Course objectives:

The goal of this course is to introduce computing as a tool for numerical problem solving in physics and to familiarize students with a variety of important methods and algorithms. We will consider problems drawn from classical and quantum mechanics, statistical physics, and condensed matter physics.

PHYS 420 Prerequisites:

PHYS 234, 244, 381, MATH 337 or equivalent.

PHYS 420 Recommended:

PHYS 343, 311, 372, 472, 481. Familiarity with C and/or FORTRAN programming language.

Lectures: CEB 1-23, Monday, Wednesday, Friday, 13:00 – 13:50
Lab: CEB 3-24, Thursday, 14:00 – 16:50
Office hours: CEB 2-54E, Monday, Wednesday, 13:50 – 15:00 (or by appointment)

Textbook: There is no required text. A list of recommended reading will be provided.

Examination schedule:

Final exam: Tuesday, December 8, 14:00 – 17:00
Deferred: Saturday, January 30, 09:00 – 12:00

For study purposes, students may find it helpful to look over examinations, assignments, and labs from previous years. These are available from a link at the top of the class website.

Grading schemes:

Two different grading schemes will apply: (1) Undergraduate students and graduate students with little or no computational experience:

Assignments (5): 60%
Final exam: 40%

(2) Graduate students with computational experience:

Term project: 60%
proposal: 5%
midterm presentation: 10%
final presentation: 10%
code submission and written report: 35%
Assignments (4): 40%
A curve appropriate for the class will be applied at the end of the term. The average mark is expected to be in the B+ range. This might be revised depending on the performance of the class as a whole.

Assignments:

Assignments will be set roughly every second week and will consist of a small computational project. A written version of the assignments will be handed out in class, and an electronic version will be posted on the class website. Assignments will be collected and graded.

Students may work co-operatively at the level of discussing algorithms and general approaches, but each student should implement his or her own, independent solution.

Weekly labs:

Attendance at weekly labs is not mandatory, and performance in the labs will not count towards the final grade. Nonetheless, students are strongly encouraged to take this part of the course seriously. Labs are the best opportunity students will have to develop their programming skills and to get hands-on experience with the computing environment in which the final exam will take place.

Term project:

The project must be defined early on. Students should discuss potential topics with the instructor and submit a detailed outline within the first two weeks of class. It is important to select a project that can be carried out within the time frame of the course. Students are free to choose a project that is related to their thesis research area (in consultation with their supervisor). The schedule for the project is as follows.

\[
\begin{align*}
\text{proposal:} & \quad \text{September 16} \\
\text{midterm presentation:} & \quad \text{October 19, 21} \\
\text{final presentation:} & \quad \text{November 23, 25, 27} \\
\text{final report:} & \quad \text{December 2}
\end{align*}
\]

Detailed guidelines for each element of the term project will be provided on the class website.

University policy regarding academic offences:

"The University of Alberta is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Code of Student Behaviour (online at http://www.uofaweb.ualberta.ca/governance/studentappeals.cfm) and to avoid any behaviour which could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University."

Students are warned that passing off code from other sources as their own constitutes plagiarism.

Policy about course outlines can be found in §23.4(2) of the University Calendar.