Aircraft. Fundamental information on clean technologies created in the CenCITT research program is translated into graduate and senior level engineering courses. At the engineering baccalaureate level, a team of twelve faculty have developed an introductory course emphasizing clean technologies and P2 and have produced videotapes of most lectures. Current efforts are directed at developing engineering design projects for use in senior and graduate level courses.

229 DR. PAUL L. BISHOP

Professor, Department of Civil and Environmental Engineering
University of Cincinnati
P.O. Box 210071
Cincinnati, OH 45221-0071

Phone: (513) 556-3675
Fax: (513) 556-2599
E-mail: pbishop@boss.cee.uc.edu

Teaches a Senior/Graduate level course on *Environmentally Conscious Engineering* to students from across the College of Engineering. Professor Bishop's teaching interests include hazardous waste management and biological treatment. His research interests include stabilization and solidification of hazardous wastes, development and evaluation of leaching test procedures, biofilm-based wastewater treatment processes, and transport mechanisms in biofilms. Professor Bishop is University Coordinator for Interdisciplinary Environmental Affairs and Director of the Center for Hazardous Waste Research and Education. He is the author of a textbook and of over 160 research publications.

230 DR. CURTIS BRYANT

Department of Civil Engineering
University of Arizona
Tucson, AZ 85721

Phone: (602) 621-2266
Fax: (602) 621-2550

Is interested in developing interdisciplinary educational modules focusing on human attitudes and technical capabilities needed to foster P2. Believes that human behavioral implications and consumer perspective on product use and waste are key factors in planning for avoidance and substitution in P2. Worked with anthropologist Dr. Rathje on the psychology of garbage production and opportunities for reuse.

231 MR. EDWARD CHIAN

School of Civil and Environmental Engineering
Georgia Institute of Technology
Atlanta, GA 30332-0512

Phone: (404) 894-7694
Fax: (404) 894-8266
E-mail: edwards.chian@ce.gatech.edu

Teaches courses in solid waste management, industrial waste treatment, sustainable development and technology, hazardous wastes management, etc. Research interest is in the areas of developing sustainable technology, P2 in metal finishing industries, solidification/stability, recycle/reuse of contaminated soils and hazardous materials, ground water remediation, dissolved air flotation membrane processes, etc. Also actively participating in the Center for Sustainable Development at Georgia Tech.

232 DR. ANTHONY COLLINS

Chair and Professor, Department of Civil and Environmental Engineering
Clarkson University
Rowley Laboratories
Potsdam, NY 13699-5715

Phone: (315) 268-6490
Fax: (315) 268-7636
E-mail: adminnyjb@clvm.clarkson.edu

Teaching interest are water and wastewater treatment processes, design of water distribution and wastewater collections. Research focus is on the physical-chemical and biological treatment processes, application of expert systems, hazardous waste management and disposal of treatment residuals. The Hazardous Waste & Toxic Substance Research and Management Center seeks to integrate the fields of environmental policy, economics, and management in developing interdisciplinary research and education programs aimed at effective hazardous waste management. Research conducted by faculty members associated with the Center focuses on the following areas: (1) multimedia-exposure assessment of hazardous waste and toxic substances; (2) environmental and human health impacts of hazardous materials; (3) waste treatment, remediation, and disposal technologies; and (4) waste minimization and reduction. For additional information on people involved with the Hazardous Waste Center, see record numbers 108 (Powers), 112 (Theis), 269 (Young) and 270 (Zander).

233 DR. MOHAMED DAHAB

Department of Civil Engineering
University of Nebraska—Lincoln
W348 Nebraska Hall
Lincoln, NE 68588-0531

Phone: (402) 472-5020
Fax: (402) 472-8934
E-mail: mdahab@unl.edu

Research and extension activities in pollution prevention and waste minimization. Teaches *Hazardous Waste Management Engineering* course with a significant P2 component in it. Teaches a *Solid Waste Management Engineering* course with a significant pollution prevention and waste management component. Teaches a (new) course entitled *Pollution Prevention*. The entire course is focused on several facets of pollution prevention in the private sector (business and industry) as well as the public sector (federal and state government).

234 DR. CAROL DIGGELMAN

Department of Physics and Chemistry
Milwaukee School of Engineering
P.O. Box 644
Milwaukee, WI 53201-0644

Phone: (414) 277-7320
Fax: (414) 277-7470
E-mail: diggelman@warp.msoe.edu

Has developed and teaches a course, *Introduction to Hazardous and Solid Waste Management*, from the perspective of pollution prevention. Students are required to complete an engineering term project, comparing RCRA Subtitle C Management of a waste system typical of what graduates are likely to encounter in an industrial setting with what is currently being done to reduce that waste stream based on information from the literature, practitioners, and vendors. Risks and costs of RCRA Subtitle C management are compared to those associated with pollution prevention.

235 DR. HADI DOWLATABADI

Engineering and Public Policy
Carnegie Mellon University
Pittsburgh, PA 15213

Phone: (412) 268-3031
Fax: (412) 268-3757
E-mail: hdØ1@andrew.cmu.edu

Research interests revolve around environmental impacts of energy use. Research in the electric utility arena has spanned issues from urban air pollution to acid rain to climate change. Has also studied emissions from mobile sources exploring tropospheric air pollution in the United States. A common theme throughout this research is decision-making under scientific, technical, economic, environmental, and regulatory uncertainty.

236 DR. RYAN DUPONT

Assistant Director, Utah Water Research Laboratory
Civil and Environmental Engineering
Utah State University
UMC-8200
Logan, UT 84322-8200

Phone: (801) 797-3227
Fax: (801) 797-3663
E-mail: rdupo@pub.uwrl.usu.edu

A Senior-level elective course in *Air Toxics and Pollution Prevention* is taught annually in the Undergraduate Environmental Engineering program. The course covers P2 concepts in both the industrial and private sectors, and focuses on the symbiotic nature of P2 efforts and Air Toxic and Risk Reduction that has been a major emphasis of the 1990 Clean Air Act amendments. A quantitative approach is provided for decision making regarding air emission and risk reductions as adopted from the State of California guidelines. The students practice these principles through case studies and a special project involving P2 and air toxic controls at an industrial facility of their choosing. Research areas focus on treatment methods for *in situ* bioremediation of contaminated soils and groundwater with an emphasis on intrinsic remediation and risk based corrective action.

