

CHEMICAL PHYSICS - M.S.

College of Arts and Sciences

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

Description

The Master of Science 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 materials and properties, lyotropic liquid crystals and bio-related materials, opto-electronics, and nanoscience and nanotechnologies. These important research foci are inherently interdisciplinary.

The Chemical Physics major includes the following optional concentration:

- The **Liquid Crystal Engineering** concentration responds to the growing need for skilled engineers with expertise in liquid crystals by providing students with opportunities to learn the basic sciences; modelling and simulation; electronic and optical design; fabrication and testing of displays, electro-optic devices, sensing devices and applied systems. Students acquire practical skills as well as working knowledge of the fundamental science and technology needed in the cutting-edge liquid crystal industry.

Fully Offered At:

- Kent Campus

Admission Requirements

- Bachelor's degree from an accredited college or university for unconditional admission
- Minimum 3.000 undergraduate GPA on a 4.000 point scale for unconditional admission
- Official transcript(s)
- Goal statement
- Two letters of recommendation
- Submission of GRE scores (general and subject test in physics or chemistry) is not required, but strongly recommended
- 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-based 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:

- Develop an advanced understanding of the fundamental science of liquid crystals and ability to apply acquired knowledge of physical and chemical properties of liquid crystals and related advanced materials in achieving development of liquid crystal materials and devices.
- Gain experience in presenting scientific data in research publications, articles, posters and oral presentations.
- Apply acquired knowledge to the development of new liquid crystal materials, new theories and effects and liquid crystal-based devices.

Program Requirements

Major Requirements

Code	Title	Credit Hours
Major Requirements		
CPHY 62450	LIQUID CRYSTAL OPTICS I: THEORY	2
CPHY 62452	LIQUID CRYSTAL OPTICS II: OPTICAL SYSTEMS	2
CPHY 62460	LIQUID CRYSTAL MATERIALS SCIENCE	2
CPHY 62462	LIQUID CRYSTAL SCIENCE: PHYSICAL PROPERTIES	3
CPHY 64491	SEMINAR: LIQUID CRYSTALS ¹	3-4
	Approved Elective ²	3
Additional Requirements or Concentration		
	Choose from the following:	14-23
	Additional Requirements for Students Not Declaring a Concentration	
	Liquid Crystal Engineering Concentration	
Minimum Total Credit Hours:		30-38

- Students register for the 1-credit hour seminar course each semester for a total of three times (3 credit hours) for students in the Liquid Crystal Engineering concentration and total four times (4 credit hours) for students who did not declare the concentration.
- Elective credit hours may include research and thesis. Candidates may choose to do a master's thesis by registering for CPHY 60199 for a total of 6 credit hours. The thesis for the Master of Science degree will present and interpret results of original research and must be defended before a committee of the Chemical Physics graduate faculty.

Additional Requirements for Students Not Declaring a Concentration

Code	Title	Credit Hours
Major Requirements		
CPHY 62241	SOFT MATTER	3
CPHY 62335	ADVANCED LIQUID CRYSTALLINE AND POLYMERIC MATERIALS	4

Approved Elective	1
Major Electives, choose from the following:	6
CPHY 62454 LIQUID CRYSTAL OPTICS III: APPLICATIONS	
CPHY 64491 SEMINAR: LIQUID CRYSTALS	
CPHY 65002 LIQUID CRYSTAL DEVICE ENGINEERING I	
CPHY 65004 LIQUID CRYSTAL DEVICE ENGINEERING II	
CPHY 65006 LIQUID CRYSTAL DEVICE PROTOTYPING	
CPHY 65008 LIQUID CRYSTAL DEVICE CONSTRUCTION	
CPHY 65010 LIQUID CRYSTAL CHARACTERIZATION	
CPHY 65012 LIQUID CRYSTAL DEVICE TESTING	
CPHY 65020 LIQUID CRYSTAL ANALOG ELECTRONICS	
CPHY 65022 LIQUID CRYSTAL DIGITAL ELECTRONICS	
CPHY 65098 MASTER'S PROJECT: ENGINEERING APPLICATIONS OF LIQUID CRYSTALS	
Minimum Total Credit Hours:	14

Liquid Crystal Engineering Concentration Requirements

Code	Title	Credit Hours
Concentration Requirements		
CPHY 62454	LIQUID CRYSTAL OPTICS III: APPLICATIONS	1
CPHY 65002	LIQUID CRYSTAL DEVICE ENGINEERING I	2
CPHY 65004	LIQUID CRYSTAL DEVICE ENGINEERING II	3
CPHY 65006	LIQUID CRYSTAL DEVICE PROTOTYPING	2
CPHY 65008	LIQUID CRYSTAL DEVICE CONSTRUCTION	1
CPHY 65010	LIQUID CRYSTAL CHARACTERIZATION	2
CPHY 65012	LIQUID CRYSTAL DEVICE TESTING	2
CPHY 65020	LIQUID CRYSTAL ANALOG ELECTRONICS	2
CPHY 65022	LIQUID CRYSTAL DIGITAL ELECTRONICS	2
CPHY 65098	MASTER'S PROJECT: ENGINEERING APPLICATIONS OF LIQUID CRYSTALS	6
Minimum Total Credit Hours:		23