US News & World Reports

America's Best Graduate Schools

#46 in Electrical Engineering

#62 in Computer Engineering

RANK

2003 – 2004

Annual Report

ELECTRICAL & COMPUTER ENGINEERING

UNM

The University of New Mexico

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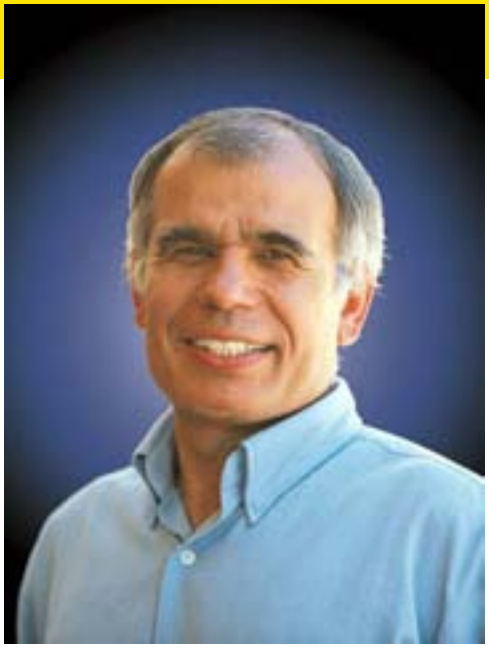
Faculty Awards

Stephen D. Hersee	IEEE Fellow
Marek Osinski	Optical Society of America Fellow
Mo Jamshidi	New York Academy of Sciences Fellow
Mark A. Gilmore	DOE Office of Science Junior Faculty Development Award
Marios S. Pattichis	ECE Distinguished Teacher Award
Sanjay Krishna	ECE Distinguished Researcher Award
Peter Dorato	School of Engineering Teacher of the Year Award
Chaouki T. Abdallah	School of Engineering Researcher of the Year Award
Edl Schmiloglu	Lawton-Ellis Award
David A. Bader	IEEE Distinguished Speaker (Computer Society)
Ramiro Jordan	International Network for Engineering Education and Research Achievement Award
Petr G. Eliseev	The OSA Nick Holonyak Award
Tom W. Sigmon	Founder's Award "Ions Caltech 1967-76"

FROM THE CHAIR



Welcome to the Electrical and Computer Engineering Department (ECE) at the University of New Mexico. This annual report provides a summary of the teaching, research, and service achievements of the ECE Department during the 2003-2004 academic year.

In the 2004 *US News & World Reports* ranking survey, our Electrical Engineering (EE) graduate program was ranked #46 in the nation and our Computer Engineering (CompE) graduate program #62. The EE and CompE programs were the only ECE graduate programs in the entire state of New Mexico to make the *US News & World Reports* listing. Our EE program tied with Brown University, Vanderbilt, Boston University, Colorado State, Rutgers, and Michigan State, and our CompE program tied with Illinois-Chicago, Oregon State, and Worcester.

Furthermore, this year, the *US News & World Reports* ranked the top seventy-five individual engineering programs as opposed to earlier years when only the top twenty-five were ranked. This ranking pays tribute to the efforts and hard work of our staff, graduate students, and faculty, which are the main reasons both the EE and CompE programs are on the map. Hiring quality professors and focusing on the quality of education we provide to our students are some of the factors that propel our rankings and ultimately enhance our reputation.

Each year the selectivity of our graduate program increases. Our acceptance ratio currently ranges from 15-20% per year. We currently have about 285 full-time graduate students, 130 of whom are Ph.D. students.

We continue to develop our laboratories and have made several improvements to both our teaching and research facilities. We now have a new Embedded Systems/DSP Laboratory that was established with the assistance of a generous donation from the Xilinx Corporation. Our Senior Design Project Laboratory has been revamped and upgraded to provide the required software and hardware tools for the design and development of industry sponsored senior design projects.

The scholarly works of our faculty have increased in every area, including journal publications, conference papers, patents, book chapters, and authored books. Research funding this year again exceeds the $10 Million mark.

The ECE faculty continue to receive national and international awards: Prof. Steve Hersee was elected Fellow of the IEEE for his contributions to the development of quantum well lasers by metal organic chemical vapor deposition. Prof. Marek Osinski was elected Fellow of the Optical Society of America for his contributions to the theory and simulation of semiconductor lasers. Professor Mo Jamshidi was elected Fellow of the New York Academy of Sciences. Dr. Schamiloglu's program on high power microwaves and pulsed power appeared in the *IEEE Spectrum* (November 2003 issue). Prof. Steve Brueck led the UNM team that won the $14 Million per year joint grant with twelve other universities to provide a nationwide network of user facilities for nanotechnology research. This was a highly competitive program with five multi-university proposals being submitted to NSF. The National Nanotechnology Infrastructure Network (NNIN) grant will span a five year period.

