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 3.00 GPA on a 4.00 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**

[PHD-CPHY]

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPHY 72241</td>
<td>SOFT MATTER</td>
<td>3</td>
</tr>
<tr>
<td>CPHY 72335</td>
<td>ADVANCED LIQUID CRYSTALLINE AND POLYMERIC MATERIALS</td>
<td>4</td>
</tr>
<tr>
<td>CPHY 72450</td>
<td>LIQUID CRYSTAL OPTICS I: THEORY</td>
<td>2</td>
</tr>
<tr>
<td>CPHY 72452</td>
<td>LIQUID CRYSTAL OPTICS II: OPTICAL SYSTEMS</td>
<td>2</td>
</tr>
<tr>
<td>CPHY 72460</td>
<td>LIQUID CRYSTAL MATERIALS SCIENCE</td>
<td>2</td>
</tr>
<tr>
<td>CPHY 72462</td>
<td>LIQUID CRYSTAL SCIENCE: PHYSICAL PROPERTIES</td>
<td>3</td>
</tr>
<tr>
<td>CPHY 74491</td>
<td>SEMINAR: LIQUID CRYSTALS</td>
<td>4</td>
</tr>
<tr>
<td>CPHY 80199</td>
<td>DISSERTATION I</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Minimum Total Credit Hours for Post-Baccalaureate Students</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td>Minimum Total Credit Hours for post-Master’s Students</td>
<td>60</td>
</tr>
</tbody>
</table>

1 Students register for the 1-credit hour seminar course each semester for a total of four times (4 credit hours).
2 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.
3 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 - 20 credit hours of core courses, 40 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 - 18 credit hours of core courses, 12 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 graduate coordinator.

**Candidacy**

In addition to satisfying the course and computer language requirements, the student must pass the Chemical Physics candidacy examination. The examination will cover material in the core courses of the chemical physics program. A student may make two attempts at passing the examination. If the student fails the second attempt, he/she will not be permitted to continue toward the doctoral degree but may complete the requirements for the Master of Science degree. The student's first attempt at candidacy should come following the first year of study. In exceptional cases, a student may defer taking the candidacy examination until the beginning of the third year of graduate study.