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ONTARIO CANADA

Department of Physics, Faculty of Science

64-496: A multi-genre, collaborative course on technical communication for physicists

Chitra Rangan

Department of Physics, University of Windsor

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Outline

64-496: Technical Communication Skills

- Course objectives
- Course outcomes (examples)
- Learning outcomes (assessment)
- Engagement strategies

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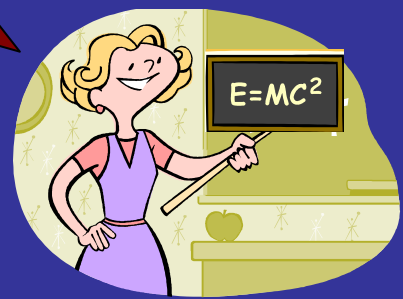
Course for physicists

- Required course in the ‘Physics and High Technology’ undergraduate program
- 2 hour ‘lectures’ + 2 lab hours per week

“This is supposed to be a *physics* course” (‘how does this course teach me any physics?’)

“This *is* a physics course - you will know more physics when you finish this course than when you start”



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Why Technical Communication?

Interpersonal Skills
Technical Writing
Management Skills

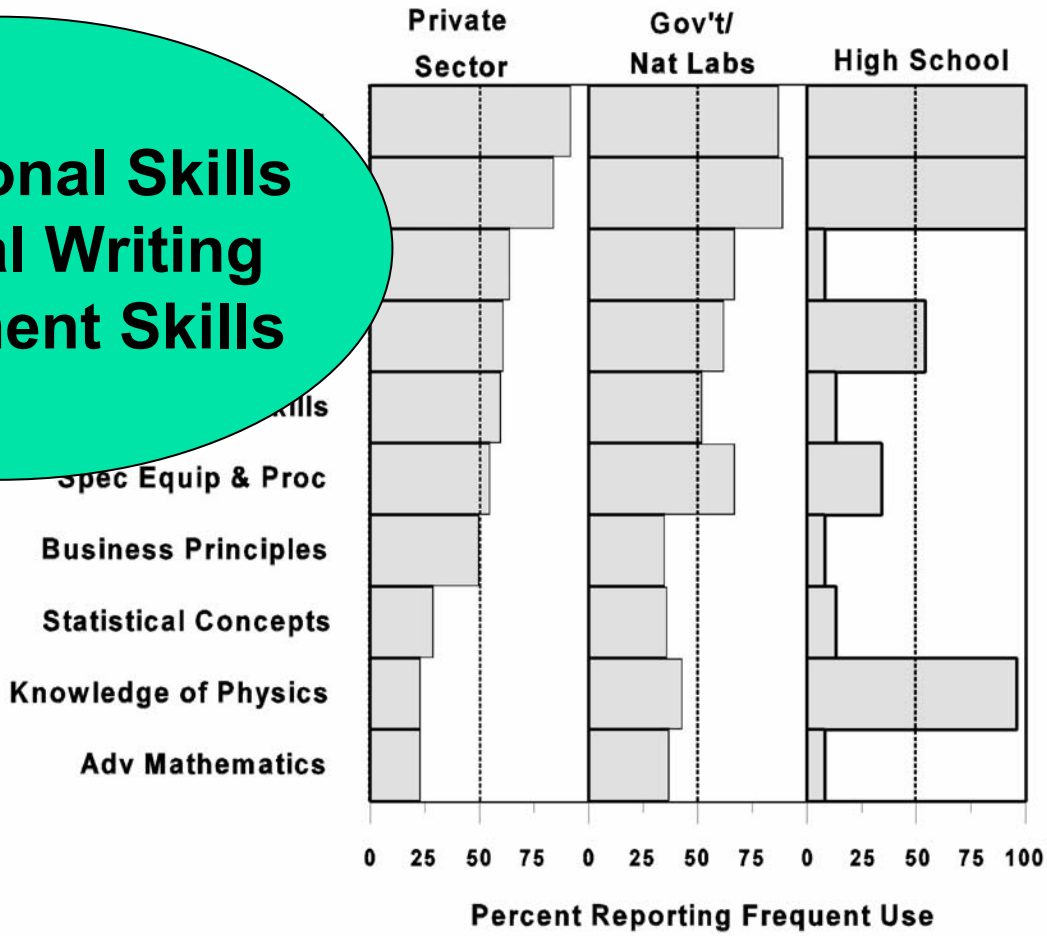

FIGURE I. Skills used frequently by physics bachelors in selected employment sectors, 1994. Respondents were asked to rate the frequency with which they use each skill in their current position on a scale of 1 (Not at all) to 5 (Extensively). These