Thank you for taking the time to learn about the ECE Department.
For more information, please visit our website at: www.ece.unm.edu

DEPARTMENT INFORMATION

Teaching Laboratories

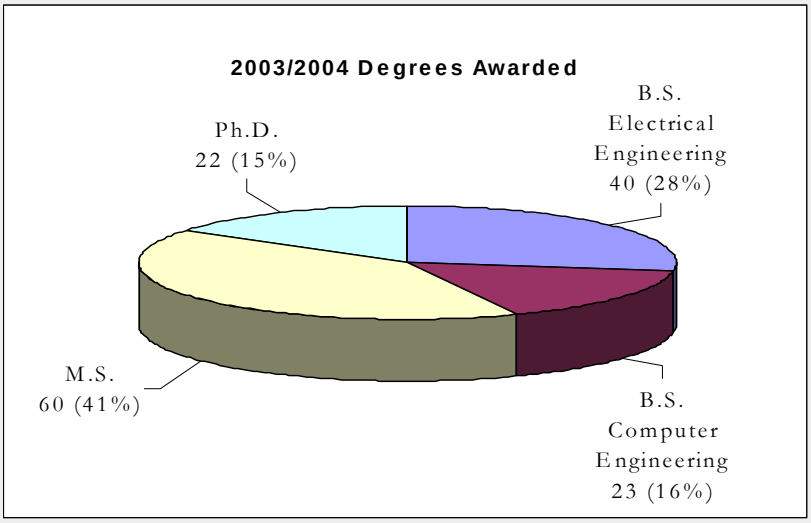
Networked Multimedia and Parallel Computing
Coordinated Systems & Controls
High-Performance Computing
Advanced Microprocessor
Embedded Systems/DSP
Senior Design Projects
Software Engineering
Microwave/Antennas
Computer Design
Microprocessor
Digital Logic
Electronics

Research Laboratories

Visualization
ACE/ISE Center
CHTM Clean Rooms
Optical Spectroscopy
Crystal Growth Facility
Antenna & Computational EM
High-Performance Computing
Pulsed Power, Beams and Microwaves
Networked Multimedia and Parallel Computing
Robotics, Artificial Intelligence & Vision Laboratory (RAIV)
image and video Processing and Communications (ivPCL)
High Performance Algorithms & Applications Research Group (HPAA)

Degrees Awarded

B.S. Electrical Engineering - 40
B.S. Computer Engineering - 23
M.S. - 60
Ph.D. - 22



Scholarly Activities

Refereed Journal Papers - 70
Conference Papers - 163
Book Chapters - 9
Patents - 14
Books - 6

Sponsored Research

Total Research Funding - $10,977,000

Corporate & Private Donations

Total Donations - $452,399

JOINT APPOINTEES

Edward S. Angel
Professor
Ph.D., USC
Interests: Computer graphics, scientific visualization.

Jean-Claude M. Diels
Professor
Ph.D., Brussels (Belgium)
Interests: Laser physics and nonlinear optics, ultrafast phenomena.

Robert V. Duncan
Professor & Associate Dean, College of Arts & Sciences
Ph.D., UC-Santa Barbara
Interests: Precision measurements, remote sensing, experimental tests of fundamental physics.

Vladimir I. Koltchinskii
Professor
Ph.D., Kiev (Ukraine)
Interests: Probability, especially probability in Banach spaces, limit theorems, empirical processes, concentration inequalities; mathematical statistics, especially nonparametric statistics; machine learning, especially statistical and computational learning theory; applications of learning theory to control.

Ronald Lumia
Professor
Ph.D., Virginia
Interests: Robotics, automation, image processing.

John K. McIver
Professor & Associate VP for Research
Ph.D., Rochester
Interests: Laser physics and nonlinear optics, quantum optics, nonlinear science.

Bernard M.E. Moret
Professor
Ph.D., Tennessee
Interests: Algorithm engineering, experimental algorithmics.

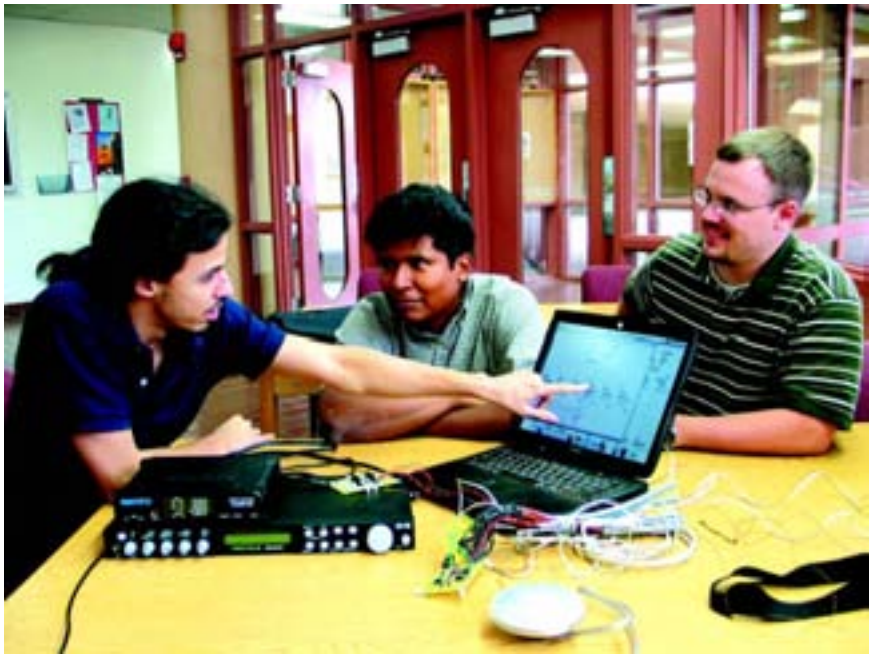
Stefan Posse
Associate Professor
Ph.D., Dusseldorf (Germany)
Interests: MR imaging and spectroscopy.

