

Core Curriculum Management

New Core Component Proposal

Date Submitted: 10/09/17 2:49 pm

Viewing: **PHYS 125-GE : Soft Matter Physics for Non-physicists**

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Changes proposed by: skessler

In Workflow

1. PHYS Department Head
2. SC College Dean UG
3. CCC Preparer
4. CCC Chair
5. Faculty Senate Preparer
6. Faculty Senate
7. Provost II
8. President
9. Curricular Services

Approval Path

1. 10/09/17 2:56 pm
Lewis Ford (a-ford):
Approved for PHYS
Department Head
2. 10/09/17 4:47 pm
Lucas Macri (lmacri):
Approved for SC College
Dean UG

Contact(s)

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Course Prefix PHYS Course Number 125

Academic Level UG

Complete Course Title Soft Matter Physics for Non-physicists

Abbreviated Course Title SOFT MATTER PHYS NON-PHYSICSTS

Crosslisted With

Semester Credit 3

Hour(s)

Proposal for:

Core Curriculum Addition/Edit

How frequently will the class be offered? Once per year

Number of class sections per semester 6

Number of students per semester 156

Historic annual enrollment for the last three years

Last year: 0 Previous year: 0 Year before: 0

Core curriculum

Foundational Core Life/Physical Sci (KLPS)

Component Area

TCCN prefix/number

Foundational Component Area: Life/Physical Sci

How does the proposed course specifically address the Foundational Component Area definition above?

This is a regular soft matter physics course adapted for the non-physics major students who have little or no experience in physics or other natural sciences. This course starts by explaining basic physical phenomena such as heat, temperature, heat capacity, and heat conduction with parallel measurements in the lab. Thus, students will use the scientific method in exploring natural phenomena. After several introductory lectures students will apply their new physics knowledge to predict and understand the soft matter mechanical properties that result from the interaction of different forces in the soft matter. The thermodynamics and mechanical properties of the soft matter differ strongly from that of ordinary crystalline materials. These differences will be described and explained by using the scientific method to analyze the interaction of different forces in the soft matter. Another major topic in this course is the formation of membranes and their properties. Students will experiment with soap bubbles (one example of a membrane) under different external conditions and solve experimentally the complicated mathematical problem of the surface with minimum energy as result of interaction of different forces in the membrane. This gives them unique opportunity to apply the scientific method to analyze everyday natural phenomena.

Core Objectives:

Critical Thinking (to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information):

Students will learn the fundamental principles of thermodynamics and soft matter physics. To solve problems and perform experiments they will need to think creatively to figure out which laws of thermodynamics they need to apply and how these laws explain soft matter properties. Students will inquire, analyze and evaluate different factors important for particular processes and synthesize available information to get answer. Labs and problems are designed in a way to inspire an innovative approach to problem solving and experimental work. This is the typical situation in teaching any physics course.

Communication (to include effective development, interpretation and expression of ideas through written, oral and visual communication):

The class will be divided into small groups of students (4-6) which will work on experiments and present their result in the form of report. This report will include written text, visual presentations (e.g., graphs, photos, short video clips). Results of experiments will be discussed in class (oral communication). The problem solving is included in the written part, the visual presentation of the results and their oral discussion. Typical discussion of problems in class includes oral and visual communication with final notes written in the lecture notes. Each student will give/lead at least one short oral discussion during the semester, which will include a visual and written presentation with Power Point.

Empirical and Quantitative Skills (to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions):

Students will develop empirical and quantitative Skills by problem solving and by manipulation and analysis of the labs numerical data. They will also develop empirical and quantitative Skills by analyzing and comparing their data with those obtained by their peers.

Teamwork (to include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal):

The class will be divided into small groups of students (4-6), which will work on experiments and present their results. The experiment will be a joint effort, and students will decide how to divide the various aspects of the experiment. These include experiment preparation, measurements and presentation. These roles will be different in each experiment, thus providing students the opportunity to experience each aspect. Results of experiments will be discussed, thus providing each student the opportunity to present his/her opinion. This approach will require that students learn how to work effectively with others to support a shared purpose or goal.

Please ensure that the attached course syllabus sufficiently and specifically details the appropriate core objectives.

Attach Course Syllabus [PHYS 125 - for core - Fall 2017.pdf](#)

Reviewer Comments