

Department/Degree Program Plan for integrating the  
Discipline-Specific Spoken, Visual and Written Communication Requirement  
into undergraduate curriculum

Date: March 11, 2005  
Department/Degree Program: Physics  
Departmental Contact: Leo Piilonen  
Contact Phone Number: 231-4449

Contact e-mail: piilonen@vt.edu

Submission of plan includes:

(three to four pages)

4. A brief statement of departmental and/or program goals and objectives for an integrated, sequenced approach to spoken, visual, and written communication,
5. A plan for developing and implementing a curriculum reflecting these goals and objectives, including an outline of phasing, and
6. A plan for assessing outcomes.

APPROVAL SIGNATURES

Departmental Representative: Date:  
College Dean: Date:

## I. Goals and Objectives

A trained physicist, whether as a graduate student, a postdoctoral fellow, a faculty/staff member, or a professional in a private institution, is expected to produce reports and/or documents that will be read and critiqued by other physicists, such as those employed by funding agencies, and to communicate effectively with non-specialists. He or she is expected also to prepare visual presentations and present these within his/her organization, at external meetings of professional societies, or, perhaps, to an outside audience. Finally, a practicing physicist is expected to maintain a coherent and legible log book that documents his/her original research as it occurs.

The Department of Physics will instill these skills in our majors through the Visual Expression, Writing, and Speaking (ViEWS) communication plan described in the next section.

After going through the program, the student will be able to perform the following tasks:

Visual/Spoken:

a) create visual illustrations of experimental or theoretical procedures and

concepts

b) create graphs (histograms, scatterplots, or 3D projections) of data with best fit

functions superimposed where appropriate

c) create a visual presentation using programs such as PowerPoint, Keynote or

OpenOffice that assimilates text with visual illustrations and graphs

d) discuss the contents of the illustrations, graphs and presentations with peers

and colleagues, to solicit feedback on how they might be modified and improved

e) deliver visual presentations in a report to a scientific audience

Written:

a) produce a polished written record of the results of an experimental or theoretical investigation, suitable for internal discussion among peers who are

familiar with the technical details of the work

b) produce a technical report, suitable for submission to a peer-reviewed journal,

of the results of an experimental or theoretical investigation

c) write a professional abstract for a scientific presentation

- d) contribute to the writing of a project proposal
- e) maintain a legible log or journal of all activities and ideas related to an

experimental or theoretical investigation, suitable for consultation by a small audience of collaborators on said investigation

## II. Plan

The Physics Department has already implemented or will implement soon the following components to satisfy the communication requirement:

1. Written work in the form of formal reports (laboratory report or library research report) in selected courses

2. Spoken and Visual work in the form of presentations prepared on a computer and/or overhead transparencies and/or slides and delivered orally to an audience of peers and faculty

3. Log book journalling (in junior and senior level laboratory courses) Training in these communication skills requires repetition and useful feedback in the form of critiques and review by faculty and peers. Therefore, the Physics Department will incorporate the communication requirement into its curriculum through the following strategies, itemized by course number. The changes to the Physics Major checksheet will be implemented for students who enter the program in Fall 2005. The manner in which each course contributes to the desired communication outcome is indicated by Va-Ve (for visual/spoken) or Wa-We (for written).

PHYS2325-2326: Seminar for Physics Majors

In PHYS2325: train students in good practices for preparing a visual presentation using, for example, the Lawrence Livermore National Laboratory model, and expose them to 20-30 minute visual/oral presentations by Physics Department faculty and postdoctoral fellows. (Va, Vb, Vc, Vd)

In PHYS2326: Require students to give a 10 minute visual/oral presentation on a physics-related topic of their choice, so that they feel entirely comfortable with the content and focus their attention instead on their presentation skills. (Student presentations at meetings of the American Physical Society are 10 minutes' duration with 2 minutes for questions from the audience.) Continue to expose students to visual/oral presentations by Physics Department faculty and postdocs. (Va, Vb, Vc, Vd, Ve)