Timothy J. Ross
Professor
Ph.D., Stanford
Interests: Structural system reliability, structural dynamics, autonomous control, fuzzy logic, fuzzy set theory, risk assessment.

Wolfgang G. Rudolf
Professor
Ph.D., Jena (Germany)
Interests: Laser physics, ultrashort light pulses, time-resolved spectroscopy and imaging.

Gregory P. Starr
Professor
Ph.D., Stanford
Interests: Robotics and dynamic systems and controls.

Monsoor Sheik-Bahae
Associate Professor
Ph.D., SUNY-Buffalo
Interests: Lasers and photonics, coherent and ultrafast processes in semiconductors, laser cooling of solids, nonlinear optics.



Chaouki T. Abdallah
Professor, Associate Chair, & Director-Graduate Program
Ph.D., Georgia Institute of Technology
Interests: Control systems, and wireless communications.

David A. Bader
Associate Professor
Ph.D., University of Maryland
Interests: High-performance computing, parallel computation, computational biology and genomics, remote sensing and image processing.

Steven R. J. Brueck
Professor & Director, Center for High Technology Materials (CHTM)
Ph.D., Massachusetts Institute of Technology
Interests: Laser-material interactions, electro-optic devices, laser spectroscopy.

Thomas P. Caudell
Associate Professor
Ph.D., University of Arizona
Interests: Neural networks, virtual reality, machine vision, robotics and genetic algorithms.

Christos G. Christodoulou
Professor & Department Chair
Ph.D., North Carolina State University
Interests: Modeling of electromagnetic systems, phased array antennas, antennas for wireless communications, microwave systems and applications of neural networks in electromagnetics.

Lawrence T. Clark
Associate Professor
Ph.D., Arizona State University
Interests: Low power and high performance VLSI architecture and circuit design, computer-aided design for VLSI, microprocessor architecture and design.

Peter Dorato
Professor
D.E.E., Polytechnic Institute of Brooklyn
Interests: Optimal control, robust design in feedback control systems.

Charles B. Fleddermann
Professor & Associate Dean, School of Engineering
Ph.D., University of Illinois at Urbana-Champaign
Interests: Plasma processing, physical electronics, photovoltaics.

Mark A. Gilmore
Assistant Professor
Ph.D., University of California-Los Angeles
Interests: Plasma physics, plasma diagnostics, magnetic confinement fusion, microwave engineering.

Charles F. Hawkins
Professor
Ph.D., University of Michigan
Interests: VLSI design and testability, IC failure analysis, IC reliability.

Majeed M. Hayat
Associate Professor
Ph.D., University of Wisconsin at Madison
Interests: Optical communication, statistical communication theory, signal and image processing, communication networks, applied probability and stochastic processes.

Gregory L. Heileman
Professor, Associate Chair, & Director-Undergraduate Program
Ph.D., University of Central Florida
Interests: Data structures and algorithmic analysis, theory of information and computing, machine learning and pattern recognition.

Manuel Hermenegildo
Professor, Prince of Asturias Endowed Chair in Information Science and Technology
Ph.D., University of Texas at Austin
Interests: Advanced program developments, programming languages, constraint and logic programming, resource-aware high-performance and distributed computing, compilers.

Stephen D. Hersee
Professor
Ph.D., Brighton Polytechnic, England
Interests: Semiconductor materials, microelectronics and optoelectronic devices.

Diana L. Huffaker
Associate Professor
Ph.D., University of Texas at Austin
Interests: Semiconductor lasers, group III-nitrides, quantum dots.

Ravinder K. Jain
Professor
Ph.D., University of California at Berkeley
Interests: Quantum electronics, optoelectronics, electro-optics, experimental solid-state physics.

THEIR RESEARCH INTERESTS

Mohammad Jamshidi
Professor
Ph.D., University of Illinois at Urbana-Champaign
Interests: Large-scale system theory and applications, autonomous control for robotic agents, biomedical modeling and simulation, space autonomy.

Ramiro Jordan
Associate Professor
Ph.D., Kansas State University
Interests: Data communications, multidimensional signal processors, software engineering.

Sanjay Krishna
Assistant Professor
Ph.D., University of Michigan at Ann Arbor
Interests: Design, fabrication and characterization of mid-infrared detectors using self-organized quantum dots, studying mid-infrared detectors using low bandgap antimonides, investigating interband laser for high speed long haul communication using quantum wells and quantum dots as the active region.

Luke F. Lester
Associate Professor & Associate Director, Center for High Technology Materials (CHTM)
Ph.D., Cornell University
Interests: High speed and high power semiconductor lasers, high temperature electronics, microwave devices, turnable lasers, III-V semiconductor devices.