Roman Czujko (1997). The physics bachelors as a passport to the workplace: Recent research results. American Institute of Physics, College Park, MD.

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Collaborative teaching

Chitra Rangan

Physics Department

Ron Dumouchelle

Academic Writing Center

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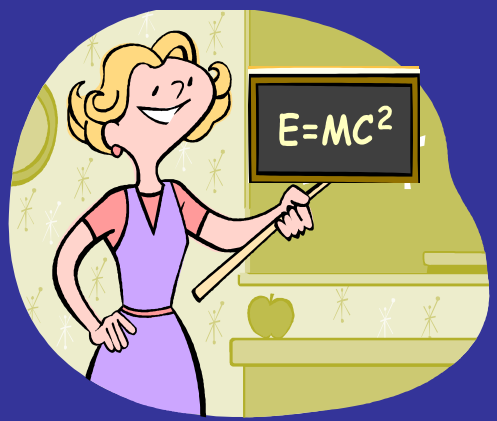
Collaborative learning

- Teams of 4 students
- Complementary strengths:
  - Technical/Academic, Writing, Leadership, Computer Skills



"The hardest skill you will have to learn is how to work effectively in a team – the whole becomes larger than the sum of its parts."

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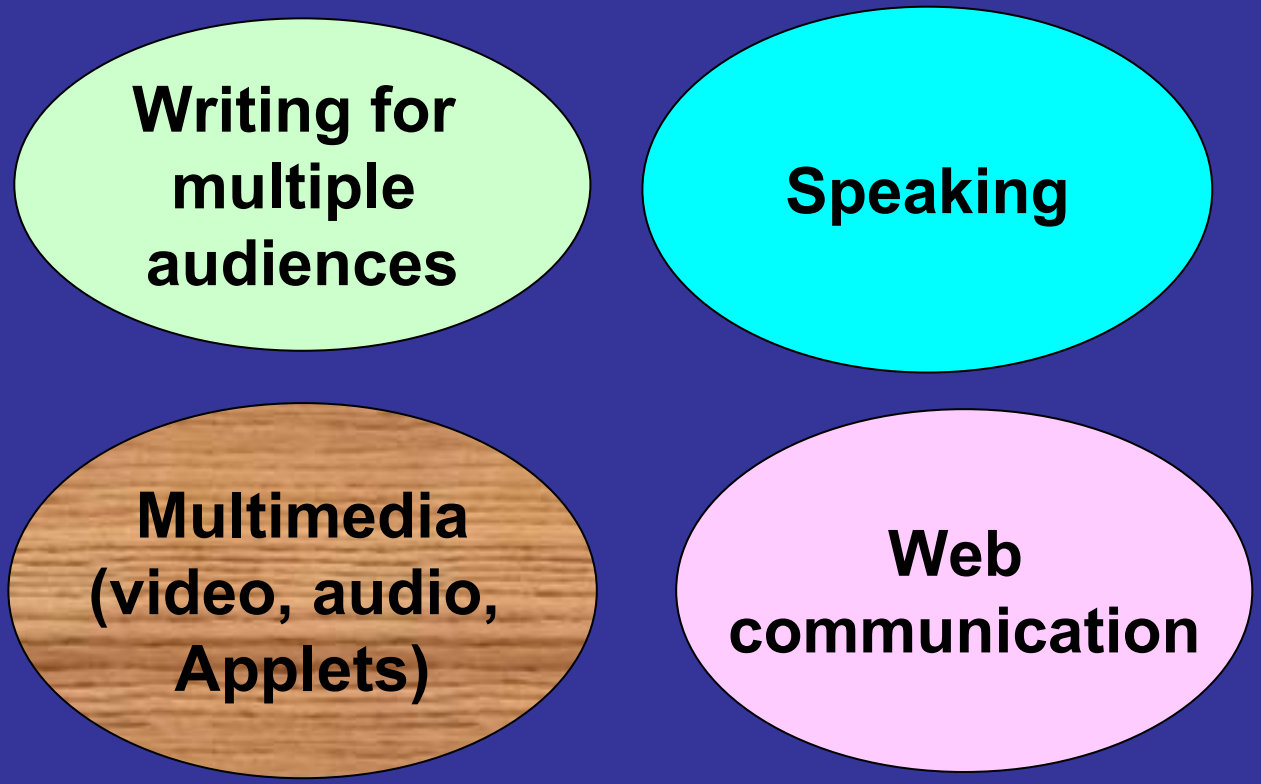
Multi-genre communication