237 DR. HECTOR R. FUENTES

Associate Professor, Department of Civil & Environmental Engineering
Florida International University
University Park, VH-160
Miami, FL 33199

Phone: (305) 348-2837
Fax: (305) 348-2802
E-mail: fuentes@eng.fiu.edu

Dr. Hector R. Fuentes, PE, CEE, teaches a graduate course on pollution prevention as part of the curriculum of the Graduate Program in Environmental Engineering at Florida International University. Currently, various graduate students complete research effort on pollution prevention, including testing of computer models in industrial settings of Dade County, Florida. He has also presented papers in national and international conferences on P2 issues. Of his particular interest has been P2 initiatives within NAFTA and Latin America, having been a member of the US EPA Advisory Board on the US/Mexico environmental plan.

238 DR. KUMAR GANESAN

Department of Environmental Engineering
University of Montana
West Park Street
Butte, MT 59701

Phone: (406) 496-4239
Fax: (406) 496-4133
E-mail: kganesan@mtvms2.mtech.edu

Dr. Kumar Ganesan, QEP has introduced pollution prevention as a core course in the undergraduate Environmental Engineering degree program. Uses local industry as class projects for students to obtain hands on experience in pollution prevention. Teaches other courses such as air pollution engineering control, industrial ventilation, and particle technology. The undergraduate engineering program has over 300 students.

239 DR. BERNICE GOLDSMITH

Assistant Professor and Coordinator, Social Aspects of Engineering
Concordia University
1455 de Maisonneuve Boulevard West
Montreal, Quebec
CANADA H3G 1M8

Phone: (514) 848-3071
Fax: (514) 848-4509
E-mail: bernice@VAX2.concordia.ca

Teaches a graduate engineering course, *Environmental Life Cycle Assessment*, which examines environmental and social profiles of products, processes and services. Also teaches *Engineering, Resources and Environment*.

240 DR. NANCY J. HAYDEN

Assistant Professor, Department of Civil and Environmental Engineering
University of Vermont
Burlington, VT 05405

Phone: (802) 656-1924
Fax: (802) 656-8446
E-mail: nhayden@emba.uvm.edu

Currently teaches course in *Hazardous Waste Management Engineering* that emphasizes pollution prevention. The course features semester-long group projects which team students with local industry. Students research source reduction alternatives for managing hazardous waste within the local industries or business. Technological as well as social economical and regulatory issues are evaluated. Dr. Hayden is currently working with the University of New Hampshire and the University of Massachusetts—Lowell on a book of homework problems for engineering curricula.

241 DR. ISABEL HEATHCOTE

Associate Professor, Environmental Engineering and Environmental Sciences
University of Guelph
226 Thornbrough Building
Guelph, Ontario
CANADA N1G 2W1

Phone: (519) 824-4120 x3072
Fax: (519) 836-0227
E-mail: heathcot@net2.eos.uoguelph.ca

Co-teaches with William James (record number 241) a graduate course on pollution control planning based on Ontario legislation for pollution prevention in surface water and non-point source pollution prevention.

242 DR. SUNIL HERAT

Lecturer, Environmental Engineering
Griffith University
Faculty of Environmental Sciences
Queensland, AUSTRALIA 4111

Phone: +61 7 3875 5288
E-mail: s.herat@ens.gu.edu.au

Griffith University offers undergraduate and postgraduate courses in Environmental Engineering. *Pollution Prevention* is offered as a full subject in the masters program and is available to the final year undergraduates as an elective. The course is supplemented by several site visits. The Waste Management Research Unit within the School of Environmental Engineering offers several professional development courses and conducts research and consulting in pollution prevention and related areas.

243 DR. WILLIAM JAMES

School of Engineering
University of Guelph
Guelph, Ontario
CANADA N1G 2W1

Phone: (519) 824-4120 x2433
Fax: (519) 767-2770
E-mail: wjames@net2.eos.uoguelph.ca

Co-teaches, with Isabel Heathcote (record number 239), a Graduate course on *Pollution Control Planning* based on Ontario legislation for P2 in surface water and non-point source pollution. Works with a research group of approximately 10 Graduate students on modeling the long term impacts of surface water pollution and flows resulting from urban development. Projects include: enhancements to US EPA programs SWMM4 and HSOF; field experiments on porous pavement; stormwater BMPs like wetlands infiltration; solar thermal enrichment of receiver waters due to urban pavement; use of GIS and weather radar in computer-controlled sewage systems; and sources controls of urban runoff pollutants. Manages an electronic bulletin board called *SWMMusers* and a quarterly newsletter called *SWMM News and Notes* that reaches 4,000 readers.

244 DR. DAVID F. KIBLER

Professor, Civil Engineering Department
Virginia Polytechnic Institute & State University
200 Patton Hall
Blacksburg, VA 24061-0105

Phone: (540) 231-8309
Fax: (540) 231-7532
E-mail: kiblerdf@vt.edu

Research and teaching interests include urban hydrology and flood control; stormwater management; urban non-point source pollutants; management practices for reducing non-point source pollutant entry to receiving streams and lakes.

245 DR. EDWARD KLEVANS

Nuclear Engineering
The Pennsylvania State University
Sackett Building
University Park, PA 16802

Phone: (814) 865-1341
Fax: (814) 865-8499

Teaches a senior and graduate level course on radioactive waste management. Areas of interest include modeling cement behavior for long term low level waste storage; development of specialized cements to contain high and low level radioactive waste; thermal hydraulic safety; plant life extension and fuel management.

246 DR. REID LEA

Assistant Professor, Department of Civil Engineering
University of New Orleans
823 Engineering Building
New Orleans, LA 70148

Phone: (504) 286-7089
Fax: (504) 286-5586
E-mail: wrlce@basin.crc.uno.edu

Research and teaching on waste management and environmental engineering. Teaches a formal course in *Pollution Prevention Plans*. Course is designed to develop these plans for industry as required by state law.

