The Saga of a Departmental Transformation

Gubbi Sudhakaran
Department of Physics
University of Wisconsin-La Crosse
www.uwlax.edu/physics/

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June 10, 2012
Brief History

• In the early 90’s, the Department of Physics had a total of 6 physics majors, 5 faculty and a graduation rate of one physics major every two years. Research was virtually nonexistent.

• The Department had received poor reviews from the Academic Program Review committee and UW-System had recommended phasing out the UW-L Physics Program due to low graduation rates.

The Department was on the verge of becoming extinct!
Fall 2011

• There were 151 majors, 10 faculty and 27 graduating physics majors in the 2011-2012 academic year.

• 41 Freshman entered UW-L as physics majors
Factors Contributing to Success

• Curricular Reforms
• Undergraduate Research
• Recruitment/Retention
• Assessment
• Strategic Plan
Key Ingredients for Curricular Reforms

1) Department is the Critical Unit

Any Curricular Reform has to be initiated at the Department Level.
Key Ingredients for Curricular Reforms

2) Faculty Buy-in
One person can develop the ideas and carry out the activities but you need the support of a large fraction of the department to sustain it.

“A key characteristic of a thriving department is the active involvement of a substantial majority of the faculty”

Key Ingredients for Curricular Reforms

3) Do not reinvent the wheel

Look at other successful programs and learn from them.

What ever you are planning to accomplish chances are someone has already done it.
Key Ingredients for Curricular Reforms

4) Develop Collaborations

You need to develop partnerships with other departments on campus.

Develop ties with other programs at other institutions

5) Target New Faculty for Curricular Reform
Key Ingredients for Curricular Reforms

6) Recognize Scholarship of Teaching

Department has to recognize and value the development of course material.

7) Target Both Majors and Non-majors

Curricular reform should not be limited to your majors only.

Departments depend heavily on service and general education courses for survival.
Key Ingredients for Curricular Reforms

8) Constantly Monitor your Curriculum

To sustain the success and to improve the quality of your program you need to incorporate assessment in your curricular reform.

9) Work with your Administrators

10) All Reforms are Local
Curricular Reform in the Major

One of the important additions in attracting new physics majors was the introduction of a set of emphasis programs that could be packaged along with course and career information.

Physics major with:

a) Astronomy emphasis
b) Computational physics emphasis
c) Optics emphasis
d) Business concentration
e) Biomedical concentration
f) Physics Education

1) Student interest
2) Faculty expertise
3) Employment opportunities
Dual Degree Program

• Physics-Engineering Dual Degree

This is a collaborative program between UW-L and four engineering colleges (UW-Madison, Milwaukee, Platteville and U. Minnesota). The students spend three years at UW-L studying physics and then transfer to an engineering college for two years. The student receives a B.S. degree in physics (along with a math minor) from UW-L and a B.S. degree in engineering from the engineering college.

• Physics-Physical Therapy Dual Degree
Undergraduate Research

One of the major facts that leads to high student satisfaction with our program is a strong set of research experiences for the undergraduate physics majors.

A key ingredient of any thriving program is a successful undergraduate research program.

Part of the Curriculum
Incentive to Students
Incentive to Faculty
Incentive for Faculty

• Teaching Credit for involving Undergraduate Students in Research

• Reduced Teaching Load for new Faculty

• Humane Teaching Assignments for new Faculty

• Bring new Faculty in one month early
Seminar for Credit

This was designed to provide a meeting place for the majors and faculty. Students must attend all seminars and either present a seminar or write a report on one of them at the end of the semester.

- Speakers from various fields
- Showcase undergraduate research
- Talks on research topics, careers, and engineering programs
- Physics Club-SPS events
- Distinguished Lecture Series in Physics
The Annual Distinguished Lecture Series in Physics


2001 DLS speaker: 1997 Nobel Laureate Steven Chu


2003 DLS speaker: 1996 Nobel Laureate Robert Richardson


2005 DLS speaker: 1998 Nobel Laureate Horst L. Stormer

2006 DLS speaker: 2001 Nobel Laureate Wolfgang Ketterle

2007 DLS speaker: 2001 Nobel Laureate Eric Cornell

2008 DLS speaker: 2004 Nobel Laureate Frank Wilczek

2009 DLS speaker: 2002 Nobel Laureate Riccardo Giacconi

2010 DLS speaker: 2003 Nobel Laureate Anthony Leggett

2011 DLS speaker: 2005 Nobel Laureate Theodor W. Hansch
Distinguished Lecture Series in PHYSICS

September 13-14, 2012

John C. Mather, Ph.D.,

is a Senior Astrophysicist at NASA Goddard Space Flight Center (GSFC) in Greenbelt, MD, where he specializes in infrared astronomy and cosmology. He received his bachelor’s degree in physics at Swarthmore College and his Ph.D. in physics at the University of California at Berkeley.

