EVALUATION OF TEACHING AND SCHOLARSHIP OF TEACHING

INTRODUCTION

Besides teaching the students the theories, the role of the instructor is to motivate and help the students to learn. Dr. Du attempts to engage all students in active learning and creative thinking through hands on projects and interactive discussions instead of traditional theory memorization. Especially in senior and graduate courses, Dr. Du always designs interesting and practical projects for the students to learn and practice the theories. Each project incorporates large portion of the design component. For sophomore and junior courses, Dr. Du designs in-class small discussions for students to engage in active learning. The students are always encouraged to learn beyond the textbook and to find the answers. She creates biometrics course in ECE department and now it is co-listed with Department of Computer Science. She incorporates her research into the teaching and helps the students to learn theories from real-life examples. Overall, the students have given Dr. Du positive evaluations and enjoyed the way she teaches. In addition, the FACET and departmental teaching review comments are very good.

More importantly, Dr. Du is a strong advocate to promote electrical engineering education to underrepresented students. She has 2 proposals pending in seeking grant to establish and develop the Honors Undergraduate Program for underrepresented students to study and perform research on homeland security related areas. She has supervised 2 McNair Scholars, 3 Minority Scholarship students, and 1 DSRP student in their undergraduate research projects. One of them pursued his master thesis study with her and received the best ECE graduate student award. Each summer, she works with Minority Engineering Advancement Program (MEAP) and/or Preparing Outstanding Women for Engineering Roles (POWER) summer camp to give lectures/demos to high quality underrepresented high school students.

Dr. Du is a dedicated mentor to her undergraduate and graduate students. Most of her publications and patents are with her students. Her effort in education has been recognized by her peers and helped her to achieve the Trustee Teaching Award in 2009 and Supervisor of the Year Recognition Award in 2009.

EXTERNAL GRANTS

In Rank

Recently, Dr. Du has worked with several of her colleagues in the department and school/campus administrators to propose Honors Homeland Security Undergraduate Program at the electrical and computer engineering department for underrepresented students. 2 proposals have been submitted to Department of Homeland Security in Feb. 2010 with total amount of $XXX. The mission of this project is to increase the intellectual base of the workforce in the homeland security fields by producing high quality graduates, who have US citizenship, specialized in homeland security (HS) related fields. In this program, we will utilize our strong ties with other academic units/centers, industry partners, and local government agencies to help our students to explore the latest development trends in homeland security fields. Our strategy to ensure students in this program obtain HS-STEM related employment is to make sure that they keep high GPAs, gain good experiences in their HS related research projects, and learn better communication skills. We will also actively seek opportunities for students to get internships and employment from our industry partners, DOD centers, DHS agencies, and national labs.

Proposal Title: Establish and Develop Honors Homeland Security Undergraduate Program at the Electrical and Computer Engineering Department for Underrepresented Students
Total amount of funding Requested: $XXX
Funding Period: 2010~2011
Role: PI
Summary: This grant will provide the seed money to help the ECE department to establish and develop the Honors Homeland Security Undergraduate Program for underrepresented students to study and perform research on homeland security related areas. The goal of this program is to enrich and nurture top quality underrepresented students, and motivate them to pursue graduate school and career in homeland security related areas. This program is expected to set an example for other departments, schools and universities to help improve the quality of underrepresented students' education and help dramatically advance the intellectual basis for a national homeland security S&T workforce.
(Note: White paper was accepted. Full proposal was submitted)

Proposal Title: An Honors Homeland Security BS and MS Integration Program in Electrical and Computer Engineering
Total amount of funding Requested: $XXX
Funding Period: 2010~2013
Role: Co-PI (PI is Dr. Stanley Chien)
Summary: The mission of this project is to increase the intellectual base of the workforce in the homeland security fields by producing high quality graduates, who have US citizenship, specialized in homeland security (HS) related fields. This mission matches perfectly with the missions of IUPUI. Therefore, it gets strong supports from different levels of IUPUI. Various ECE department/school resources and IUPUI scholarships are promised in conjunction to support the students in this track during and after the end of the proposed project in year 2013.

PUBLICATIONS
Dr. Du has published two refereed journal articles and one refereed international conference papers in rank and one international paper prior to the rank. Both journals are top quality engineering education journals. All publications are about biometrics education.

