Typical Course Schedule

		Units per term		
		1st	*2nd*	*3rd*
Second Year				
Ph 12 abc	Sophomore Physics	9	9	9
Ma 2 and 3	Sophomore Mathematics	9	9	0
ACM 95 abc	Intro. Methods of Applied Math.	12	12	12
	HSS electives	9	9	9
	Laboratory electives[1]	6	6	6
	Other elective	0	0	9
		45	45	45
Third Year				
Ph 125 ab	Quantum Mechanics	9	9	0
APh 110 ab	Topics in Applied Physics	2	2	0
APh 17 ab	Thermodynamics and Stat. Mech	9	9	0
Ph 106 abc	Topics in Classical Physics	9	9	9
	HSS electives	9	9	9
	Other electives[2]	9	9	27
		47	47	45
Fourth Year				
APh 78 abc	Senior Thesis, Experimental[3]	9	9	9
or				
APh 77	Laboratory in Applied Physics[3]	-	9	9
	Advanced Elective[2]	9	9	9
	HSS electives	9	9	9
	Other electives including APh100	27	18	18
		45	45	45

[1] *See item 2, option requirements.*
[2] *See item 6, option requirements.*
[3] *See item 5, option requirements.*

Suggested Electives
Students are encouraged to obtain a well-rounded course of study pursuant to the B.S. degree in applied physics. The option representative and/or undergraduate adviser will gladly assist students in choosing appropriate elective courses. Students ultimately interested in pursuing an advanced degree in applied physics or related fields are encouraged to complete a senior thesis project through APh 78 or 79.

Astrophysics Option

With the goal of understanding the physical processes that govern the universe, its constituents, and their origins and evolution, astronomy uses the apparatus and methodology of physics to gather and interpret data. Theoretical work and technology development round out astrophysics. In what follows, we use the terms "astronomy" and "astrophysics" interchangeably.

The astrophysics option is designed to give the student an understanding of the basic facts and concepts of astronomy today, to stimulate his or her interest in research, and to provide a basis for graduate work in astronomy/astrophysics. The sequence Ay 20, 21 constitutes a solid introduction to modern astrophysics and may be taken either sophomore or junior year, with more advanced courses (Ay 101, 102, plus Ay electives) taken in the junior and senior years. It is desirable for a student to gain as broad a background as possible in related fields of science and engineering.

Attention is called to the fact that any student whose grade-point average is less than 1.9 at the end of an academic year in the subjects listed in the Division of Physics, Mathematics and Astronomy may, at the discretion of his or her department, be refused permission to continue the work in this option.

Option Requirements

1. Ay 20, 21, 101, 102, 30 or 141, 31, Ma 2, Ma 3, Ph 2 abc or Ph 12 abc, Ph 125 ab, and Ph 106 abc.
2. Any three of Ph 3, Ph 5, Ph 6, Ph 7, or Ay 105. APh 23 and 24 taken as a pair may be substituted for one of these labs.
3. 63 additional units of Ay or Ph courses.
4. 27 additional units of science or engineering electives, of which 18 must be outside the Division of Physics, Mathematics and Astronomy. Core classes (see pages 208-209) or other introductory-level courses such as CS 1 do not count toward fulfillment of this requirement.
5. Passing grades must be earned in a total of 486 units, including the courses listed above. Courses satisfying requirements 1, 2, and 3 must be taken for grades unless they are pass/fail only.

Typical Course Schedule

		Units per term		
		1st	*2nd*	*3rd*
Second Year				
Ph 12 abc or Ph 2 abc	Sophomore Physics	9	9	9
Ma 2, Ma 3	Sophomore Mathematics	9	9	-
Ay 20	Basic Astronomy and the Galaxy	-	10	-
Ay 21	Galaxies and Cosmology	-	-	9
Ay 30	Intro. to Modern Research	-	3	-
	Physics Laboratory	-	-	9
ACM 95 abc	Intro. Methods of App. Math.	12	12	12
	HSS electives	9	9	9
		39	52	48

Third Year				
Ph 125 abc	Quantum Mechanics	9	9	9
Ph 106 abc	Topics in Classical Physics	9	9	9
Ay 101	The Physics of Stars	11	-	-
Ay 102	Physics of the Interstellar Medium	-	-	9
	HSS electives	9	9	9
	Astronomy, physics, or APh electives	9	9	9
		47	36	45
Fourth Year				
Ay 31	Written Communication	-	-	3
Ay 105	Astronomy Instrumentation Lab	-	-	10
	Astronomy, physics, or APh electives	9	9	-
Ay 78	Senior Thesis	9	9	9
	HSS electives	9	9	9
	Electives	18	9	18
		45	36	49

An ability to present one's work is vital to a successful career in research and teaching. Ay 30 satisfies the oral communications requirement, but for further development, students are *also* urged to sign up for Ay 141 in their junior and senior years. Ay 31 satisfies the written communication requirement. Students are encouraged (but not required) to undertake research leading to a senior thesis; credit for this work is provided through Ay 78. Non-thesis research credits may be earned through Ay 142 with a maximum of 9 units per term. Computational skills may be acquired through Ph 20–21, Ay 117, Ay 190, ACM 106, or equivalent classes.

Suggested Electives
The student may elect any course offered in any division in a given term, provided that he or she has the necessary prerequisites for that course. The following courses are useful to work in various fields of astronomy and astrophysics: ACM 95, ACM 106, APh 23/24, Ay 104, Ay 105, Ay 117, Ay 121–127, Ay 190, Ch 125, EE 45, EE 91, EE/Ae 157, Ge/Ay 11 c, Ge 103, Ge/Ch 128, Ge 131, Ge/Ay 132, 133, 137, Ma 4, Ma 112, ME 18 ab, ME 19 ab, Ph 20–22, Ph 77, 101, 127, 129, 136, 199 (this is not necessarily a complete list).

Bioengineering Option

The undergraduate bioengineering option provides a foundation for graduate studies in the application of engineering principles to the design, analysis, construction, and manipulation of biological systems, and in the discovery and application of new engineering principles inspired by the properties of biological systems. Undergraduate research is encouraged both during the academic year and through participation in summer research programs.

Students should present a plan for satisfying all degree requirements to their academic adviser by the end of the third term of the