**UIUC**
**====**

**Freshman**
Mech/Thermo (5 Hr)
Light/E&M/Modern (5 hr)

**Sophomore**
Mech (4 Hr)
E&M (4 Hr)
Thermal (2)
Waves and QM (2)

**Rensselaer RPI**
**==========**
First Year

| | | | | | |
|---|---|---|---|---|---|
| PHYS-1100 | Physics I | 4 | PHYS-1200 | Physics II | 4 |
| MATH-1010 | Calculus I | 4 | MATH-1020 | Calculus II | 4 |
| CHEM-1100 | Chemistry I [2] | 4 | CHEM-1200 | Chemistry II | 4 |

Second Year

| | | |
|---|---|---|
| PHYS-2100 | Intro to Methods of Theoretical Physics | 4 |
| PHYS-2350 | Experimental Physics | 4 |
| MATH-2010 | Multivariable Calculus & Matrix Algebra | 4 |
| MATH-2400 | Intro. to Differential Equations | 4 |
| CSCI-1100 | Computer Science I | 4 |
| PHYS-2620 | Fundamentals of Optics | 4 |
| ASTR-2050 | Intro. to Astronomy & Astrophysics | 4 |

Third Year

| | | |
|---|---|---|
| PHYS-2330 | Intermediate Mechanics | 4 |
| PHYS-4210 | Electromagnetic Theory | 4 |
| PHYS-2510 | Quantum Physics | 4 |
| PHYS-4100 | Intro. to Quantum Mechanics | 4 |
| MATH-4600 | Advanced Calculus | 4 |
| PHYS-4420 | Thermodynamics and Statistical Mechanics | 4 |
| MATH-4300 | Intro. to Complex Variables:Theory and Applications | 4 |

Fourth Year

| | | |
|---|---|---|
| PHYS-4720 | Solid State Physics | 4 |
| PHYS-4620 | Particles and Nuclei | 4 |
| PHYS-6510 | Quantum Mechanics I | 3 |
| PHYS-6520 | Quantum Mechanics II | 3 |

**MIT**
**===**
Freshman Physics I, Physics II

Sophomore
8.03 Physics III (vibrations and waves)
18.03 or 18.034 Differential Equations
8.033 Relativity
Junior
8.04 Quantum Mechanics I 8.044 Statistical Physics I
8.05 Quantum Mechanics II
Senior
8.06* CI-M Quantum Mechanics III 8.13* CI-M Experimental Physics I
8.14 Experimental Physics II 8.ThU Thesis (12 units)

Astronomy
12.400 (3-0-9) The Solar System 8.284 (3-0-9) Modern Astrophysics
8.286 (3-0-9) The Early Universe

Biophysics
7.03 (4-0-8) Genetics 7.05 (5-0-7) General Biochemistry
8.593J (formerly 8.515J) (4-0-8) Biological Physics

Computational Physics
6.001 (5-3-7) Structure and Interpretation of Computer Programs
18.330 (3-0-9) Introduction to Numerical Analysis

Nanotechnology
8.231 (4-0-8) Physics of Solids I  6.152J (3-4-5) Microelectronics Processing Technology
6.781 (3-0-9) Submicrometer and Nanometer Technology

CARNEGIE MELLON --1997  (Reinhard Schumacher)
==========
Consider how the seemingly immutable curriculum experienced by undergraduates is actually quite fluid when viewed on a timescale of more than four years. In 1994 the engineering college reduced the number of physics courses taken by engineering students from three to two. A year later the science college followed suit. This upset a long-standing sequence of three courses offered by the department: Physics I (Newtonian mechanics including rotations and angular momentum), Physics II (waves, vibrations and optics for half the semester and thermodynamics for the other half) and Physics III (electricity and magnetism up to Maxwell's Equations). We had to devise a pair of two-semester sequences for the engineering and the science students which in some way covered the ground previously covered in three semesters. The "third" course would be required only for physics majors.

We agreed not to simply compress three semesters of physics into two. Some topics, agonizingly, would have to be deleted from the old sequence. We wanted a third course for physics majors that would not just fill in topics omitted from the first two courses, but give these sophomores a first look at 20th-century physics. A great deal of discussion followed, since everyone on the committee, not to mention every other faculty member in the department, had his or her own ideas about what the introductory sequence should contain. Starting in the fall of 1996 we fully implemented the results of our efforts. Physics I now treats basic Newtonian Mechanics plus several weeks of thermal physics. Physics II is now mostly electricity and magnetism, as well as a few weeks of wave motion. Both of these courses exist in versions for the science students and for the engineering students. While their syllabi are very similar, instructors are free to make adjustments according to which group they are addressing.

Physics III received the largest make-over in this process. Subtitled "Modern Essentials," the new course consists of Special Relativity and early quantum phenomenology, finishing with the Schroedinger equation. The virtue of teaching SR to sophomores is that it challenges people's conceptions of space and time, but in a context that can be kept mathematically simple; we find that this approach captures and holds people's interest. The virtue of bringing quantum physics into the curriculum early is similarly to give young students a chance to deal

with non-classical, initially non-intuitive, topics early enough to keep their interest in the subject high. Our response to this course offering has been very good. Although only required for physics majors, over half the enrollment in each semester has come from other areas of the university.

To compensate for the loss of several topics in the introductory mechanics course, we made another adjustment in the early curriculum, adding a course to be taken in parallel with the Modern Essentials course. Called Physics Analysis, this course deals with simple harmonic motion, using it as a vehicle for solving the relevant differential equation in many different contexts. We introduce numerical modeling and symbolic manipulation using the Maple computer program. Thus the physics majors still have four courses at the introductory level to prepare for their intermediate level course, just as in former times.