“multi-genre, collaborative course in technical communication for physicists”

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Course Objectives

To empower students to communicate

- In a variety of formats - written, oral, web communication
- To diverse audiences - Academic, industry and lay audiences
- Their technical strengths to prospective employers

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Course Outcome

Web-based multimedia instructional module (MMIM) that will be a resource for high-school teachers who wish to teach advanced physics concepts in their classes.

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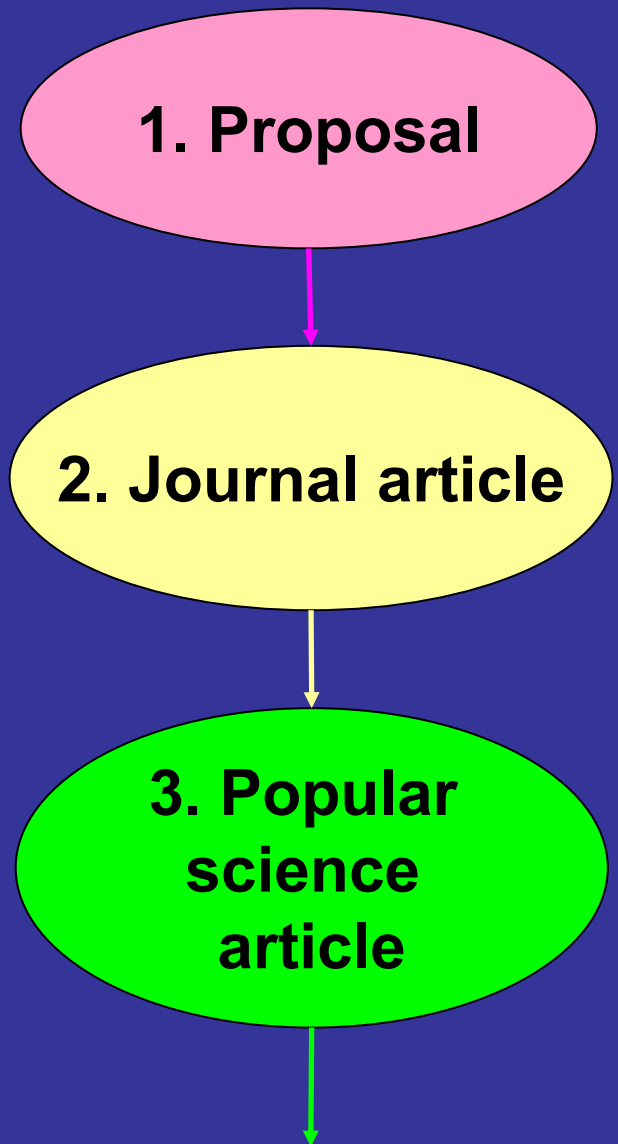
Course design I



Identify physics concepts of interest to HS students (teams formed around "winning proposals")