247 LT. COL. STEVEN T. LOFGREN

Assistant Professor, Department of Engineering and Environmental Management
Air Force Institute of Technology
AFIT/ENV
2950 P Street, Building 640
Wright-Patterson AFB, OH 45433-7765

Phone: (513) 255-6565 x4314
Fax: (513) 476-4699
E-mail: slofgren@afit.af.mil

Teaches and directs Master's degree level research with graduate students in the area of environmental management at the Air Force Institute of Technology (AFIT). The Graduate Engineering and Environmental Management (GEEM) program at AFIT provides students with graduate education in the management of technical and organizational resources and environmental issues. Engineering management is the discipline which addresses making and implementing strategic and operational decisions in technical settings while considering interrelated systems. AFIT's GEEM program goes beyond other graduate programs which meet this definition by including environmental interrelated systems and considerations in engineering management education. Thus, the GEEM program educates a continuous stream of environmentally conscious students who are prepared to properly plan, direct, and control the activities of the work force which designs, operates, and maintains the physical plant at military installations.

248 DR. KRISHNANAND MAILLACHERUVU

Assistant Professor, Department of Civil and Environmental Engineering
Polytechnic University
Six Metrotech Center
Brooklyn, NY 11201

Phone: (718) 260-3260
Fax: (718) 260-3433
E-mail: kmaillac@duke.poly.edu

Teaches pollution prevention concepts in undergraduate and graduate environmental engineering courses. Conducts research in the following areas: (1) pollution source reduction measures; (2) landfill reclamation

strategies and decision support system development; (3) solid and hazardous waste treatment; (4) industrial waste treatment; (5) biological treatment processes in wastewater treatment; and (6) bioremediation enhancement in subsurface environments.

249 DR. JOSEPH M. MARCHELLO

Old Dominion University
Kaufman-Duckworth Room 35
Norfolk, VA 23529-0241

Phone: (804) 683-3753
Fax: (804) 683-5354
E-mail: jmm1ØØu@triton.kdh.odu.edu

Teaches graduate courses in civil and environmental engineering, specifically in pollution prevention, air quality, solid, and hazardous waste. Teaches a course specifically on P2 and includes P2 concepts in the others. Uses case studies from various sources, for example the American Institute of Chemical Engineers, the University of Tennessee, and EPA reports. Recent projects deal with refuse-derived fuel and bioremediation, and on control of diesel engine air emissions.

250 DR. DAVID H. MARKS

Crafts Professor of Civil and Environmental Engineering
Massachusetts Institute of Technology
Room 1-123
Cambridge, MA 02139

Phone: (617) 253-1992
Fax: (617) 258-6099
E-mail: dhmarks@mit.edu

Serves as the Director of the MIT Program for Environmental Engineering Education and Research, as the Coordinator for the MIT/ETH/UT Alliance for Global Sustainability, and as the Coordinator of the MIT Managing the Future Uses of Chlorine Program. Research interests include: environmental systems, water resource systems, environmental management, industrial ecology and environmental remediation.

251 DR. MALCOLM J. McPHERSON

Massey Professor of Mining Engineering
Department of Mining and Minerals Engineering
Virginia Polytechnic & State University
Blacksburg, VA 24061-0239

Phone: (540) 231-8109
Fax: (540) 231-4070
E-mail: mmcphrsn@vt.edu

Research interests include air pollution (emissions of liquids, gases and particulates from mining activities), land pollution (land disturbance from mining), and control of ventilation and air quality in subsurface environments. Author of book entitled Subsurface Ventilation and Environmental Engineering (Chapman Hall 1993).

252 DR. CAROL J. MILLER

Associate Professor, Department of Civil and Environmental Engineering
Wayne State University
Detroit, MI 48202

Phone: (313) 577-3876
Fax: (313) 577-3881
E-mail: cmiller@eng.wayne.edu

Conducts research involving containment of wastes including design and construction of landfills and computer modelling of subsurface environmental problems. Dr. Miller is also conducting joint research with the Wayne State University Law School on legal aspects of pollution prevention. She teaches *Groundwater Modelling* and *Groundwater/Hydraulics*.

253 DR. DONALD MODESITT

Environmental Engineering Program
University of Missouri
Department of Civil Engineering
Rolla, MO 65401

Phone: (314) 341-4452
Fax: (314) 341-4729

Teaches an introductory environmental engineering course which teaches methods such as process modification, to achieve better environmental results. In a *Water and Wastewater Engineering* course for Senior and Junior level engineering students, introduces ideas like using recycled water in industry. Areas of interest are environmental engineering education and research and consulting in the areas of water quality, waste water treatment, municipal solid waste, hazardous waste, public health, and aquiculture. Is a consultant to municipalities, industry, and individuals on alternative solutions. Active in professional organizations such as the National Society of Professional Engineers, Water Environment Federation, American Waterworks Association, American Academy of Environmental Engineers and the American Society of Civil Engineers.

254 DR. DAVID MOY

Director, Waste Management Research Unit
Griffith University
School of Environmental Engineering
Queensland, AUSTRALIA 4111

Phone: 61 7 3875 5506
Fax: 61 7 3875 5288
E-mail: d.moy@ens.gu.edu.au

Involved in teaching Environmental Engineering Undergraduate, Graduate diploma, and Masters courses. Teaches short courses for specific industry/government programs. Also involved in the technical and curriculum development aspects of Train the Trainer Programs.

255 MR. EL KHOBAR M. NAZECH

Faculty Member, Department of Civil Engineering
University of Indonesia
Campus UI Depok
Jakarta, INDONESIA 16424

Phone: (62) 21 727 0029
Fax: (62) 21 727 0028
E-mail: elkhobar@eng.ui.ac.id

Designed the undergraduate and graduate engineering course in *Pollution Prevention and Clean Industrial Production*. P2/CIP is examined utilizing concrete Indonesian case histories. The course was developed based on a sabbatical study visit in Colorado State University and the National Pollution Prevention Center at the University of Michigan (March—June 1996). Mr. Nazech also assisted in the planning and implementation of US AID's waste reduction assessment studies on specific industries in Indonesia implemented by US experts.

256 DR. FREDERICK G. POHLAND

Professor and Weidlein Chair of Environmental Engineering
University of Pittsburgh
Department of Civil and
Environmental Engineering
1141 Benedum Hall
Pittsburgh, PA 15261-2240

Phone: (412) 624-1880
Fax: (412) 624-0135
E-mail: pohland@civ.pitt.edu

Dr. Frederick G. Pohland, PE, focuses his teaching and research on environmental engineering operations and processes, industrial and hazardous waste management, and environmental impact assessment. Pollution prevention and waste minimization, as well as life cycle assessment and risk management, are included in many of the courses taught within the Graduate program in *Environmental Engineering*. A course in P2 using industrial case studies is taught in collaboration with Chemical and Petroleum Engineering.