Kevin J. Malloy
Professor & Associate Dean for Research, School of Engineering
Ph.D., Stanford University
Interests: Semiconductor physics, device physics.

Marek Osinski
Professor
Ph.D., Institute of Physics, Polish Academy of Sciences
Interests: Semiconductor lasers, optoelectronic devices and materials, group-III nitrides, degradation mechanisms and reliability, computer simulation.

Marios S. Pattichis
Assistant Professor
Ph.D., University of Texas at Austin
Interests: Digital image and video processing and communication, Telemedicine, digital signal processing.

L. Howard Pollard
Assistant Professor
Ph.D., University of Illinois at Urbana-Champaign
Interests: Computer architecture, digital design, fault tolerance, microprocessors.

Andres C. Salazar
Professor, PNM Endowed Chair in Microsystems, Commercialization and Technology
Ph.D., Michigan State University
Interests: Commercialization of technology, microsystems and MEMS applications, business planning.

Balu Santhanam
Assistant Professor
Ph.D., Georgia Institute of Technology
Interests: Statistical signal processing, statistical communications, digital signal processing, time-frequency analysis, adaptive signal processing, and general signal processing.

Edl Schamiloglu
Professor
Ph.D., Cornell University
Interests: Physics and technology of charged particle beam generation and propagation, high power microwave sources, pulsed power science and technologies, plasma physics and diagnostics, electromagnetics and wave propagation.

Wei Wennie Shu
Associate Professor
Ph.D., University of Illinois at Urbana-Champaign
Interests: Operating systems and resource scheduling, system support for parallel computing, multimedia networking.

Thomas W. Sigmon
Professor, Endowed Chair in Microelectronics and Optoelectronics
Ph.D., Stanford University
Interests: Pulsed laser processing of electronic materials, fabrication of polysilicon thin film devices on flexible plastic substrates and metals, development of spin polarized injection and transport in semiconductor materials.

Christopher E. Smith
Assistant Professor
Ph.D., University of Minnesota
Interests: Robotics, computer vision, medical image processing, intelligent transportation systems, virtual collaborative environments.

J. Scott Tyo
Assistant Professor
Ph.D. University of Pennsylvania
Interests: Time-domain electromagnetics, electromagnetic modeling, wideband radar, polarimetric and spectral remote sensing.

Min-You Wu
Associate Professor
Ph.D., Santa Clara University
Interests: Parallel programming systems, multimedia systems, parallel and real-time OS, computer architecture.

UNDERGRADUATE

Undergraduate Program:
Gregory Heileman
Director
heileman@ece.unm.edu

Roberta Menicucci
Academic Advisor
rmenicucci@ece.unm.edu

The Department of Electrical and Computer Engineering (ECE) continues to be recognized locally, nationally, and internationally for the quality of its undergraduate programs. These two programs, one in electrical engineering and the other in computer engineering, have continued to change over the past few years in order to stay current with the dynamic evolution of these professions. In addition, ECE students are exposed to state-of-the-art technology in the department's laboratories that include Electronics, Digital Logic Design, Microprocessors, Computer Design and Software Engineering laboratories, as well as specialized laboratories associated with Coordinated Systems and Control, Microwaves, Digital Signal Processing, and VLSI Design. Students also have access to a Clean Room that contains equipment obtained through major grants from Intel Corporation, Philips Semiconductor, AT&T and Sandia National Laboratories.

The Department continues to work closely with Sandia National Laboratories and Los Alamos National Laboratory through numerous research projects, and these national laboratories also support a number of ECE students through research contracts and internships. Furthermore, laboratory scientists regularly teach courses in the Department related to their areas of expertise.

ECE graduates are well-prepared to enter the workforce. ECE students are actively recruited by Ford Motor Company, Hewlett-Packard, Honeywell, IBM, Intel Corporation, Los Alamos National Laboratory, Sandia National Laboratories, and Xilinx, to name a few.

The department has numerous scholarship opportunities available to ECE students, including the highly prestigious IEEE/Presidential Scholarship. The department awards over $50,000 each academic year to ECE undergraduate students.

Research Associate Professor Nader Vadiee is the Faculty Coordinator and Director of the Intelligent Distributed Multi-Agent Robotic Systems (IDMARS) laboratory, which has hosted NASA SHARP PLUS students for three consecutive summers. This NASA program selects junior-level students from high schools across the nation and assigns them to host universities for an 8-week internship. Three graduate students and 12 undergraduate mentor students supervise the projects involving mobile robots design, design and implementation of a tele-conference and tele-presence facility for the IDMARS laboratory, market analysis for the educational mobile robot kits in the U.S., and design and development of the IDMARS Mars Habitat Environment. The IDMARS laboratory regularly hosts tours and hands-on activities for Albuquerque area middle schools and high schools.

Senior Design Lab Team Projects (ECE 419 & 420)

Adjunct Professor **Dr. Marvin Daniel** teaches the course on Senior Design Projects each semester. These are some sample projects from this year's course:

Project: Automated Control for Irrigation System

Student Team: Haley Bell and Arezou Khoshakhlagh

Design and implement a system of moisture sensors, integrate them with an existing (or new design) irrigation system, and interface them with a microcontroller to calculate and control when and how much water needs to be applied to a variety of lawn, garden, and xeriscape areas.