Understand the science accurately

Present the science to a lay audience

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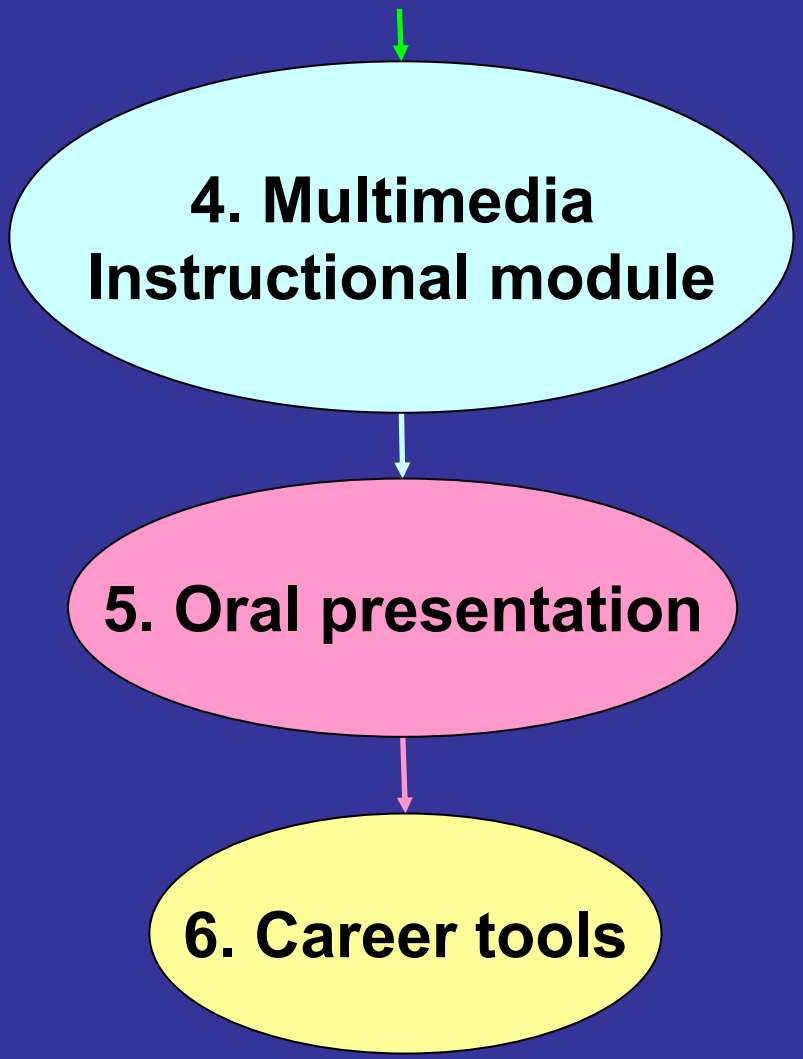
Course design II



Develop audience appropriate instructional materials (MMIM)

Promote technical skill / product

Fit to personal career goals

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Module topics

Students successfully executed MMIMs on very challenging topics

2006:

Medical Imaging

Molecular Electronics

Space Exploration

2005: (Einstein year)

Photoelectric Effect

Special Relativity

Brownian Motion

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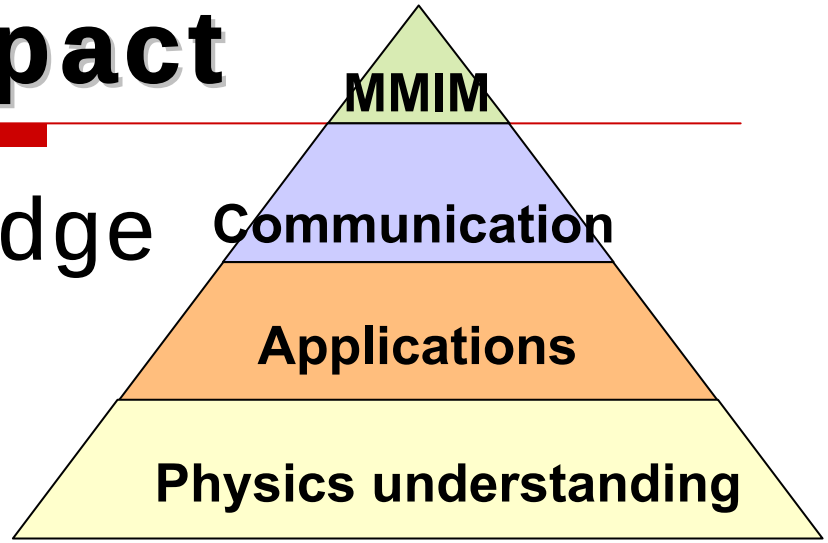
Student Viewpoint