257 DR. ROBERT B. POJASEK

Senior Program Director, Cambridge Environmental Inc.
58 Charles Street
Cambridge, MA 02141

Phone: (617) 225-0812
Fax: (617) 225-0813
E-mail: camenv58@aol.com

Is a Lecturer at Tufts University and an Adjunct Professor at Harvard University. The graduate school course on pollution prevention has been offered at Tufts University (Civil and Environmental Engineering Masters in Hazardous Materials Management, Masters in Environmental Engineering) since 1988. The course is participatory where students learn by practicing the use of tools presented during the semester. Course emphasizes waste prevention rather than the design of new water, air, and waste treatment facilities. A new university-wide course is planned for Harvard University starting in the Fall of 1996. A number of courses have been offered to trade associations and private companies on a one-day or two-day schedule. Executive briefings of one hour to four hours have also been presented.

258 DR. ANGELOS PROTOPAPAS

Dept. of Civil and Environmental Engineering
Polytechnic University
6 Metrotech Center
Brooklyn, NY 11201

Phone: (718) 260-3632
Fax: (718) 260-3136

Introduces pollution prevention concepts in two groundwater hydrology courses. The courses emphasize contaminant transport, treatment technologies, and pollution prevention. Plans to offer an extension course on P2 open to the broader Metrotech community (an academic-industrial complex).

259 DR. SHELDON J. REAVEN

Director, Graduate Program in Environmental and Waste Management
State University of New York
College of Engineering and Applied Sciences
210 Old Engineering
Stony Brook, NY 11794-2250

Phone: (516) 632-8765
Fax: (516) 632-7809
E-mail: sreaven@ccmail.sunysb.edu

Devised pollution prevention/waste minimization programs for electronics, automobile, plastics recycling, petrochemical, appliance, and solar panel industries, and for hotels, restaurants and universities. Theoretical work diagnoses methodological problems in measuring pollution prevention and in life-cycle analysis of energy, pollution, waste, and risk. Teaches graduate course, *Diagnosis of Disputes in Pollution Prevention*. Directs Environmental and Waste Management graduate program with strong multidisciplinary emphasis on industrial waste management and pollution prevention. Many students receive paid internships to work on pollution prevention and waste audit projects in the private and public sectors. Serves as the Executive Editor of *Journal of Environmental Systems*, which publishes many articles on pollution prevention.

260 DR. LISA RIEDLE

Department of Civil Engineering
University of Wisconsin—Plattville
1 University Plaza
Plattville, WI 53818

Phone: (608) 342-1539
Fax: (608) 342-1566

Plans to introduce concepts of source reduction and P2 into the current environmental thinking within the Department of Civil Engineering. Teaches substitution and avoidance as sound environmental practice with respect to the use of many consumer products.

261 DR. DIPAK ROY

Professor, Department of Civil and Environmental Engineering
Polytechnic University
6 Metrotech Center
Brooklyn, NY 11201

Phone: (718) 260-3768
Fax: (718) 260-3433
E-mail: droy@duke.poly.edu

Areas of teaching include (1) biological and chemical unit processes for water and wastewater treatment, (2) hazardous waste management, (3) hazardous waste site remediation, and (4) air pollution. Recent research activities include (1) biological processes for waste treatment, (2) disinfection of water and wastewater, (3) hazardous waste management using in-situ remediation techniques like bioremediation and surfactant soil flushing and (4) soil washing using microbubble gas suspensions known as Colloidal Gas Aphrons. Dr. Dipak's professional activities include membership in the American Chemical Society, Water Environment Federation, AEEP, and AWWA.

262 DR. MICHAEL L. SHELLEY

Head, Department of Engineering and Environmental Management
Air Force Institute of Technology
AFIT/ENV
2950 P Street
Wright Patterson Air Force Base, OH 45433-7765

Phone: (513) 255-2998
Fax: (513) 476-4699
E-mail: mshelley@afit.af.mil

The Department of Engineering and Environmental Management of the Graduate School of Engineering at the Air Force Institute of Technology offers the Graduate Engineering and Environmental Management (GEEM) Program. The GEEM program provides students with the opportunity to develop and apply a variety of quantitative and qualitative concepts, skills, and techniques to integrate engineering, science, and policy issues into a decision-making framework for optimum management of facility and environmental programs at the organizational level. Upon completion, students are granted a Master of Science (MS) degree. A thesis is required for graduation. The curriculum includes courses in engineering management, environmental systems engineering, economic and decision analysis, environmental management and policy, quality control and management, operations management, pollution prevention, and organizational management and behavior. In addition, students have the opportunity to focus in a specific area such as engineering management, air resources management, site remediation, or environmental systems analysis.

263 DR. SAMPAT SRIDHAR

Professor of Environmental Engineering
Carleton University
Dept. of Civil and Environmental Engineering
1125 Colonel By Drive
Ottawa, Ontario
CANADA K1S 5B6

Phone: (613) 520-2600 x8280
Fax: (613) 520-3951
E-mail: ssridhar@ccs.carleton.ca

Research and teaching topics include: environmental impact assessment; hazardous and radioactive waste management; solid, liquid and gaseous pollution abatement; energy and environmental impact; wastewater and industrial wastewater treatment; and the use of UV-technologies for pollution abatement.

264 DR. MICHAEL K. STENSTROM

Professor and Chair, Civil and Environmental Engineering Department
University of California—Los Angeles
4173 Engineering I
Los Angeles, CA 90095

Phone: (310) 825-1408
Fax: (310) 206-5476
E-mail: stenstro@seas.ucla.edu

Teaches courses in treatment and prevention of water pollution, including wastewaters and stormwaters. Dr. Stenstrom's research interests center around process development for water and wastewater treatment systems, including mathematical modeling and optimization. A recently completed project involves the use of wastewater reclamation. Dr. Stenstrom's research team constructed and operated a 40L/min. pilot plant at the Grass Valley Treatment Plant in Lake Arrowhead, CA. The pilot plant included dentrification, ozonation, filtration, and two membrane treatment steps. The plant demonstrated virus removal well in excess of California State guidelines. The plant met other treatment objectives as well. In the past two years, the research team has developed a land-use and drainage model for the Santa Monica Bay Water Shed. From this model we can predict pollutant emissions to the Bay and how changes in land-use regulations will affect pollutant emissions. We are also conducting an experimental study to access toxicity in urban runoff.