PHYS3154: Observational Astrophysics

Log book that is reviewed by instructor periodically. Formal report in professional journal style for each observing project (2--4 pages each excluding figures, about 5 projects per semester). Training by instructor in how to give a visual/oral presentation (1 lecture). Visual/oral presentation to peers and faculty by student, with

content selected from one of the observing projects (10 minutes, plus 2 minutes for audience questions). (Va, Vb, Vc, Vd, Ve, Wa, Wb, Wc)

PHYS3314: Intermediate Laboratory

Log book that is reviewed by instructor periodically. Formal reports (7 labs per

semester). (We)

PHYS3356: Intermediate Mechanics (second semester)

Research paper on a topic of the student's choosing from a list compiled by the instructor. Visual/oral presentation (10 minutes, plus 2 minutes for audience questions) to peers and instructor during designated class sessions. (Va, Vb, Vc, Vd, Ve, Wa)

PHYS3455: Foundations of Quantum and Solid State Physics

Formal lab reports (7 per semester) from the accompanying lab. Research report on a

topic of student's choice from a list of topics prepared by instructor. Visual/oral

presentation to peers and instructor on the contents of either this report or one of the labs (15 minutes), given during one of the weekly recitations. (Va, Vb, Vc, Vd, Ve, Wa, We)

PHYS3504: Foundations of Nuclear and Particle Physics

Formal lab reports (7 per semester). (We)

PHYS4315-4316: Modern Experimental Physics

Log book that is reviewed by instructor periodically. Formal reports (7 per semester). One visual/oral report of 10 minutes duration plus 2 minutes for audience questions, presented to the department in the second half of the second semester (in lieu of the departmental colloquia on two uncommitted Fridays: five hours total for 30 presentations). (Va, Vb, Vc, Vd, Ve, Wa, Wb, Wc, Wd, We)

PHYS4624: Optics Laboratory

Log book that is reviewed by instructor periodically. Formal report for each lab (8 per semester), in the style of a professional journal article. (Wa, Wb, Wc, We)

PHYS4714: Introduction to Biophysics

Formal report (one per semester) on a biological system from the physics point of view, on a topic selected by the instructor. Visual/oral presentation on the contents of this report to peers and instructor (15 minutes). (Va, Vb, Vc, Vd, Ve, Wa, Wb, Wc)

PHYS4574: Nanotechnology

Four library research reports (2-3 pages each) on topics of current interest selected by student, with instructor approval. One final library research report (10 pages) on a topic of current interest selected by student, with instructor approval, using research journal articles found by student, with instructor approval. Visual/oral presentation (15 minutes duration) on the contents of this final research report. (Va, Vb, Vc, Vd, Ve, Wa, Wb, Wc)

### III. Assessment of Outcomes

#### A. Student Assessment

The checksheet for Physics majors will have a checkbox next to the course for each of the above accomplishments. The assessment that a student has (or has not) fulfilled each accomplishment is done by the course instructor as part of the regular course grade, and is reported separately (as "Satisfactory" or "Unsatisfactory") to the Physics Undergraduate Secretary during the semester so that each student's checksheet can be updated. The checksheet will contain an additional checkbox for Visual, Written and/or Log, as appropriate for a given course, indicating whether the student has completed the corresponding requirement in that course.

The Physics Department will maintain for each physics major an electronic portfolio of each of the above-mentioned written reports and visual presentations, to document his/her progress in completing the communication requirement. This portfolio will be maintained during the student's tenure as an undergraduate at Virginia Tech, and will be discarded one year after his/her graduation.

#### B. Department Assessment

The effectiveness of the Department of Physics to instill in its majors the ability to communicate clearly and coherently will be measured by the following strategies:

1. The student's level of "Satisfactory" communication performance, as indicated on his/her checksheet
2. Written feedback to the department (not the students) from the faculty audience attending the visual/oral reports given by the physics majors at the end of the second semester of PHYS4315-4316.
3. Written feedback to the department (not the students) at the end of each spring semester from an ad hoc committee of faculty from the Department of Physics and other selected departments on a random sample of student written reports that were generated in the just-completed academic year.
4. Student responses to ViEWS-specific questions that will be added to the existing Senior Exit Interview.
5. Alumni/ae responses to ViEWS-specific questions that will be added to the

existing Post-Graduate Survey.

6. Review of the above feedback by the Five-Year Departmental Review Committee.

