

# CHEMICAL PHYSICS - PH.D.

## College of Arts and Sciences

Liquid Crystal and Materials Science Building  
Kent Campus  
330-672-2654  
<https://www.kent.edu/cpip>

## Description

The Ph.D. degree in Chemical Physics provides students with extensive scientific training, cutting-edge research opportunities and engineering skills necessary for a variety of careers in the academy and in industry. Program faculty and students conduct research through Kent State's Advanced Materials and Liquid Crystal Institute in liquid crystal synthesis and molecular design, liquid crystal and related advanced materials and properties, lyotropic liquid crystals and bio-related materials, optoelectronics, and nanoscience and nanotechnologies. These important research foci are inherently interdisciplinary.

## Fully Offered At:

- Kent Campus

## Admission Requirements

- Bachelor's degree or higher from an accredited college or university for unconditional admission
- Minimum 3.000 GPA on a 4.000 point scale for unconditional admission
- Official transcript(s)
- GRE scores (general and subject test in physics or chemistry) are not required, but strongly recommended
- Goal statement
- Two letters of recommendation
- English language proficiency - all international students must provide proof of English language proficiency (unless they meet specific exceptions) by earning one of the following:
  - Minimum 525 TOEFL score (paper-base version)
  - Minimum 71 TOEFL score (Internet-based version)
  - Minimum 74 MELAB score
  - Minimum 6.0 IELTS score
  - Minimum 50 PTE score

Admission will be granted by examination of the student's background on an individual basis. Students from a variety of undergraduate majors—such as physics, chemistry, engineering and materials science—are invited to apply.

For more information about graduate admissions, please visit the Graduate Studies website. For more information on international admission, visit the Office of Global Education's admission website.

## Program Learning Outcomes

Graduates of this program will be able to:

1. Develop an advanced understanding of the fundamental science of liquid crystals and related advanced materials and ability to apply acquired knowledge of physical and chemical properties of soft

materials in achieving understanding of novel phenomena in liquid crystals.

2. Gain experience in presenting scientific data in research publications, articles, posters and oral presentations.
3. Apply acquired knowledge to the discovery of new liquid crystal effects, new liquid crystal materials and development of liquid crystal based devices and applications.

## Program Requirements

### Major Requirements

Code	Title	Credit Hours
<b>Major Requirements</b>		
CPHY 72242	CHARACTERIZATION OF SOFT MATTER	3
CPHY 73000	PHYSICS OF SOFT MATTER	3
CPHY 73015	CHEMISTRY OF SOFT MATTER	3
CPHY 73020	APPLICATIONS OF SOFT MATTER	3
CPHY 80199	DISSERTATION I <sup>1</sup>	30
Approved Elective Coursework, including research <sup>2</sup>		48
<b>Minimum Total Credit Hours for Post-Baccalaureate Students</b>		<b>90</b>
<b>Minimum Total Credit Hours for post-Master's Students</b>		<b>60</b>

<sup>1</sup> Each doctoral candidate, upon admission to candidacy, must register for CPHY 80199 for a total of 30 credit hours. It is expected that a doctoral candidate will continuously register for Dissertation I, and thereafter CPHY 80299, each semester, including one term each summer, until all requirements for the degree have been met. A prospectus of the dissertation research project is required for all Ph.D. candidates. The prospectus is prepared jointly with the student's dissertation advisor. The prospectus must be approved by the members of the student's dissertation committee. A dissertation presenting and interpreting results of original research is required for the Ph.D. degree. Following acceptance of the dissertation by the dissertation committee, the final degree requirement is the satisfactory completion of the final oral exam (defense of dissertation) in front of a committee of graduate Chemical Physics faculty and representatives from other departments in the College of Arts and Sciences.

<sup>2</sup> Post-Baccalaureate students may take up to 15 credit hours of research. Post-Master's students may take up to 6 credit hours of research.

## Graduation Requirements

Post-Baccalaureate students are required to complete a minimum of 90 credit hours - 12 credit hours of core courses, 48 credit hours of elective courses with a maximum of 15 credit hours of research and 30 credit hours of dissertation. Post-Master's students are required to complete a minimum of 60 credit hours beyond the master's degree - 12 credit hours of core courses, 18 credit hours of elective courses with a maximum of 6 credit hours of research and 30 credit hours of dissertation. The student's faculty advisor must approve the choice of electives. If a required core course is not available, an equivalent course may be substituted with permission of the program director.

## Candidacy

In addition to satisfying the course work the student must pass the Chemical Physics Candidacy examination. The examination is divided

into two parts, a written and an oral exam. The written exam is scheduled first followed by the oral exam. The exams will cover the core courses of the Chemical Physics program taken during the first year. A student who does not pass the candidacy exam the first time, may take it a second time. The student's first attempt at candidacy will take place in January, during the week before the start of the spring semester of the student's second year of study. A request for exception will be considered for medical reasons or for other unpredictable circumstances. Requests must be submitted in writing with supporting documentation prior to the test date and must be approved by the candidacy exam committee and by the director of the Chemical Physics program. If the student fails the second attempt, they cannot continue towards the doctoral degree, but may complete the requirements for the Master's of Science degree.