Curriculum Vitae

Name: **Scott Willenbrock**

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Education:

Ph. D. Physics, The University of Texas at Austin, May 1986 (advisor: S. Weinberg)
A. B. Physics, Princeton University, June 1980; graduated *summa cum laude*

Work experience:

Professor, University of Illinois, September 2005–present
General Member, Kavli Institute for Theoretical Physics, UCSB, January–July 2003
Frontier Fellow, Fermilab, August–December 2002
Associate Professor, University of Illinois, September 1998–August 2005
Visiting Scholar, University of Chicago, October–December 1998
Assistant Professor, University of Illinois, September 1993–August 1998
Guest Scientist, Fermilab, September 1991–June 1992, February–June 1993
Associate Physicist, Brookhaven National Laboratory, 1990–93
Assistant Physicist, Brookhaven National Laboratory, 1988–90
Research Associate, University of Wisconsin, 1986–88

Fellowships and Awards:

Arnold T. Nordsieck Physics Award for Teaching Excellence, 2009
Sony Bardeen Faculty Scholar, University of Illinois, 2007–2010
Fellow of the American Physical Society, 2006
Frontier Fellow, Fermilab, Fall 2002
Rose Award for Teaching Excellence, College of Engineering, University of Illinois, 2001
$A\Lambda\Delta$ National Honor Society Outstanding Teacher of Freshmen Award, 1998
List of Teachers Ranked as Excellent, 19 times
Fellow in the Center for Advanced Study, University of Illinois, 1996–97
SSC Fellowship, Texas National Research Laboratory Commission, 1991–93

Research:

Author of over 100 articles in theoretical elementary particle physics.

Curriculum Vitae

Name: **Kevin Pitts**

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University of Illinois
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Phone: 217-333-3946 (work)
217-377-8355 (cell)

Education:

Ph. D. Physics, University of Oregon, June 1994
M. S. Physics, University of Oregon, June 1989
B. A. Physics and Math, Anderson University, June 1987; graduated *summa cum laude*

Work experience:

Professor, University of Illinois, September 2009–present
Associate Professor, University of Illinois, September 2005–August 2009
Assistant Professor, University of Illinois, September 1999–August 2005
Research Associate, Fermi National Accelerator Laboratory, 1994–99

Fellowships and Awards:

Universities Research Association Visiting Scholar, 2009
Xerox Award for Outstanding Research, 2007
U.S. Department of Energy Outstanding Junior Investigator, 2002
National Science Foundation CAREER Award, 2004
University of Illinois Center for Advanced Study Fellow, 2001
University of Illinois Collins Scholar, 2000
List of Teachers Ranked as Excellent, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009
Engineering Council Award for Outstanding Advisor, 2002, 2004, 2005, 2006, 2007

Research:

Author of over 500 articles in experimental elementary particle physics.

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Department of Physics

Loomis Laboratory of Physics
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March 12, 2010

Environmental Change Institute
N-409 Turner Hall MC-047
1102 S. Goodwin Avenue
Urbana IL 61801

The Department of Physics fully supports and endorses the efforts of Professors Scott Willenbrock and Kevin Pitts to develop a course that will teach nonscientists about physics topics that are relevant to societal issues. Their effort is well integrated with our existing efforts to provide quality science education to nonscientists. The Department has scheduled this course to be offered in the Fall 2010 semester and we are planning for regular offerings thereafter.

Sincerely,

Dale Van Harlingen
Head and Professor

DJVH:mmg

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Physics 150 Course Narrative

Future politicians, business persons, lawyers, journalists, and other world leaders, as well as ordinary citizens, need to understand science in order to make the crucial decisions that will determine the future of our planet. We propose to develop a new course, intended for non-science majors, that will discuss in nontechnical language the science behind the topics that are crucial to society. Among the topics that will be discussed are the various sources of energy (oil, nuclear, solar, wind, *etc.*), energy efficiency, global warming, nuclear weapons, outer space, and other topics of vital importance. Economic and social considerations will be presented alongside the science. Our goal is to provide future leaders with the scientific knowledge they need to make important decisions.