In Rank
Title: A Multidisciplinary Approach to Biometrics
Authors: R. W. Ives, Y. Du, D. M. Etter, and T. B. Welch,
Source: IEEE Transaction on Education, Vol. 48, No. 3, 462-471, 2005
6 Citations.
(Note: This journal is a top Electrical Engineering Education journal)

Title: Signal Processing Outreach at the United States Naval Academy
Authors: R. W. Ives, J. C. McGowan, D. M. Etter, Y. Du
Source: IEEE Signal Processing Magazine, Vol. 23, No. 2, 10-12, 2006.
3 Citations.
(Note: This journal is a top Electrical Engineering journal. It is ranked No. 1 in electrical and electronic engineering. Link:
http://www.ieeec.com/publications_standards/publications/journmag/journalcitations.html)

PEER-REVIEWED TEACHING

The external review processes helped Dr. Du to improve her teaching methods. She learned a lot from the valuable feedbacks and constructive suggestions from her colleagues. The external teaching evaluation processes have partially contributed to her excellent Spring 2010 student evaluations.

FACET Review

Prof. Elaine Cooney from the Department of Electrical and Computer Engineering Technology served as the external FACET reviewer in Fall 2009. She reviewed Dr. Du's ECE 302 Probability and Random Process. The review comments are very positive. In the report, she said, "her report with the students was good. For example, when one student pointed out a possible mistake on the board, she praised the student for the observation. This is an excellent strategy to keep students engaged and part of the discussion; it fosters a supportive environment for both the students and the instructor." "She (Dr. Du) did several things to help the students successfully solve problems:

- She modeled and described how the solution should be presented
- She used different colors of marker to represent different types of variables
- She sketched the signals in the time domain
- She recommend(ed) methods to check their work
- She offered examples from her own research"

Departmental Teaching Review

In Spring 2009 and Fall 2009, Prof. Stanley Chien and Associate Prof. Brian King from the Department of Electrical and Computer Engineering served as the external reviewers. Their review comments are very positive.

In Spring 2009, the review report states, "Dr. Du explained the objective of the lecture clearly… She provided a number of real-world examples/application that utilized the lecture topics. Dr. Du organized the teaching material on the board very well and answered the students' questions professionally." "Dr. Du's course syllabus are informative, well organized, and follows the published department course syllabus." "The overall evaluation of Dr. Du's classroom teaching, for the observed lectures, was that Dr. Du's teaching was effective, that she was well-organized and that her lesson sessions were professionally conducted."

In Fall 2009, the review report states, "Dr. Du carefully planned the class, introduced the goal of the lecture, and followed the plan throughout the lecture. In the lecture, she successfully engaged students into thinking process. The students were focused; they listened attentively, asked and answered questions. Prof. Du did an outstanding job for such a math oriented lecture."

ADDITIONAL EVIDENCE OF TEACHING EXCELLENCE

Course Features

Dr. Du assigns projects to senior and graduate level courses. These projects are designed to help students to practice the theory and explore their research capabilities. Some students are then pursuing their research projects with Dr. Du after these courses. For example, after Spring 2006 ECE 595 Biometrics, 5 undergraduate students in that class did the summer undergraduate research and independent study with Dr. Du. Dr. Du likes to use practical examples to explain complicated terms. Dr. Du always encourages the students to have interactive discussion.

Dr. Du recognizes that today's students are diverse with a variety of backgrounds. They also come with varying levels of preparation. Dr. Du wants students to learn from one another, and gain confidence as they share. Though she acknowledges and respects her students' differences, she also holds each student to a uniform standard of excellence in keeping with the mission of education.

Course Evaluations (at least last three years)

Semester	Course	Title	Enrollment	Num Resp	Overall Evaluation*	Departmental Average of Overall Evaluation
Fall 2007	ECE 301	Signals &Systems	38	9	XX	XX
Fall 2007	ECE 662	Patter Recog &Dec. Making Proc	10	4	XX	XX
Spring 2008	ECE 595	Biometrics	3	17	XX	XX
Spring 2008	CS 590+	Biometrics	3	3	XX	XX
Fall 2008	ECE 301	Signals and Systems	26	13	XX	XX
Fall 2008	ECE 595	Information Theory	6	1	XX	XX
Spring 2009	ECE 302	Probabilistic Meth in Elec. Engineering	31	19	XX	XX
Spring 2009	ECE 510	Biometrics	6	5	XX	XX
Spring 2009	CSCI 590+	Biometrics	2	2	XX	XX
Fall 2009	ECE 302	Probabilistic Meth in Elec. Engineering	29	15	XX	XX
Fall 2009	ECE 662	Patter Recog &Dec. Making Proc	20	12	XX	XX
Spring 2010	ECE 302	Probabilistic Meth in Elec. Engineering	21	21	XX	XX
Spring 2010	ECE 510	Biometrics	23	23	XX	XX