As a National Research Council (NRC) postdoctoral fellow at the Goddard Institute for Space Studies (New York City), he led the proposal efforts for the Cosmic Background Explorer (COBE) and came to GSFC to be the Study Scientist (TM-58), Project Scientist (BR-68), and the Principal Investigator for the Far IR Absolute Spectrophotometer (FIRAS) on COBE. He and his team showed that the cosmic microwave background radiation has a blackbody spectrum within 0.3 parts per million, confirming the Big Bang theory to extraordinary accuracy.

The COBE team also discovered the cosmic anisotropy (and cold spots in the background radiation), now believed to be the primordial seeds that led to the structure of the universe today. It was these findings that led to Mather receiving the Nobel Prize in 2006. Mather now serves as Senior Project Scientist (SR-10) for the James Webb Space Telescope, the successor to the great Hubble Space Telescope.

Schedule of Events

Thursday, September 13, 2012
PUBLIC LECTURE
4:30 p.m. Reception
Shagen Auditorium A Room 1400
Centennial Hall | Refreshments served
5 p.m.
History of the Universe from the Beginning to End
The history of the universe is a science, from the Big Bang to now, and as the future—John Mather will tell the story of how we got here, how the Universe began with a Big Bang, how it could have produced an Earth where human beings can live, and how those beings are discovering that story. Mather was Project Scientist for NASA’s Cosmic Background Explorer (COBE) satellite, which measured the expansion rate of the Universe and its anisotropy. He will also discuss some of his favorite jokes. How did you get here? How did we get here? How do we get there? Friday, September 14, 2012
PHYSICS SEMINAR
3 p.m. Reception
Shagen Auditorium A Room 1400
Centennial Hall | Refreshments served
3:20 p.m.
Engineering Challenges and Scientific Capabilities of the James Webb Space Telescope
The James Webb Space Telescope (JWST) is planned for launch in 2018 as the successor to the Hubble Space Telescope (HST). It intends the scientific discovery of the HST into the infrared band, covering 5 to 500 microns, and will observe the universe in the wavelengths of the infrared, ultraviolet, and X-ray regions. The JWST is a joint initiative of NASA, ESA, and the CSA, and it is expected to be launched in 2018.

For further information about the lecture contact:

www.uwlax.edu/physics

For more information about making arrangements to attend, contact:

UW-La Crosse Foundation Inc.
615 East Ave. N. | La Crosse, WI 54601 | 608.785.6893
email: uwl@uwlaconline.com

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Recruitment Tools

- High school Recruitment
- Campus Close-Ups
- Department Tours
- Physics Demos/Laser Shows
- Freshmen Scholarships
Assessment Overview

• A 3-member assessment committee is responsible for the oversight of the department’s assessment activities.

• All department members participate in the assessment effort at the course level.
  – An annual meeting dedicated to assessment is required by our bylaws.
  – Results of assessment are discussed. Action Item(s) identified for the following year
Program Goals

- Understand basic and advanced concepts of classical and modern physics.
- Understand and be able to use high-level mathematics to solve physics problems.
- Compete successfully for graduate schools and/or jobs, and perform well therein.
- Design and conduct experiments, to make careful and accurate measurements using many different kinds of equipment and to correctly analyze and interpret experimental data.
- Use symbolic and numerical computer software to solve physics problems, and to acquire, plot, and analyze data.
- Effectively communicate (oral and written) using conventional scientific style.
Assessment
Capstone Course

• Major Field Test in Physics (ETS)
• Presentation of material in a paper from the primary literature, to an audience of Physics faculty & students
• Short write-up (“Ask a Physicist” newspaper-column style) of a physics topic chosen by the students
• Fermi Questions (process & estimation skills emphasized) Test
• Math Skills Test designed by faculty in our department
Recognition

- Selected by the National Task Force On Undergraduate Physics Education (NTFUP)
Recognition

- Listed in the Top Ten of The AIP Statistical Research Center, Enrollments and Degrees Annual Report
- UW System Regents Teaching Excellence Award
Bachelor's-Only Departments Averaging 10 or More Physics Bachelor's Degrees Per Year, Classes 2008 through 2010.

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<tr>
<th>Annual Average</th>
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<tr>
<td>US Naval Academy (MD) 31</td>
<td>Gustavus Adolphus Coll (MN) 13</td>
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<td>SUNY College, Geneseo (NY) 26</td>
<td>Saint Johns U (MN) 13</td>
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<td>U of Wisconsin, La Crosse 23</td>
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Note: List includes only those departments that offered a bachelor's as their highest physics degree in 2010 and contributed degree data for all 3 years.

http://www.aip.org/statistics
The UW La Crosse Physics Department receiving the 2004 UW System Regents Teaching Excellence Award From Governor Jim Doyle