265 MR. ENDRO SUSWANTORO

Faculty Member, Department of Environmental Engineering
University of Trisakti
JL—Kiyai Tapa No 1
Jakarta, INDONESIA 11440

Phone: (62) 21 566 3232 x767
Fax: (62) 21 560 2575

Conducts research in environmental impact assessment and waste reduction, especially in industry. Has plans to develop courses in pollution prevention.

266 DR. KEN WILLIAMSON

Department of Civil Engineering
Oregon State University
Apperson Hall 202
Corvallis, OR 97331-2301

Phone: (541) 737-6836
Fax: (541) 737-3052
E-mail: williamk@ccmail.orst.edu

Graduate and undergraduate pollution prevention courses are now offered at OSU in the Departments of Chemical Engineering and Civil Engineering. The civil engineering course is offered in Portland through OSU Continuing Education.

267 DR. SANDRA WOODS

Department of Civil Engineering
Oregon State University
Apperson Hall
Corvallis, OR 97331

Phone: (503) 737-6837
Fax: (503) 737-3099

Has worked with Dr. Ken Williamson (see record number 266) on developing Waste Reduction seminars that have served as an introduction to pollution prevention at the Graduate level. The issue of integrating P2 and other environmental problems into engineering curricula is currently being studied.

268 DR. NAZLI YESILLER

Assistant Professor, Department of Civil and Environmental Engineering
Wayne State University
Detroit, MI 48202

Phone: (313) 577-3766
Fax: (313) 577-3881
E-mail: yesiller@eng.wayne.edu

Conducts research involving containment of wastes including design and construction of landfills and computer modelling of the subsurface environmental problems. Dr. Yesiller is interested in using recycled materials such as waste tires in geotechical engineering applications. Also teaches *Land Disposal of Hazardous Waste* (as part of Hazardous Waste Management Program offered by WSU Chemical Engineering Department), *Landfill Design,* and *Remediation Geotechnics.*

269 DR. THOMAS YOUNG

Professor, Civil and Environmental Engineering
Clarkson University
Rowley Laboratories
Potsdam, NY 13699-5715

Phone: (315) 268-4430
Fax: (315) 268-7636
E-mail: adminnyjb@clvm.clarkson.edu

Teaches Undergraduate and Graduate courses in deterministic water quality simulation modeling for surface and subsurface aquatic systems, limnology, environmental microbiology, water renovation processes, wet chemical and instrumental environmental analysis, engineering design, computer programming, and courses on other topics appropriate to environmental science and engineering. Research interests include: contaminant fate and transport modeling in aquatic systems, fluvial load estimation, uncertainty and sensitivity analysis, applied environmental statistics; reactions of environmental contaminants in heterogeneous systems, surface-chemical phenomena in aqueous systems, applications to industrial and hazardous waste management; chemical aspects of lake acidification and regionalization of aquatic effects. Also involved with the Hazardous Waste & Toxic Substance Research and Management Center. For additional information on people involved with the Hazardous Waste Center, see record numbers 108 (Powers), 112 (Theis), 232 (Collins) and 270 (Zander).

270 DR. AMY ZANDER

Assistant Professor, Department of Civil and Environmental Engineering
Clarkson University
Rowley Laboratories
Potsdam, NY 13699-5715

Phone: (315) 268-6532
Fax: (315) 268-7636
E-mail: adminnyjb@clvm.clarkson.edu

Teaches on water and wastewater quality and treatment. Research interest includes physical, chemical and biological treatment processes in water and wastewater. A special interest lies in the area of membranes in air, water and wastewater treatment, including membrane phase contact processes and pressure-driven membrane processes. Also involved in the Hazardous Waste and Toxic Substance Research and Management Center. For additional information on people involved with the Hazardous Waste Center, see record numbers 108 (Powers), 112 (Theis), 232 (Collins) and 269 (Young).

COMPUTER SCIENCE

271 MR. TIM McALOONE
Researcher, Computer Integrated Manufacturing Institute
Cranfield University
Cranfield, Bedford
MK43 ØAL UNITED KINGDOM

Phone: (44) 0 1234 754073
Fax: (44) 0 1234 750852
E-mail: tmcaloone@cim.cran.ac.uk

The Computer Integrated Manufacturing (CIM) Institute was established to be a leading international center for research, consultancy and postgraduate education in Computer Integrated Manufacturing (CIM). The CIM Institute offers a one-year, full-time Master's Degree course; a program of research projects carried out by Ph.D. students and contract staff; in-house staff development projects for industrial clients; and a professional business consultancy service. The CIM Institute conducts research into providing decision support within the design process to enable product designers to consider the environment up-front in the design process. One of our major activities in this area is a project entitled *Design for the Environment, Decision Support* (DEEDS). The project is government funded and shared across two universities, Cranfield and Manchester Metropolitan. It is supported by Electrolux Floorcare Ltd and ICL plc., two British companies. The key outcomes of the project are: (1) a set of practical, effective and proven tools to improve the environmental performance of products; and (2) an integrated model of the environmentally conscious design process, validated by mapping onto the individual companies. For more information, visit WWW site at http://www.zen.co.uk/cim.inst/research/environm/deeds/deeds.html.

272 DR. DUNDEE NAVIN CHANDRA
Robotics Institute
Carnegie Mellon University
School of Computer Science
5000 Forbes Avenue
Pittsburgh, PA 15213

Phone: (412) 268-7019
Fax: (412) 268-5699
E-mail: dchandra@cs.cmu.edu

Currently researching product disassembly guideline software to aid in product design for the environment. The system is called *ReStar* and is available from the Green Engineering Corporation in Pittsburgh. Co-teaches undergraduate project courses which in recent years have included product pollution prevention projects.

ENGINEERING

273 DR. JACK A. FISHSTROM

Lecturer, College of Engineering
University of Michigan
323 Engineering Programs Building
2609 Draper
Ann Arbor, MI 48109-2140

Phone: (313) 936-4907
Fax: (313) 763-1558
E-mail: jackfish@umich.edu

Incorporation of pollution prevention concepts into *Introduction to Engineering* courses for first year students. Development and distribution of educational videos on hazardous waste management, pollution prevention, bioremediation and innovative remedial cleanup technology.