+It is co-listed with ECE 595 Biometrics

Overall, students enjoyed the way Dr. Du engaged with them. They loved the hands-on projects and interactive learning method. While some comments could be frustration, most are very generous. Overall, the comments from the students are very positive, and some are even flattery. Followings are the quotes of some of the students' comments:

In ECE 302 (Spring 2009): When asked about if "the instructor explained the subject clearly", the comment is "The subject matter was very well explained and real-world applications were discussed at length." When asked if "Assignments were helpful to me in meeting course objectives," the comment is "Practice problems really helped when quizzes and tests." (Fall 2009), when asked about "The instructor provided a motivating environment for learning", the comment is "(Dr. Du) encouraged us to do our best." (Spring 2010): When asked about "the instructor helped me fulfill the course goals", the comment is "She is awesome! Yep. All fulfilled." When asked about "Overall, this instructor was effective at teaching this course." The comments are "She is awesome! Great teacher, really know her stuff, and wants kids to succeed. Thanks professor Du!" "Very good teacher."

In ECE 595/ECE 510 (Spring 2009): When asked about "The instructor's responses to questions helped me learn," the comment is "It is a very useful introduction to what a great area of engineering..." When asked about "The instructor provided a motivating environment for learning," the comment is "very good and interesting examples and applications." When asked about "Course content matched the department course description," the comment is "we successfully went over the objectives set at the beginning of the semester." When asked about "Assignments were helpful to me in meeting course objectives," the comment is "Although not very well defined at the beginning, these assignments served as the ground work for the concepts at hand." (Spring 2010): When asked "the instructor helped me fulfill the course goals", the comment is "The instructor helped me understand the course and took time to clear my doubts and answer my questions after the class too." When asked about "Instructional materials (for example, handouts and online resources) helped me learn the subject." The comment is, "Instructional materials (for example, handouts and online resources) helped me learn the subject." When asked about "Course assignments helped me learn the subject." The comment is, "Before this class, I knew almost nothing about MatLAB. After this course, I feel as though I could rewrite Adobe Photoshop as an implementation in MatLAB code. It was an intense and immersive experience but you cannot argue with the results." "Yes." When asked about "Overall, I learned a great deal from this class." The answers are "The midterm project and final project help me get the working knowledge of biometric recognition methods." "Fascinating topics from biometrics to data analysis to graphic processing."

In ECE 662 (Fall 2007): When asked about "the instructor's response to questions helped me learn," the comment is "She is very open to questions which is helpful." When asked about "overall, I would rate the instructor as, the comment is "Dr. Du is one of my favorite professors. Keep up the good work." (Fall 2009), when asked about "the instructor provided a motivating environment for learning," the comment is "I can tell that she really wants us to learn." When asked about "overall, I would rate the instructor as", the comment is "(Dr. Du is) a very good teacher."

Mentoring Activities with Students

Besides teaching, Dr. Du dedicated her time and effort to supervise, mentor, and advise undergraduate and graduate students. She has graduated 4 Master thesis students, 2 Master project students, and 1 Ph.D. student. She has been a mentor for many undergraduate students for their independent study, senior design projects, MURI, UROP, McNair, and Minority Student Research Programs. So far, Dr. Du has published 49 journal articles, book chapters, and international conference papers, and applied 10 U.S. or international provisional patents with her graduate and undergraduate students. Most of her publications (36 out of 49) and patents (9 out of 10) are with her students.

Note: Please more details about graduate student supervision in research session.

Supervised Undergraduate Student Research Projects in Rank

MURI Projects

1. Title: Multimodal Biometric System Using Low-cost Sensors (Summer 2006)
   Students: Craig Belcher (EE), Matt Terry (CE), and Sophia Vinci-Booher (BME)
   My Role: Mentor

2. Title: Using Multimodal Biometrics Technologies to Evaluate Mental Workload (Fall 2007-Spring 2008)
   Students: Tron Artavatkun (CE), Sean Michael Collins (EE), and Karthir Prabhakar(CS)
   My Role: Mentor
   Co-Mentor: Vince Duffy, Ph.D., Associate Professor at the Industry Engineering Department, Purdue Univ.)

3. Title: Computer-Assisted Identification of Celiac Ganglia during Endoscopic Ultrasound-guided Celiac Plexus Neurolysis (EUS-CPN) (Summer 2009)
   Students: Jia Li (Biology, Purdue Univ. West Lafayette), Osman Samet Incedere (EE, Middle East Technical University), Ching-Sheng Hsiao (EE), Andrew Kazacoff (CE), and Jacob Norby (CE).
   My Role: Mentor
   Co-Mentor: Julia K LeBlanc, MD, MPH, Associate Professor, School of Medicine, Indiana Univ.