Project: XILINX Hardware Project

Student Team: Joe Eddie Leyba, Allison Tafoya, and Leslie Vonderheide

Develop, build, and test an educational printed circuit board containing XILINX FPGAs that can be sold to and used by Universities in conjunction with XILINX software.

Project: Polarization Vision for Computer with a Beam Splitter

Student Team: Alberto Martinez

Create a system that can sense polarization and display the polarization in a meaningful vision format. The project involves mechanical, digital, optical, and software components and will eventually be applied to sense polarization in marine life habitats at the Albuquerque Aquarium.

Project: Pulsed Power Supply to drive a Step-up Transformer

Student Team: Marvin Roybal, Aaron Ferreira, Michael Shagam, and Tina Duong

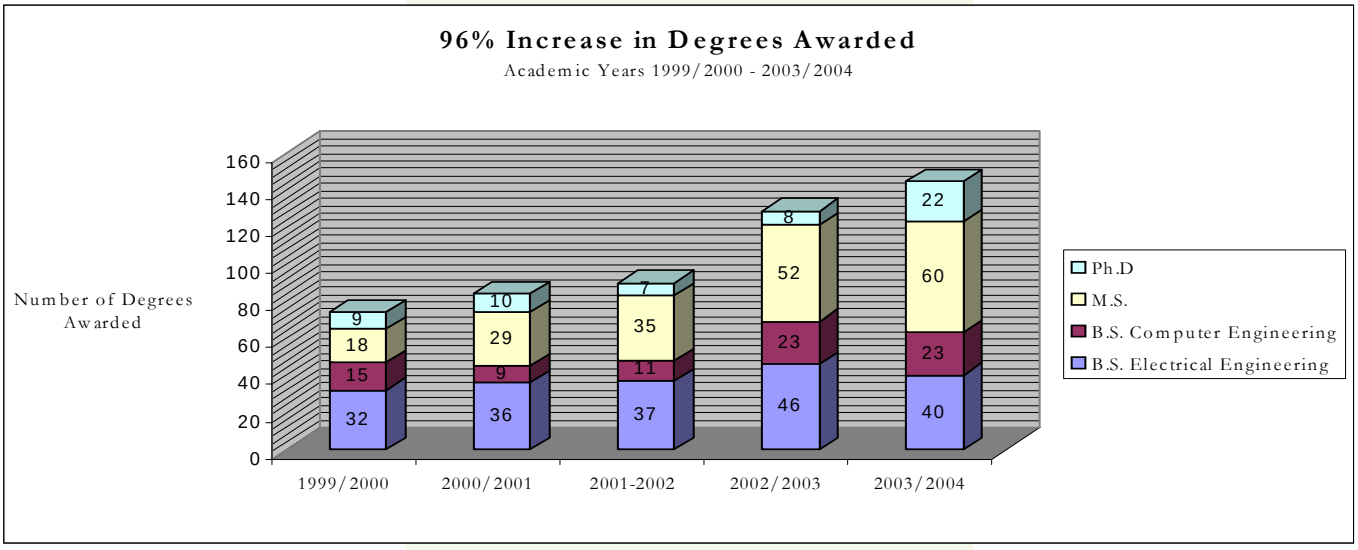
The pulsed power supply is designed around an isolated gate bipolar transistor (IGBT) that will be used for ceramic voltage breakdown experiments. The project includes designing, documenting, assembling, and machining the power supply; re-designing the driver board to provide a fast turn-on power signal to the gate and a fast turn-off signal; and designing a chassis that will provide power to charge a capacitor bank. The project also includes safety features to provide protection for personnel and equipment from electrical hazard.