Mr. Atri Maharaj
4th year PHT student

- My unique perspective
- First a student (Winter 2005)
- Then a Teaching Assistant (Winter 2006)

The Impact

- Pyramid of knowledge



- Links education to the popularity of technology
- Ability to communicate with people of various science backgrounds

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Learning outcomes

- Communication: (Writing competency, Oral presentation skills, web communication)
- Apply and integrate knowledge
- Critical thinking/ scientific inquiry/ problem solving
- Information access and evaluation
- Ethical behaviour and social awareness
- Teaching skills
- Web design & development
- Career management
- Interpersonal and Team work skills

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Assessment

• Communication	• Writings, talks, MMIM
• Apply and integrate knowledge	• MMIM
• Problem solving	• Proposal, MMIM
• Information access and evaluation	• Writings, MMIM
• Ethical behaviour and social awareness	• Writings, MMIM, case studies
• Teaching skills	• Lay article, MMIM
• Web design & development	• MMIM
• Career management	• Job search, resume
• Interpersonal and Team work skills	• All assessments

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Engagement Strategies

- Large ‘useful’ project goal
- Team assignments
- Peer reviews
- Workshop-type classes
- Guest lectures
- Mock talks
- Skills for career management
- Keeping course content current
- Marks for lab work

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Project goal

- Well-defined goal (Multimedia Instructional Module)
- Useful outcome
- Adds resume value for several career paths
- Pedagogical experience
- Fame and glory (?)

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Team work

- Teams formed with complementary strengths
- Collaboration vs. compilation
- Time on task – logs for every group assignment
- Written rules of operation (best practices document) – student control of team behaviour

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Peer reviews

- Author-publisher-reviewer model

  (Thanks to Ron Richard from CFL)
- Importance of peer reviews in research administration / publishing
- Valuing student opinions

- Anonymous peer reviews of all assignments
- Peer reviews – graded
- Resubmit after review

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Lecture-workshops

- Paragraph writing
- Grammar and writing – case studies
- Collaboration/ group dynamics
- Ethics case studies
- Learning styles/ teaching methods
- Storyboarding
- Resume writing

Guest lectures

Information search and citations:

Tamsin Bolton, Information literacy librarian

Ethics workshop:

Danielle Istl, Academic Integrity Officer

Job search management:

Kerry Ann Gray, Career Services

Academic careers:

Alison Samson, Graduate Studies

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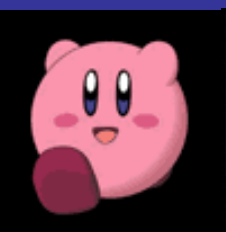
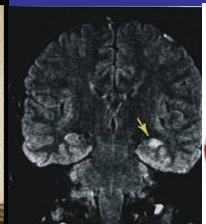
Mock talks

- 5-min talks on topic of students' choice
- This year's topics:

  Vacuum technology, Epilepsy, Obtaining a pilot's license, Anime, Robotics, Fantasy basketball, Poker, Blackjack, Beer or liquor?, George Mason Patriots, My school, My hair, My dog





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Career skills

- Job search management
- Research, teaching and applied careers
- Resume writing for a ‘real’ job

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'Evidence' of engagement

Excerpt from student's comment, April 11, 2006:

"Dr. Rangan,

Although my attendance was still kind of spotty for this course, it was my highest attendance of my university career. This is a compliment for you because usually I don't attend classes because they are boring."

…[rest of complimentary comments deleted]

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Summary

Multi-genre, collaborative course in technical communication provides

- opportunities for using engagement strategies
- variety of learning outcomes (that can be assessed)
- course outcomes that benefit both the student and public (high-school teachers)
- “valuable learning experience”

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Contact: rangan@uwindsor.ca