274 DR. WILLIAM H. GLAZE

Chairman, Department of Environmental Sciences and Engineering
University of North Carolina at Chapel Hill
School of Public Health
CB#7400, Rosenan Hall
Chapel Hill, NC 27599-7400

Phone: (919) 966-1024
Fax: (919) 966-2583
E-mail: wglaze@sphvax.sph.unc.edu

Several courses are offered in graduate and doctoral degree programs that include aspects of pollution prevention. These include: *Management of Hazardous Waste, Air Pollution Control,* and *Current Applications in Environmental Management*.

275 DR. PIERRE M. LICHAA

Coordinator, Border Programs
Texas Natural Resource Conservation Commission
TNRCC-MC 112
TNRCC P.O. Box 13087
Austin, TX 78711-3087

Phone: (512) 239-3132
Fax: (512) 239-3165
E-mail: plichaa@smtpgate.tnrcc.state.tx.us

Developing with the University of Texas—Pan America (with Dr. Wayne Wells) a set of curriculum materials and appropriate cases which can be used by faculty members in a variety of engineering courses which integrate pollution prevention and waste reduction into the existing engineering curriculum. Provide environmental technical assistance and outreach to federal, state, and municipal authorities, and the general public at the Texas/Mexico border.

276 DR. ALBERT MACHLIN

Adjunct Associate Professor, New York Institute of Technology
330 West 28th Street, Number 18F
New York, NY 10001-4722

Phone: (212) 675-5868
Fax: (212) 924-8071
E-mail: amachlin@aol.com

Dr. Albert Machlin, PE is a member of the Consulting Group for the Center for Advanced Food Technology (CAFT) at Rutgers University. This group serves the food industry of New Jersey. Has given two pollution prevention seminars to executives of the food industry. Another seminar is planned for this year. Also lectures on pollution prevention at New York Institute of Technology.

277 DR. INDIRA NAIR

Engineering and Public Policy
Carnegie Mellon University
Shenley Park
Pittsburgh, PA 15206

Phone: (412) 268-3645
Fax: (412) 268-1019

Teaches project courses for undergraduates. Recent courses have focused on green automobile design, component labeling for recycling/reuse, design for waste avoidance, and environmental ethics.

INDUSTRIAL ECOLOGY

278 DR. JESSE AUSUBEL

Program for the Human Environment
The Rockefeller University
1230 York Avenue, Box 234
New York, NY 10021-6399

Phone: (212) 327-7842
Fax: (212) 327-7519
E-mail: phe@rockvax.rockefeller.edu

The Program for the Human Environment at the Rockefeller University recognizes the growing connection between the biological and other research and environmental concerns. The program houses research, organizes meetings on topics of interest to the bio-medical community, hosts visiting scientists in environmental fields, and encourages faculty-student collaborations at the host institution. The Program is responsible for communicating widely the scientific results of environmental studies in an effort to inform environmental policies. It also houses selected studies concerned with the health of the scientific enterprise. It is involved in the development of industrial ecology, the study of the network of all industrial processes as they may interact with each other and live off each other, in the sense of direct use of each other's material and energy wastes and products, as well as economically. The program also explores how long-run technical change relates to efficiency of use of land, energy, and materials and the consequences for human populations. A related concern is relative risk, which is approached by considering "the community as patient" with respect to provision of health and environmental services and associated research needs. With regard to analytical methods, we are interested in statistical analysis of long time-series of environmental data, models of growth and diffusion, and software for effective graphical display. For more information, visit WWW site at http://www.rockefeller.edu/phe.

279 DR. RAYMOND P. CÔTÉ

Director, School for Resource and Environmental Studies
Dalhousie University
1312 Robie Street
Halifax, Nova Scotia
CANADA B3H 3E2

Phone: (902) 494-3632
Fax: (902) 494-3728
E-mail: rcote@is.dal.ca

Teaches courses on *Management of Chemicals and Wastes* (a multidisciplinary perspective on management of this complex issue); *Management and the Natural Environment* (a course oriented primarily to the threats and opportunities involving business); and a seminar on *Industrial Ecology* (an introduction to the developing field of industrial ecology). Directs a multidisciplinary research and development program on industrial parks as ecosystems. Project reports include: (1) Designing and Operating Industrial Parks as Ecosystems; (2) The Industrial Park as an Ecosystem: Sectoral Case Studies; (3) The Industrial Park as an Ecosystem: Cross-Sectional Case Studies; (4) Industrial Parks as Ecosystems: Updated and Annotated Bibliography; and (5) Industrial Parks as Ecosystems: Diskette Presentation.

280 DIPL. -ING ANDREAS FRIEDEL

Professor, Fraunhofer Institute for Manufacturing and Automation
Stuttgart University
Nobelstrasse 12
Stuttgart, GERMANY 70569

Phone: 49 711 970 1301
Fax: 49 711 970 1399
E-mail: mbh1@ipa.fhg.de

Teaches on the subjects of (1) eco-controlling; (2) DfE of complex technical products; (3) life cycle analysis; (4) system analysis of EMAS's; and (5) material and energy flow analysis. Research topics include: (1) energy-based assessment of waste management processes for complex technical products; (2) DfE of complex technical products; and (3) planning of refurbishing/recycling systems and processes. Has written several publications related to the above teaching and research activities.

281 DR. ROBERT A. FROSCH

Senior Research Fellow, Center for Science and International Affairs
Adjunct Lecturer in Public Policy, J.F. Kennedy School of Government
Harvard University
79 John F. Kennedy Street
Cambridge, MA 02138

Phone: (617) 495-8132
Fax: (617) 495-8963
E-mail: rfrosch@ksgrsch.harvard.edu

Has taught course with Professor William C. Clark entitled *Environment and Public Policy*, which builds on ideas from industrial ecology. Currently teaching graduate seminar entitled *Public Policy for Industrial Ecosystems: Towards the Sustainable Management of Materials*. Working on a research project titled The Industrial Ecology of Metals. This project is an investigation into the patterns of flow (mostly non-ferrous) metals through metal manufacturing companies (ex. foundries, machine shops, finishers) focussing on the New England area, but tracing the metals from source to recycle or disposal. Also examines the efficiency of this process in terms of metal use in products or recycling compared to emissions and loss. Recent publications include "Industrial Ecology: Minimizing the Impact of Industrial Waste" (*Physics Today*, Nov. 94); "The Industrial Ecology of the 21st Century" (*Scientific American*, Sept. 95); and "Industrial Ecology: Adapting Technology for a Sustainable World" (*Environment*, Dec 95).