Many students that are not science majors are uncomfortable with science. This is an undesirable situation, because these same students will be making choices, both in public policy as well as in their personal lives, that depend on a proper understanding of science. Unfortunately, the science is often presented in a way that makes it intimidating. We believe that the science can be made accessible to any motivated student, and that these students will enjoy learning (and using) the science that is so much a part of our modern world. Our goal is not to turn these students into physicists; it is to give them the knowledge and skills they will need to interact with science and scientists. Furthermore, this course will help students develop the critical thinking skills that are crucial in today's world.

The payoff to such a course can be great. As an example, consider global warming. If one is involved in an effort to confront global warming, it is essential to have a clear and deep understanding of the issue. Yet much of the discourse on this topic is riddled with exaggeration and distortion. Savvy world leaders must understand the science well enough to separate the distracting noise from the deep, underlying issues. At the same time, it is not necessary (or even feasible) that everyone confronting global warming be a climate expert. One only needs to know enough to recognize the difference between science and propaganda.

Another example is energy. This is an important component of sustainability, and has many implications for public policy as well as for the choices we make as consumers. We will discuss how a nuclear reactor works, how solar and wind power are generated, the physics of well-insulated windows, how hybrid and electric automobiles work, biofuels, *etc.* The more well informed one is about the basic physics and technology, the better decisions one can make.

While this will be a nontechnical course, we do intend to teach the students how to work with numbers, and to have some feeling for their meaning. We want them to know that sunlight at midday contains about 1 kilowatt of power per square meter and that a large power plant generates about 1 gigawatt of electric power. We will teach them how to do approximate calculations, such as to estimate how large an array of solar cells generates as much power as a large power plant if the solar cells have an efficiency of 15%.

We are fortunate that a terrific textbook for this course has recently been published by Princeton University Press, "Physics and Technology for Future Presidents," by

Richard Muller. Professor Muller (UC Berkeley) has been teaching the course upon which the book is based for about 10 years, and it was voted "Best Class at Berkeley" by the students a few years ago. He has worked extensively in science policy, and has crafted a book that suits our needs very well.

Physics 150 Course Outline

Phys 150, "How Nature Works," has not been offered by our department for several years. It is the platform we will use to introduce our new course, which would be more appropriately titled "Science and Society." Once the course is established, we will seek to change its name. We intend to offer the course in Fall 2010. We will advertise the course widely to make students aware of its new focus.

Phys 150 satisfies the general education requirement in Physical Sciences, and this is appropriate for our new course. One the course is established, we may ask that it also be considered to satisfy the Quantitative Reasoning I requirement.

We intend to develop the course in Summer 2010 and to launch it in Fall 2010. If there is sufficient demand, it will be offered every semester.

Professor Willenbrock taught a similar course (Phys 199SS, "Science and Society") as a Freshman Discovery Course in Fall 2009. Professor Pitts has taught Phys 192, "Science and Pseudoscience," several times as a Freshman Discovery Course.

The general outline of the course is given below.

- Energy and Power
- Nuclear Reactors and Weapons
- Radiation
- Satellites and Outer Space
- Climate Change
- Energy Efficiency
- New Technologies

Physics 150 Budget

We intend to develop the course in Summer 2010 and to launch it in Fall 2010. To that end, we would like to hire a Teaching Assistant in Summer 2010 to help us with the development of the course. While we have an excellent textbook for the course, we need to develop a set of PowerPoint slides to deliver the lectures, which will highlight material from the book as well as supplement it.

Lectures will be presented in Loomis 151, which adjoins the physics department demonstration room. This room is loaded with demonstrations, and has a terrific staff dedicated to maintaining and upgrading the equipment. We will be able to use many of the existing demonstrations in our course. However, some of the material we will cover has not been covered in physics courses before, so we would like to request some funds to purchase materials and compensate staff to develop new demonstrations.

The textbook for the course, "Physics and Technology for Future Presidents," is excellent and covers a wide range of topics, but it does not go into a great deal of depth on any one topic. We would like to request funds to purchase books that the professors and TA can use to augment the material in the textbook. (The publisher has kindly agreed to send us copies of the textbook at no cost.) An example of the sort of book that is interesting to us is "Physics of Societal Issues" by David Hafemeister. While this book is in appropriate for direct use in the course, it provides a wealth of information that the professors and TA can use to supplement the textbook.

Teaching Assistant, Summer 2010: \$1895/mo $\times$ 2 months = \$3790

Materials and staff for development of demonstrations: \$500

Books and supplies: \$500

Total request: \$4790