

# BACHELOR OF SCIENCE IN CHEMICAL PHYSICS

## OVERVIEW

Chemical Physics is an interdisciplinary field merging the disciplines of chemistry and physics. A number of hot research topics, including areas of materials science, surface science, and nanotechnology, require an in-depth knowledge of both of these fields. In addition, there is much work being done to better understand the physical processes that take place in chemical reactions and chemical bonding. Such understanding can lead to advances in any chemistry-related industry, including pharmaceuticals and plastics.

## FACULTY

Currently six full-time faculty teach in the Chemistry Department including the chair.

### **Brother Pierre St. Raymond, FSC, Department Chair**

Brother Pierre is a Professor of Chemistry and a native of New Orleans, La. He has a B.S. from the College of Santa Fe and a Ph.D. from the University of Maryland.

## CONTACT

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## HIGHLIGHTS

Lewis University is one of a few institutions of higher education that has undergraduate students working in a laser lab. Dr. Charles Crowder, Assistant Professor of Physics, mentors the students as they build lasers, disassemble them and learn how to manipulate the devices.

Lewis students are constructing optical tweezers, which use laser beams to trap microscopic or nanoscopic particles with precise 3-dimensional positioning to levitate bacteria, viruses, single atoms and molecules. They contribute to the emerging science of nanotechnology, and biologists can use the laser tweezers to examine cells.

Students are also utilizing interferometers to influence laser waves. Understanding interferometry is currently being employed as an important investigative technique in the fields of astronomy, fiber optics, engineering metrology, optical metrology, oceanography, seismology, quantum mechanics, nuclear and particle physics, plasma physics, and remote sensing.

## CHEMICAL PHYSICS / BACHELOR OF SCIENCE

Students majoring in Chemical Physics must maintain an average GPA of 2.75 in the required coursework for the major to remain in the program. All transfer students must have a minimum GPA of 2.75 in their Chemistry and Physics courses. All students majoring in this program may take a required class only twice at Lewis University. If a student has not achieved a minimum of a C after the second attempt, the student may not repeat the class.

All Chemical Physics students will take the core courses listed and then branch out into either the chemistry or physics track.

### I. B.S. in Chemical Physics Core (66)

- 03-110 General Chemistry I (4) and (03-111) Lab (1)
- 03-115 General Chemistry II (4) and (03-116) Lab (1)
- 03-220 Organic Chemistry I (4) and (03-221) Lab (1)
- 03-300 Physical Chemistry I (3) and (03-301) Lab (1)
- 03-305 Physical Chemistry II (3) and (03-306) Lab (1)
- 03-320 Analytical Chemistry I (3) and (03-321) Lab (1)
- 13-200 Calculus I (4)
- 13-201 Calculus II (4)
- 13-250 Calculus III (4)
- 13-300 Differential Equations (4)
- 17-210 General Physics I (4) and (17-211) Lab (1)
- 17-215 General Physics II (4) and (17-216) Lab (1)
- 17-240 Introduction to Modern Physics (4)
- 17-300 Mechanics (4)
- 17-400 Advanced Experimental Physics Lab (4)

### II. Physics Track (77-79)

- 17-310 Electricity and Magnetism (4)

*One of the following five:*

- 17-320 Solid State Physics (3)
- 17-350 Optics (3)
- 17-220 Electronic Circuits (4)
- 17-341 Quantum Mechanics (3)
- 70-200 Computer Science I: Programming and Algorithm Design (3)

*One of the following three:*

- 03-225 Organic Chemistry II (4)  
AND
- 03-226 Organic Chemistry II Lab (1)
- 03-325 Instrumental Analysis (3)  
AND
- 03-326 Instrumental Analysis Lab (2)
- 03-400 Advanced Inorganic Chemistry (3)  
AND
- 03-420 Advanced Chemical Laboratory Topics (1-2)

### III. Chemistry Track (83-85)

- 03-225 Organic Chemistry II (4)  
AND
- 03-226 Organic Chemistry II Lab (1)
- 03-325 Instrumental Analysis (3)  
AND
- 03-326 Instrumental Analysis Lab (2)

*One of the following two:*

- 03-400 Advanced Inorganic Chemistry (3)  
AND
- 03-420 Advanced Chemical Laboratory Topics (1-2)
- 03-401 Advanced Organic Chemistry (3)  
AND
- 03-420 Advanced Chemical Laboratory Topics (1-2)

*One of the following four:*

- 17-310 Electricity and Magnetism (4)
- 17-320 Solid State Physics (3)
- 17-341 Quantum Mechanics (3)
- 17-350 Optics (3)

\* 17-400 fulfills the advanced writing requirement. Several extensive laboratory reports are required in this course, including a final report and presentation of their capstone project. Several other papers such as a response to a case study in laboratory ethics are also required in this course.