282 MR. T. E. GRAEDEL

Adjunct Professor, Yale University
AT&T Bell Labs
600 Mountain Ave.
Room 1D349
Murray Hill, NJ 07974

Phone: (908) 582-5420
Fax: (908) 582-3958
E-mail: teg@bell-labs.com

As an Adjunct Professor at Yale University, co-taught *Industrial Ecology* with B.R. Allenby in Fall 1994 and Spring 1996. Co-authored instructors manual for course with Allenby. Industrial Ecology is available from any Prentice Hall marketing representative.

283 DR. CHRISTOPHER HENDRICKSON

Duquesne Light Professor of Engineering
Carnegie Mellon University
Department of Civil and
Environmental Engineering
Pittsburgh, PA 15213-3890

Phone: (412) 268-2948
E-mail: cth+@andrew.cmu.edu

Conducts research and development on product and process design for the environment. Individual projects include: creating software tools for environmentally-conscious product design, design stage life cycle analysis, and post-consumer product recycling and disposal—with application to automobiles, chemicals, construction facilities and electronics.

284 DR. VICTOR M. IBEANUSI

Assistant Professor, Department of Biology
Spelman College
350 Spelman Lane
Atlanta, GA 30314

Phone: (404) 223-7641
Fax: (404) 223-1449
E-mail: vibeanus@etta.auc.edu

Teaching and research interests have been in the area of applied environmental microbiology. Through his research, Dr. Ibeanusi has developed a cost-effective integrated mixed microbial ecosystem for *in situ* bioremediation of a variety of heavy metals and aromatic compounds from sediments and water. In addition, Dr. Ibeanusi directs the Spelman environmental studies efforts and strongly advocates for the incorporation of environmental courses within the curricula of liberal arts colleges, particularly those schools serving persons of color and women. He is the founder and faculty director of the Spelman College Environmental Task Force (SCETF); an outreach organization set up to give students, faculty and the community a greater voice in planning for conservation. Dr. Ibeanusi has received several grant awards from the US EPA, DOE and DOI for his research in the area of bioremediation. He is one of the recipients of the AT&T Industrial Ecology Fellowship, selected by the AT&T Foundation to conduct research in the newly emerging area of industrial ecology. He has over 40 abstract presentations and publications in the area of bioremediation.

285 DR. LYNN JELINSKI

Cornell Center for Advanced Technology - Biotechnology
Cornell University
130 Biotechnology Building
Ithaca, NY 14853-2703
Phone: (607) 255-2300
Fax: (607) 255-6249
E-mail: lwj2@cornell.edu

Teaching emphasis in pollution prevention includes use of biotechnology and biophysical processes to interface with environmental problems.

286 DR. PAUL R. McCRIGHT

Associate Professor, Department of Industrial and Management Systems Engineering
University of South Florida
ENG 118
4202 East Fowler Avenue
Tampa, FL 33620-5350
Phone: (813) 974-2709
Fax: (813) 974-3651
E-mail: mccright@sunburn.ec.usf.edu

Teaches two courses in the graduate program in Industrial Engineering at University of South Florida. *Environmental Management and Manufacturing Strategy* is designed to cover issues related to managing a manufacturing firm for minimal negative environmental impact. It focuses on a strategy of waste minimization rather than waste treatment. It includes the need for waste minimization efforts, regulation, audits, performance measurement, green marketing, and packaging. It includes a project to perform an environmental audit of a firm. *Industrial Waste Minimization* focuses on product and process design choices which can reduce waste products and pollution generated by manufacturing and other industrial operations.

287 DR. VALERIE THOMAS

Center for Energy and Environmental Studies
Princeton University
H102 Engineering Quad
Princeton, NJ 08544-5263
Phone: (609) 258-4665
Fax: (609) 258-3661
E-mail: vmthomas@pucc.princeton.edu

Works with students to try to determine which materials are used and in what manner in the entire industrial system. Studies problems caused by these materials and looks for opportunities for pollution prevention. Work focuses on industrial ecology of cadmium, lead, and dioxin, mostly at the regional, national, or global scale. Special emphasis is on the use of exposure assessment in industrial ecology, and on the technical factors contributing to the continuing international use of leaded gasoline.

INDUSTRIAL ENGINEERING AND OPERATIONS RESEARCH

288 DR. DAVID CRESS
Associate Professor, Petroleum Engineering Department
Marietta College
215 Fifth Street
Marietta, OH 45750
Phone: (614) 376-4780
Fax: (614) 376-4777
E-mail: cressd@mcnet.marietta.edu

Teaches an introductory course in Industrial Engineering. The course has modules on life cycle analysis and design for the environment. Developing pollution prevention modules for courses in air pollution control and environmental science.

289 DR. MIRIAM HELLER
Assistant Professor, Department of Industrial Engineering
University of Houston
4800 Calhoun Road
Houston, TX 77204-4812
Phone: (713) 743-4193
Fax: (713) 743-4190
E-mail: heller@jetson.uh.edu

Developed and introduced *Industrial Ecology* into curriculum. Course used Graedel and Allenby's text, used and expanded some NPPC materials, Padnos' *Environmentally Conscious Design* manual, NEWMOA material, and Allan's book on pollution prevention: Homework and Design Problems for Engineering Curriculum. The course had three guest speakers (DuPont, Compaq and M.W. Kellogg), two field trips (Champion International Paper and Compaq Computer), one project and one class wide analysis and write-up of the Compaq field-trip. Dr. Heller injects environmental engineering and policy decision making problems into operations research and artificial intelligence courses. Conducts research in expert design and selection of pollution prevention technology in metal finishing and electroplating industry. Research also in environmental cost accounting, including the development of an Activity-Based Environmental Cost Analysis System (ABECAS), and cross-border benchmarking on environmental cost accounting. Co-authored World Resource Institute case studies on environmental cost accounting at Amoco Yorktown refinery and DuPont.

290 DR. K. B. RUNDMAN
Metallurgical and Materials Engineering
Michigan Technological University
1400 Townsend Drive
Houghton, MI 49931
Phone: (906) 487-2632
Fax: (906) 487-2934
E-mail: krundman@mtu.edu

Focuses on material flow in an industrial society. Is developing a new senior/graduate level course on material and energy flow in an industrial society, and has co-developed a sophomore level course, *Engineering for the Environment*. Is also incorporating P2 concepts (focusing on recycling, air quality, and solid waste problems in the foundry industry) in a Senior level hands-on course on cast metals.