4. Title: Multispectral Iris Analysis (Summer 2009)
   Students: Winfred Asante (McNair Scholar, ECET), Andres Vasquez (EE, Minority Scholarship Student), Mustafa Ümit Arabul (EE, Middle East Technical University, Ankara, Turkey),
   My Role: Mentor

Senior Design Projects

1. Title: Low-cost Mobile Video-based Iris Recognition (Spring 2008)
   Students: Luke Thomas, Sriharsha Muttineni, Shing Mang, Dylan Sran
   My Role: Mentor

2. Title: Low-Cost 3D Head Motion (Fall 2008-Spring 2009)
   Students: Wes Edens, Hai Hong, David Griffin, Andrew Kazacoff, and Matt Walde
   My Role: Mentor
   Co-Mentor: Sarah Koskie, Ph.D., Associate Professor, ECE Department, IUPUI
   (Note: This project is the **best senior design project runner-up**).

3. Title: Ultrasound Image Processing (Fall 2009-Spring 2010)
   Students: Matthew Hedrick, Eun Jung Kwak, Pouya Rahmati, and Faraz Siddiqui
   My Role: Mentor
   Co-Mentor: Julia K LeBlanc, MD, MPH, Associate Professor, School of Medicine, Indiana Univ.

4. Title: Robot Guard (Fall 2010-Spring 2011)
   Students: Ahmed Mohammed Jan, Han-Kyu Moon, Matthew Joseph Ragozzino, and Craig Thomas Buchanan
   My Role: Mentor
   Co-Mentors: Dr. Peter Orono, Senior Lecture, Freshman Engineering Department, IUPUI; Mr. Michael Long, Rolls-Royce North American

McNair Scholar Student Projects

1. Craig Belcher (EE Student, Summer 2006): Iris Recognition
2. Winfred Asante (ECET Student, Summer 2009-Spring 2010): Multispectral Iris Recognition

Minority Scholar Student Projects

1. Tron Artavatkun (CE, Spring 2007): Eye tracking system
2. Andres Vasquez (EE, Summer 2009): Multispectral iris recognition
3. Evans Kimathi (EE, Summer 2009): Traffic monitoring and vehicle classification system
4. Jose Miranda (EE, Summer 2010): A new approach to enable the blind people see (the DSRP scholarship)

Other Undergraduate Student Projects

Dr. Du supervises several undergraduate student research projects and independent research (ECE 496 and ECE 492): Umut Tugsal (Summer 2006), Bryan Bennett(Summer 2006), Matt Terry(Summer 2006), Craig Belcher(Summer 2006), Tron Artavatkun (Summer 2007), Tommy Muse(Summer 2007), N. Luke Thomas (Spring 2008), Sean Michael Collins (Summer 2007), and Jacob Norby (Fall 2010).

Dr. Du mentored Vladimir Pozdin in Summer 2006 for his research project. This research results in 1 international conference paper.

Served as a Member for M.S. and Ph.D. Thesis Committee

Master thesis committee chair: Zhi Zhou (2008), Emrah Arslanturk (2008), Craig Belcher (2009), Luke Thomas (2010), and Kai Yang (to be graduated)

Ph.D. thesis committee Co-Chair: Xiaoli Jiao (2010), and Zhi Zhou (to be graduated)

Master thesis committee member: Huisi Ai (2009), Qun Gao (2009), and Niraj Dipak Desai (to be graduated)

Ph.D. thesis committee member: Francis Bowen (to be graduated)

Curriculum Enhancements

As a key member of our undergraduate curriculum committee, Dr. Du has worked with other members to reshape our undergraduate curricula since 2006. She is the initiator and key member to streamline ECE 301 and ECE 202 curriculum. She was a key member in: creating the policy on credit for summer internships, a sophomore year seminar, an engineering project management course, the 4 credit ECE 2xx C language course, and the engineering economics course; changing the senior design class from one semester to two semesters; cross-listing with MS and CS courses; acquiring approval of two new courses for the computer engineering program and new textbooks; and revising technical elective lists.

ECE 510 Biometrics (previously experimental course ECE 595): Dr. Du created this course at the ECE department and is teaching this course for the fourth time. The course has been approved by IUPUI, Purdue University, and Indiana University for permanent number.