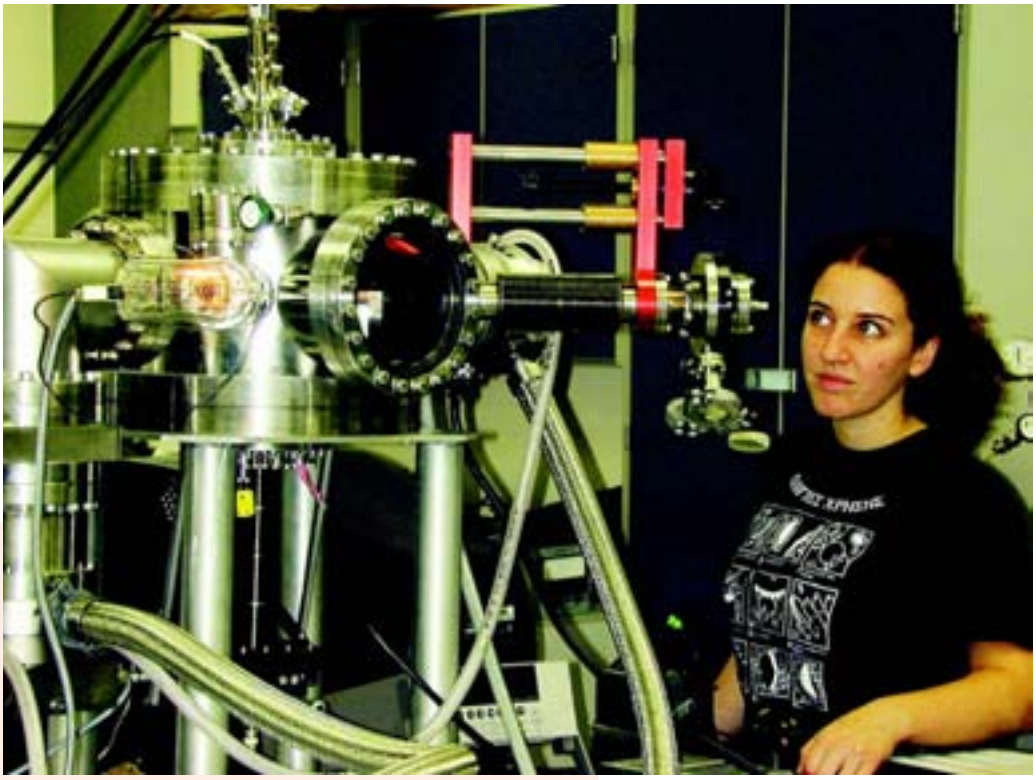
Graduate Program:
Chaouki Abdallah
Director
chaouki@ece.unm.edu

Maryellen Tow
Coordinator
maryellen@ece.unm.edu

The ECE graduate program continues to improve both in quality and numbers. In the year 2003-2004, we had 280 graduate students which included 130 Ph.D. students and 150 M.S. candidates. Despite the drop in international applications (which reflected the national trend) our selectivity remains around 15%. Domestic applicants have increased in number and quality, and the composition of our graduate student body is split almost evenly between domestic and international applicants. Approximately 40 students took the Ph.D. (and M.S. exit) qualifying exam this past year, providing further testimonial to the vitality of the Ph.D. program. For the first time ever, we will be graduating more than 20 Ph.D.s, and project similar or larger numbers for the years to come.

The reputation of our graduate program is finally catching up with its quality as evidenced by the 2004 *U.S. News & World Reports* ranking, which placed our EE program at #46 (tied with Boston University, Brown University, Colorado State University, Michigan State University, Rutgers State University, University of California-Irvine, and Vanderbilt University), and our Computer Engineering program at #62 (tied with Oregon State University, the University of Illinois-Chicago, and Worcester Polytechnic Institute). This is especially significant as these were the only programs ranked in the state of New Mexico out of 149 national Electrical Engineering programs, and 118 national Computer Engineering programs.





In terms of new initiatives, the graduate office has started to actively advertise the ECE Department by organizing individual meetings between the ECE chair and associate chairs and CEOs and executives of local and national companies. We have also organized several informational meetings for local recruiters, and as a consequence identified positions for many of our graduates. These meetings have also resulted in several funded projects for both our faculty and our graduate students. In a related effort, the graduate office has been actively presenting research projects at the state capitol, local schools, and at various science fairs.

On the international front, we are in the final stages of establishing joint programs between ECE-UNM and the University of Campinas (UNICAMP) in Brazil, and the University of Rome II-Tor Vergata in Italy. The joint program with Campinas was inaugurated by hosting Professor Max Costa, and one Ph.D. student from UNICAMP. The program with Tor Vergata currently has two M.S. students and three visiting scholars. Both programs will allow students to earn dual M.S. or Ph.D. degrees from UNM and the respective international institution, and will serve as models for similar programs with other universities.

Ongoing Development of Web Courses

During the past year, ECE has responded to curriculum requests by developing new Web/Internet Classes and converting standard courses to online technology with great success. Enrollments are high, and demand from both the undergraduate and graduate community continues. We are gratified to be able to deliver our leading-edge coursework online.

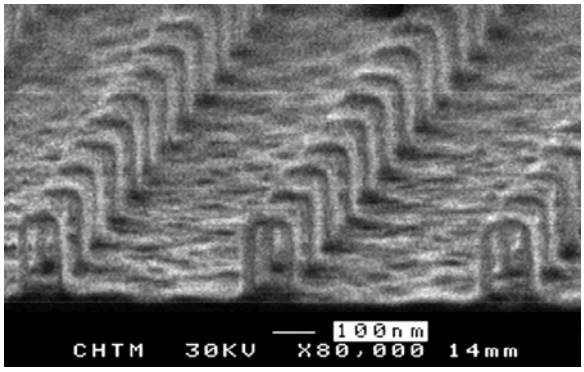
http://online.unm.edu

CENTER for HIGH TECHNOLOGY MATERIALS

www.chtm.unm.edu *505.272.7800*

The Center for High Technology Materials (CHTM) provides a research environment for graduate and undergraduate students in photonics, optoelectronics and materials science, complementing the academic program of the Department of Electrical and Computer Engineering (ECE). During year 2003-2004, 8 ECE students received their Ph.D. degrees through CHTM, and another 10 received their M.S. degree in Electrical Engineering. Currently over 80 graduate students are conducting research at CHTM, more than half of whom are working towards advanced degrees through the Department. In addition, 9 ECE faculty and 9 ECE research faculty conduct their research through CHTM.