291 DR. JULIE ANN STUART

Assistant Professor, Department of Industrial, Welding, and Systems Engineering
The Ohio State University
1971 Neil Avenue
Columbus, OH 43210-1271
Phone: (614) 292-6239
Fax: (614) 844-7852
E-mail: jastuart@cadcam.eng.ohio-state.edu

In Fall 1995, Dr. Stuart incorporated environmental issues into the required senior undergraduate level course *Operations and Facilities Planning* at Georgia Tech. Her Ph.D. dissertation in Industrial and Systems Engineering focused on the development of an analytic model to aid in the selection of manufacturing product and process alternatives with consideration of trade-offs between yields, reliability, and environmental impacts. One of the benefits of the model is that it allows manufacturers to quantitatively study the impacts of pollution prevention over time. The approach is validated using a test case from the electronics industry but can be applied to other industry cases. Currently, Dr. Stuart is teaching in the Department of Industrial, Welding and Systems Engineering at Ohio State University.

MECHANICAL ENGINEERING

292 DR. JAMES W. BLACKBURN

Associate Professor, of Mechanical Engineering and Energy Processes
Southern Illinois University at Carbondale
Carbondale, IL 62901
Phone: (618) 453-7008
Fax: (618) 453-7455
E-mail: blackbur@engr.siu.edu

Is currently teaching undergraduate and graduate coursework and implementing a research program in bioremediation and pollution prevention. Dr. Blackburn is a member of the American Institute of Chemical Engineers, the American Society for Microbiology, and the American Chemical Society and is a registered professional engineer in the State of Ohio. His research interests include: bioremediation processes; bioprocess treatment of waste and wastewater; pollution prevention through tuning complex chemical processes and bioprocesses for higher yields and lower by-product/waste generation; and reduction or control of organic air emissions.

293 DR. BARNEY L. CAPEHART

Industrial and Systems Engineering
University of Florida
303 Weil Hall
Box 116595
Gainsville, FL 32611
Phone: (352) 392-3180
Fax: (352) 392-3537
E-mail: capehart@ise.ufl.edu

Through the University of Florida Industrial Assessment Center, Dr. Capehart performs industrial assessments in order to reduce energy costs and to reduce industrial waste generation. Teaches a course each year on *Energy Management*. Chairman of the University of Florida Energy Network. Author of textbook, Guide to Energy Management (Atlanta: Fairmont Press, 1994).

294 DR. SHIRLEY FLEISCHMANN

Seymour and Esther Padnos School of Engineering
Grand Valley State University
301 West Fulton, Suite 618
Grand Rapids, MI 49504

Phone: (616) 771-6762
Fax: (616) 771-6642

The Seymour and Esther Padnos School of Engineering at Grand Valley State University has just completed a two year curriculum development project in which they developed and classroom tested student design projects and problems through which students learn to incorporate environmental issues from the first stages of a design project. They have embedded an environmental theme into the entire curriculum for all engineering students in their program. Curriculum resources have been developed for freshmen—introduction to design classes, material sciences, ethics, thermodynamics, manufacturing processes, and heat transfer as well as Senior projects. A notebook of these materials, *Teaching Environmentally Responsible Design*, is available upon request. The Padnos School of Engineering also annually administers the *Padnos Design Competition* for environmentally responsible student design projects. This competition is co-sponsored by the Padnos Foundation and American Society of Mechanical Engineers (ASME).

295 DR. MAHENDRA S. HUNDAL

Professor of Mechanical Engineering
The University of Vermont
Votey Building
Burlington, VT 05405-0156

Phone: (802) 656-1930
Fax: (802) 656-1929
E-mail: hundal@emba.uvm.edu

Teaches about Design for Environment in his design course. Dr. Hundal's professional and scholarly activities in the recent years have included the following: designing for manufacturability, designing for cost, product development, and noise and vibrations. He is also a member of the American Society of Mechanical Engineers and the Institute of Noise Control Engineering

296 DR. EDWARD S. RUBIN

Professor of Mechanical Engineering and Public Policy
Director, Center for Energy and
Environmental Studies
Carnegie Mellon University
128 A Baker Hall
Pittsburgh, PA 15213

Phone: (412) 268-5897
Fax: (412) 268-3757
E-mail: rubin+@cmu.edu

Working on an NSF project to enhance the environmental content of engineering curricula, with a focus on Freshman and Sophomore courses. Also involved in a broader *Environment Across the Curriculum* effort at Carnegie Mellon, coordinated by CMU's Environmental Institute. Dr. Rubin's research focuses on the green design of electric power systems and chemical processes. A comprehensive set of detailed engineering-economic models of advanced coal-based energy conversion systems and environmental control technologies is being developed under sponsorship of the U.S. Department of Energy as the keystone of this effort. The focus of this research is on innovative process design, process optimization to minimize environmental impacts, and the characterization of uncertainties and technological risks. For more information, visit WWW site at http://www.epp.emu.edu/.

297 DR. J. K. SPELT
Department of Mechanical Engineering
University of Toronto
5 King's College Road
Toronto, Ontario
CANADA M5S 1A4

Phone: (416) 978-5435
Fax: (416) 978-7753
E-mail: spelt@me.utoronto.ca

Teaches a half-year course entitled *Environmental Engineering*, which is a required core course for all Senior Mechanical Engineering students. A large part of the course deals with the concepts of P2 engineering, although the students are also introduced to other topics such as applied ecology, regulatory theory, the causes of environmental disturbances, pollution control, and various aspects of energy conservation. She is the Mechanical Engineering representative for the Collaborative Environmental Engineering Program, a group of environmental options taken by undergraduate students in the general programs of Mechanical Engineering, Civil Engineering and Chemical Engineering.

NAVAL ENGINEERING

298 DR. ANASTASSIOS PERAKIS
Associate Professor, Naval Architecture and Marine Engineering
University of Michigan
College of Engineering
218 NAME Building
Ann Arbor, MI 48109

Phone: (313) 764-3723
Fax: (313) 936-8820
E-mail: tassos@engin.umich.edu

Since 1984, offered every year NA 582 (3 credits), *Reliability and Safety*, a graduate Marine Systems course. Also teaches an advanced seminar NA 685 (1 credit), which includes topics on marine system safety. Almost all research to date has the common theme of probabilistic modeling and optimization of marine systems.