This is a very challenging course because there is no suitable textbook. As an emerging technology, biometrics theories and technology change every year. There are always better theories, methods, and systems to achieve higher accuracy. This requires the changing of the course content accordingly to reflect it. Dr. Du spent a lot of time to develop the curriculum. She designed the midterm and final projects. These projects are doable for senior students and also challenge for the graduate students. They need significant time to get accomplish and also can be done in the given semester. These projects are not only requiring the students to practice and apply certain theories, but also open for each student to add on

his/her design components. For example, in the face recognition project, the students were required to use principle component analysis and Fisher linear discriminate analysis methods (two different methods) for feature extraction. At the same time, the students should design their own face recognition scenario, segmentation method, user-machine interface, and classification methods for their system. With her effort, this course becomes an interesting, practical, and design-oriented course. The students have given very high evaluation of this course (please see the course evaluation part of this dossier for more details.)

In addition, in Spring 2009, Dr. Du worked with Freshman Instructor Prof. Gee. The freshman students were invited to see the midterm project demo and presentations. This would help the freshman engineering students to be better prepared for their future study and be more motivated in their study.

ECE 662: Dr. Du taught this course in Fall 2007 and Fall 2009. She reinvented the wheel and added the project and design components in this course. Totally 30 graduate students have taken this class. Each one of them is required to apply the pattern recognition theory to an engineering project. The students have commented that they liked the projects. These projects include: iris recognition, medical image processing, vehicle classification, DTFT tone detection and recognition, authorship classification, most popular English sentences input and correction, company bond grade classification, text detection and recognition, robot vision, and spam detector, etc.. The theories applied to these projects include Hidden Markov Model, Bayesian detection and estimation theory, Maximum-Likelihood estimation, Expectation-Maximization (EM) theory, Pazen window, principle component analysis, nearest-neighbor estimation, linear discriminate function, neural network, and etc. By learning the theories in this way, the students could better understand the concepts and be more motivated in learning.

ECE 595 Information Theory: Dr. Du taught this course in Fall 2008. She reinvented the wheel and added the project components in this course. This is a very theoretical course. Dr. Du believes that collecting the theories with research will encourage and motivate the students to learn the theories. Therefore, in this course, she asked the students to study, analyze, and present related journal publications. At the end of semester, each student had at least studied 8 journal articles related to information theory. They liked this approach and felt these research papers have helped to better understand the theories and know the application of the theories in many different research areas.

ECE 302, ECE 301, ECE 202, and ECE 305: Dr. Du tried very hard to use vivid engineering examples to explain the concepts and theories. In addition, Dr. Du always encourages group learning and cooperative learning. For example, when teaching low-pass, high-pass, and band-pass filters, she showed the class the affects of the filters to the image and voice signals. The students could visualize the changes after the filtering process. Dr. Du understood the importance of peer-education. The students were encouraged to discuss questions in and out of the class. Dr. Du always works hard to promptly response to the students' questions, homework, quizzes, and exams. In the ECE 302 feedback, the students wrote that Dr. Du gave "great feedback", "returns quizzes, tests, and homework very quickly." The assignments in Dr. Du's class "is appropriately challenging and directly related to the material being covered (quoted from ECE 302 course evaluation)." For the ECE 302 in Spring 2009, Dr. Du asked the students to learn in group voluntarily. The exam scores for the students learning in group have shown more improvement than those studied alone.

Teaching Laboratory Developments

Dr. Du has developed the Biometrics and Pattern Recognition Laboratory. This lab has supported Dr. Du's ECE 510 and ECE 662 classes. Partial of the funding is from Dr. Du's internal and external grants.

Other Educational Activities at IUPUI

Dr. Du has helped with the high school students' education. She and her students helped with Minority Engineering Advancement Program (MEAP), POWER (preparing outstanding women for engineering roles), 3rd annual Project lead the way (pre-engineering courses to high school students), and many other events that support department and school recruiting.

Recognition of Teaching

Dr. Du is honored to be a recipient of Trustee Teaching Award in 2009 and IUPUI Supervisor of the Year Recognition Award in 2009.

SUMMARY AND FUTURE DIRECTIONS

Dr. Du is very enthusiastic in teaching, mentoring, and educating next generation of engineers. She knows that learning is an active process that students have to participate and engage in. She works hard to provide a positive, trusting, and encouraging learning environment to ensure effective teaching and learning. She understands that the most important element of teaching is not lecturing on the material itself, but to provide students with opportunities to engage in critical thinking and inspire them to practice and pursue future learning. She provides prompt feedback, by treating them fairly and equally, by being organized in course structure and lecture materials, and by being up front and frank. In such a way, she creates a positive and enjoyable learning environment. Her teaching evaluation is excellent. She would like to continue her good work in education.