PHYS 2360 Experimental Physics III (2,0,3)
Prerequisite: Year II standing or consent of the instructor
This course consists of a series of laboratory experiments complementing the courses PHYS 2260 Modern Physics, PHYS 2130 Electromagnetism I, PHYS 3120 Statistical Physics I and PHYS 2140 Electromagnetism II.

PHYS 3120 Statistical Physics I (4,4,0)
Co-requisite: Year III standing or consent of the instructor
Foundation course on thermal and statistical physics. After a discussion of thermodynamic systems and processes, the basic postulates and framework of the statistical mechanics will be laid out, and connections to the classical thermodynamic laws will be made. The formalism will then be applied to simple classical and quantum systems such as the ideal gas, paramagnetic solid, free electron gas and phonons in solids, etc. The quantum statistics of Bosons and Fermions will be introduced.

PHYS 3140 Solid State Physics I (3,3,0)
Prerequisite: PHYS 3120 Statistical Physics I or consent of the instructor
This course studies applications of statistical physics and quantum mechancis to the solid state of matter. Aspects included are crystal structures, X-ray diffraction, lattice dynamics, thermal properties, and band theory of solids.

PHYS 3150 Quantum Mechanics I (4,4,0)
Prerequisite: PHYS 2260 Modern Physics
The course begins with a revision of the elementary wave mechanics for a particle in one dimension. The basic formalism of quantum mechanics is then introduced after equipping students with tools from linear algebra. The theory is then applied to the treatment of the hydrogen atom and classification of angular momentum eigenstates. The wave functions for many-electron systems and their applications will be introducted.

PHYS 3170 Solid State Physics II (3,3,0)
Prerequisite: PHYS 3140 Solid Physics I or consent of the instructor
This course is a continuation of PHYS3140 Solid State Physics I. A wide range of properties of solids, which include charge transport phenomena, optical properties, dielectric properties, and selected new materials of current interest will be treated in detail.

PHYS 3240 Experimental Physics IV (2,0,3)
Prerequisite: Year III standing or consent of the instructor
This course consists of a series of laboratory experiments complementing the courses PHYS 2260 Modern Physics, PHYS 2130 Electromagnetism I, PHYS 3120 Statistical Physics I and PHYS 2140 Electromagnetism II.

PHYS 3250 Experimental Physics V (2,0,2)
Prerequisite: Year III standing or consent of the instructor
This course consists of a series of laboratory experiments complementing to year three courses, as well as some level two courses.

PHYS 3260 Quantum Mechanics II (3,3,0)
Prerequisite: PHYS 3150 Quantum Mechanics I or consent of the instructor
This course studies the principles and applications of quantum mechanics. The topics include: angular momentum and spin, perturbation theory, the variational principle, helium atom, molecules, and scattering.

PHYS 3270 Modern Optics (3,3,0)
Prerequisite: PHYS 3130 Electromagnetism II or consent of the instructor
The first part of this course focuses on understanding the nature of light and its interactions with matter. Though based on classical ideas, modern applications will be emphasized. The second part covers the quantum mechanical treatment of light-matter interactions, including semi-classical model of the laser and topics of current interest.

PHYS 3280 Mechanics II (3,3,0)
Prerequisite: PHYS 2330 Mechanics I or consent of the instructor
The application of particle dynamics to systems with many degrees of freedom, including, motion in noninertial frame, rigid body motion, elastic deformations and topics of current interest.

PHYS 3290 Statistical Physics II (3,3,0)
Prerequisite: PHYS 3120 Statistical Physics I or consent of the instructor
Elementary treatment of statistical mechanics of interacting particles and simple kinetic processes, with applications to condensed systems such as liquids, superfluids or superconductors. Topics covered include cluster expansion for non-ideal gas, simple transport processes, individual and collective diffusion, and collective phenomena.

PHYS 3310 Modern Science Experimental Lab (3,0,3)
Prerequisite: COMP 1170 Introduction to Structured Programming, COMP 1180 Structured Programming or I.T. 1180 Information Management Technology
This course provides an introductory level to graphical programming for data acquisition and instrument control encountered by science students, using LabVIEW™ as the programming platform. In contrast to other structured programming platforms such as C and BASIC which require a sophisticated programming experience, the graphical programming environment offers a simple platform for beginners to control instruments, automate data acquisition and data presentation.

PHYS 3460 Computational Physics I (3,3,0)
Prerequisite: COMP 1170 Introduction to Structured Programming or COMP 1180 Structured Programming or consent of the instructor
This is an introductory course on doing physics on the computer. By working through selected examples, students will learn basic programming strategies, as well as an appreciation of important concepts in numerical analysis, such as accuracy, stability, and efficiency of various algorithms. They will also encounter examples of modelling and simulation designed to deepen their understanding of physical phenomena such as diffusion, growth, and phase transitions. The course includes a lab component which gives the student hands-on experience in numerical computation.

PHYS 3591-2 Physics Project I & II (3,0,9)
A one-year individual project which usually relates to the interdisciplinary or applied courses in the final year, and requires knowledge and skill acquired in the course. A thesis and an oral presentation are required upon completion of the project. This course is open to Physics majors only.

PHYS 3640 Computational Physics II (3,3,0)
Prerequisite: PHYS 3460 Computational Physics I or consent of the instructor
This course focuses on the Molecular Dynamics (MD) and Monte Carlo (MC) methods applied to particle and spin systems. The basic ideas are first introduced through the simple example of a harmonic oscillator. The MD method is then applied to a many-particle classical system in a box. Some standard algorithms for numerical integration, and for bookkeeping are discussed, along with methods of data analysis. Two versions of the MC method will be applied to the Ising model. The question of relaxation time will be addressed. Finally, a version of the MC method will be introduced to simulate the liquid state of a particle system and compared with the corresponding MD simulation.

PHYS 3910 Topics in Physics I (*,*,*)
PHYS 3920 Topics in Physics II (*,*,*)
PHYS 3930 Topics in Physics III (*,*,*)
Prerequisite: Year III standing or consent of the instructor
This course covers more advanced topics or topics of current