Nanotechnology, quantum dot devices, and nanoscale lithography continue to be major research interests at CHTM. Significant advances have been made in the areas of nanoheteroepitaxy, immersion interferometric lithography, nanofluidics and quantum dot detectors and lasers.



A highlight of year 2003-04's funding is the award of the NSF National Nanotechnology Infrastructure Network program (NNIN). This is a multi-institution program under which each of 13 universities will have nano-fabrication facilities open to external users, both academic and industrial. Integral to this effort are diversity and societal components. NNIN support for CHTM's lithographic, cleanroom and MBE growth facilities will enable significant infrastructure growth over the next five years. CHTM's equipment base was further strengthened through three AFOSR-ARO DURIP awards, for a mid-infrared femtosecond spectroscopy system, a 5.2m fiber draw tower, and a new state-of-the-art MOCVD reactor. The latter, now installed, is a VEECO model P75, which will be used for the growth of III-nitrides for HBTs, UV LEDs and other advanced III-N device structures in CHTM research programs.

ISTEC is a non-profit organization comprised of educational, research, industrial, and multilateral organizations throughout the Americas and the Iberian Peninsula. Professor Ramiro Jordan was involved in establishing the Consortium to foster scientific, engineering, and technology education, joint international research and development efforts among its members, and to provide a cost-effective vehicle for the application and transfer of technology.

The purpose of the ISTEC program is to use its current infrastructure in New Mexico and the Ibero-American Region to continue advancing and disseminating state-of-the-art technology, scientific education and research, joint projects and international collaborative networking.

Over the past fourteen years, the Consortium has become an internationally renowned participant in the implementation and analysis of Information and Communications Technology (ICT). It has also achieved important milestones such as alliances with the United Nations, Organization of American States, Internet 2, IEEE and some of the most prestigious academic and industrial institutions in the region. The Consortium's efforts have also led to significant collaborative experiences, joint projects and networking across the academic, industrial, and government sectors.

istec
IBERO AMERICAN SCIENCE & TECHNOLOGY EDUCATION CONSORTIUM

www.istec.org *info@istec.org*

RESEARCH FACULTY

Tanya Yonit Berger-Wolf
Post-Doctoral Fellow
Ph.D., Illinois

C. Jerald Buchenauer
Research Professor
Ph.D., Cornell University

Max H.M. Costa
Research Professor
Ph.D., Stanford

Larry Ralph Dawson
Research Professor
Ph.D., University of Southern California

Roderick A.B. Devine
Research Professor
Ph.D., Warwick University, England

Abdel-Rahman A. El-Emawy
Research Associate Professor
Ph.D., Colorado State University

Petr G. Eliseev
Research Professor
Dr.Sc., Russian Academy of Sciences

Mikhail Isaakovich Fuks
Research Professor
Ph.D., Gorky State University, Russia

Brian J. Gaudet
Post-Doctoral Fellow
Ph.D., Colorado State

John A. Gaudet
Research Professor
Ph.D., Air Force Tech University

Arthur H. Guenther
Research Professor
Ph.D. Penn State University

Michael John Healy
Research Scholar
M.S., Idaho

Manuel Martínez-Ramón
Post-Doctoral Fellow
Ph.D., Juan Carlos III (Spain)

J.S. Kirsten Mills
Research Associate Professor
Ph.D., Nottingham University, England

Panaiotis
Research Assistant Professor
Ph.D., UC-San Diego

Stanley Z. Peplinski
Research Professor
M.S., Tennessee Space Institute

Elizabeth Ann Ritchie-Tyo
Research Associate Professor
Ph.D., Monash University, Australia

Thomas M. Shay
Research Professor
Ph.D., Colorado State University

Walter M. Shedd
Research Professor
Ph.D., Northeastern University

Edward W. Taylor
Research Scholar
M.S., University of New Mexico

Nader Vadiee
Research Associate Professor
Ph.D., University of New Mexico

Harry T. Weaver
Research Professor
Ph.D., Auburn University

ECE & DEPARTMENT OF MUSIC

During the 2004 Spring semester UNM's Department of Music and the Electrical and Computer Engineering Departments introduced a cross-listed course that brought musicians and engineers together to study compositional algorithmic processes and the use of audio digital signal processing functions in real-time applications. This culminated in two public sound and music installations. Among other things, graduate engineering students designed and built custom controller PCBs that were used to monitor sensors installed in doors, under carpets, and attached to windows. Information from these sensors influenced computer-generated music and sound.

Dr. Panaiotis, who taught the course, has performed worldwide as a composer and performer. He is a Research Assistant Professor in both the Music and the Electrical and Computer Engineering Departments. His research at the Visualization Lab of the High Performance Computing Center at UNM involves developing algorithmic music for virtual reality immersive systems, transforming complex data into music for data analysis and medical education.

ECE & MIND Institute

Professors Greg Heileman and Stefan Posse are collaborating on research at the MIND Institute, which, in turn, is a partnership among the Universities of New Mexico, Harvard, Minnesota, and Iowa. The mission of the Institute is to explore the mind and brain in order to enhance the lives of men, women and children with mental illness. The Institute advances and applies neuroimaging technologies, Magnetic Resonance Imaging (MRI) and Spectroscopy with Magnetoencephalography to bridge the emerging frontiers of basic neurosciences with their clinical applications. The Institute brings together leading scientists in the fields of Medicine, Neurosciences, Physics, Computer Sciences, Mathematics and Engineering to achieve its goals.

The MIND Institute is developing a large state-of-the-art imaging facility in Albuquerque, in collaboration with the University of New Mexico and the MIND Imaging Center, housed in the Pete and Nancy Domenici Hall. The center operates state-of-the-art 1.5T and 4T clinical MRI scanners. A state-of-the-art MEG scanner will also be installed at the Center, which will enable researchers to study brain function with millisecond temporal resolution.

ECE & Telehealth Program

Professor Tom Caudell continues his research on the "Collaborative Knowledge-based Virtual Environments for the Enhancement of Learning" project in conjunction with the Telehealth program.

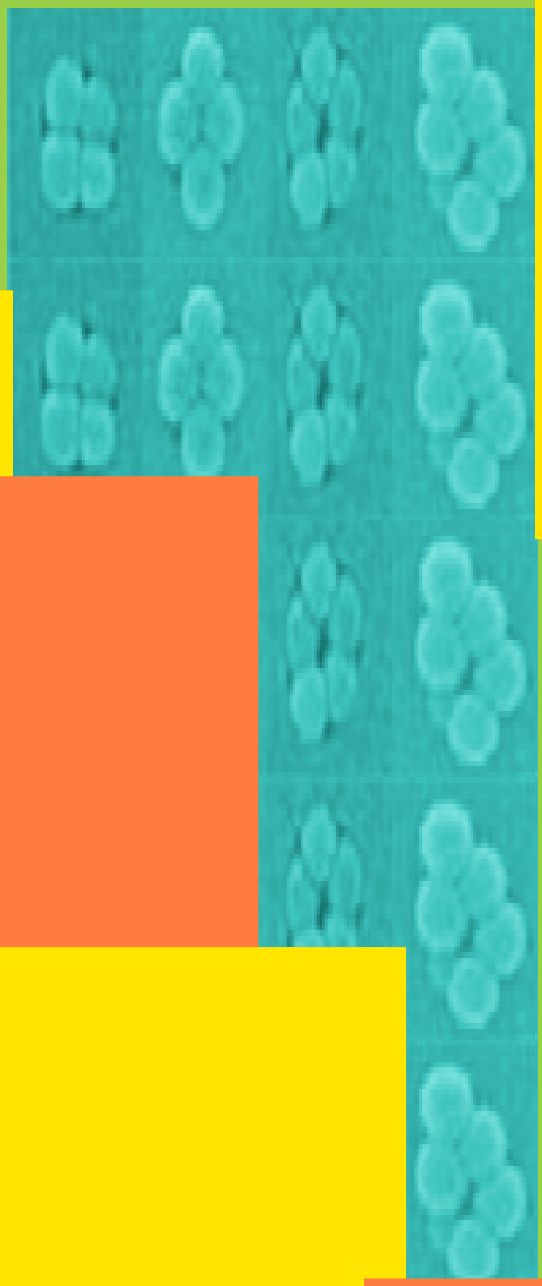
Medical knowledge and skills essential for tomorrow's healthcare professionals continue to change faster than ever before creating new demands in medical education. Project TOUCH (Telehealth Outreach for Unified Community Health) is developing methods to enhance learning by coupling innovations in medical education with advanced technology in high performance computing and next generation Internet2 embedded in virtual environments (VE), artificial intelligence and experiential active learning. Simulations are used in education and training to allow learners to make mistakes safely in lieu of real-life situations, learn from those mistakes, and ultimately improve performance by subsequent avoidance of those mistakes.

Project TOUCH is a multi-year program initiated in August of 2000 as a collaborative effort between the University of New Mexico and University of Hawaii and their associated high-performance computing centers. The goal of the project is to determine effective ways to use advanced technologies, such as virtual reality, to enhance learning of complex health related concepts, and to quantify the effects.

Entrepreneurial Activities of ECE Faculty

Professor Luke Lester continues his association with Zia Laser Inc. Zia is the innovator and leading manufacturer of Quantum Dot (QD) optoelectronic devices. The company is a high-tech spin off from the Center of High Technology Materials (CHTM), a research center created by the University of New Mexico. Headquartered at the UNM Science and Technology Park, the company has raised a total of $11.4M in venture capital funding co-led by the RWI Group in California, and Prism Venture Partners in Massachusetts. Quantum Dot technology is today's disruptive solution for higher performance and lower cost optoelectronic devices.

Zia's platform Quantum Dot technology enables applications in high-growth market segments. The company has a strong Intellectual Property portfolio and exclusive licenses through the UNM Science and Technology Corporation. Zia's strategic partnerships allow the company to accelerate time-to-market, revenue growth and return on investment. The company is an extremely capital-efficient operation, driven by seasoned management and expert technical teams.



The University of New Mexico

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