

HOW TO GRADUATE IN 4 YEARS
READ THE SAMPLE SCHEDULE

Pages 2-9 list the university, college and department requirements for a B.S. degree in Astrophysics, plus other useful information.

STARTING ON PAGE 10, the sample schedule and the notes to it explain what courses you need to take, in what semesters, in order to meet all graduation requirements, including having taken the necessary prerequisite courses in order to be able to take more advanced courses on schedule.

READ THE SAMPLE SCHEDULE CAREFULLY, AND THEN FOLLOW IT UNLESS YOU KNOW FOR SURE THAT YOU DON'T NEED TO.

In your first year, the two key steps are (1) take the MTH 132/133 sequence unless you have verified that you have already satisfied that requirement through courses you took in high school; and (2) take PHY 183 or 193H in the Spring.

A potential roadblock down the line is that the two required upper-division astronomy courses, AST 304 and AST 308, are only taught once every two years. They are taught in the Fall semester in alternate years (i.e. AST304 is taught one year, and then AST 308 is taught the next year, etc). You need to have the prerequisite courses completed so that in the Fall semester of your 3rd year you can take whichever of AST 304/308 is being offered.

UNDERGRADUATE CURRICULUM

B. S. PROGRAM

ASTRONOMY and ASTROPHYSICS

MICHIGAN STATE UNIVERSITY

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**ADVANTAGES OF AN ASTROPHYSICS DEGREE
FROM
MICHIGAN STATE UNIVERSITY**

Here are several reasons why we believe Michigan State University is a good choice for pursuing a Bachelor of Science degree in Astrophysics. We urge you to consider these points while making your decision. For further information or questions about the astrophysics degree, please contact the Department of Physics and Astronomy, Michigan State University, East Lansing, MI 48824-1116.

The Astrophysics B.S. degree offered at MSU requires a carefully chosen set of astronomy and astrophysics courses plus a comprehensive preparation in physics. Thus our program in astrophysics has the advantage of giving you many options for your future. For example: (a) Our astronomy and astrophysics courses are an excellent foundation for astronomy graduate school. Although it is possible to be successful in grad school without having any advanced astronomy as an undergraduate, you will have an important advantage with the preparation available here. (b) An extensive physics background is necessary to function in today's world of astronomy; our program provides that background. Also, if you elect not to pursue a career in astronomy after you receive a B.S. degree, you would be qualified for the same wide range of activities which are available to physics majors, including future graduate work in physics or engineering and employment in industry.(c) Because of the integration of the Physics and the Astrophysics programs, it is easy to change from one program to another, even as late as the senior year.

1. From experience, we know that the undergraduate astrophysics education you will receive at MSU will provide you with an excellent preparation for graduate work in astrophysics. Our capable astrophysics majors are being accepted into the finest graduate astronomy programs in the country with full financial support. Examples over the past few years include Princeton University, Massachusetts Institute of Technology, California Institute of Technology, University of Arizona, University of Colorado, and University of Wisconsin.
2. The integration of our astronomy program with a good physics program enables our students to have access to superior physics courses, and also to seek employment in physics research if undecided about physics versus astronomy.
3. The Honors College programs at MSU present a unique opportunity to arrange an enriched course of studies to fit your individual needs, abilities, and goals. Through this program you will also be able to enroll in honors courses as soon as you are ready for them. Your academic adviser, a member of the astronomy research faculty, will work with you in planning your program.
4. Our students have the opportunity to take graduate courses in astrophysics and physics as undergraduates -- this is possible because MSU has graduate programs in both areas.
5. We have a substantial number of undergraduate majors in astrophysics, large enough so that you will get to know several other students with your interests and goals.
6. The astronomy and astrophysics faculty at MSU have a reputation for excellent teaching. From time to time we have received letters or visits from former undergraduates who compare their MSU courses most favorably with those of their first ranked graduate schools. All of the courses you take in our department are taught by the faculty actively engaged in astronomical research, not by graduate students.
7. If you come to MSU, you have the opportunity to become a member of the Lyman Briggs College, which is a small science residential unit housed in the Holmes Hall

dormitory. In such a setting, there is a small-college atmosphere within the large university setting. The Briggs students are recognized as a very capable group.

8. If you are interested in earning a teaching certificate for high school science teaching while earning your astrophysics degree, MSU is an excellent choice. Several astrophysics majors are presently taking advantage of this opportunity.
9. The astronomy faculty at MSU has research interests ranging over a rich variety of specialties in both observational and theoretical astronomy and astrophysics.

CURRENT ASTRONOMY FACULTY AND THEIR SPECIALITIES

Jack Baldwin Professor	Active galaxies and quasars; chemical evolution of the universe.
Timothy Beers Professor	Structure of galaxy clusters, properties of galaxies, chemical evolution of stars and galaxies.
Ed Brown Assistant Professor	Theoretical Nuclear Astrophysics
Megan Donahue Associate Professor	Observational astrophysics; X-ray sources.
Edwin D. Loh Associate Professor	Observations of distant galaxies, cosmology, charge-coupled detectors.
Horace A. Smith Professor	Chemical evolution of galaxies, physical and evolutionary states of intrinsically variable stars.
Robert F. Stein Professor	Astrophysical fluid dynamics: Solar atmosphere, star formation, cosmology.
Mark Voit Associate Professor	Theoretical astrophysics.
Stephen Zepf Professor	Formation and dynamics of elliptical galaxies; globular clusters.

Further information on research in astronomy at Michigan State University is available from the departmental web site at www.pa.msu.edu.

THE UNDERGRADUATE ASTROPHYSICS PROGRAM REQUIREMENTS

Astronomy deals with the physical properties of the extraterrestrial universe. Advanced astronomy courses, particularly astrophysics, depend on prior work in physics. Therefore, a student who plans to study astronomy should take an extensive program in physics. This is especially true of those students who contemplate graduate training.

The Department of Physics and Astronomy offers a program in astronomy and astrophysics at the undergraduate level leading to the Bachelor of Science degree in astrophysics. As a result of the extensive training in physics as well as astronomy, a student who graduates with this degree becomes eligible for admission to graduate study in either astronomy or physics, and in many cases in related areas such as meteorology or geophysics. The recipient of the degree may also look forward to a career in astronomy and physics education in secondary schools and planetaria. This degree is also desirable for future work in other areas, such as computer applications in industry.

A student with an interest in this program should immediately consult with an astronomy adviser in the Department of Physics and Astronomy, even if astrophysics may not be the final choice of major. The vertical structure of courses in the astrophysics program makes guidance important in the selection of a course schedule. Later pages of this brochure itemize the requirements for the degree and present samples of four-year course schedules for the degree.

An astrophysics major should normally elect AST 207 and 208 during the Sophomore year. Calculus is necessary for both beginning astronomy and physics courses, and therefore should be started immediately on entering the university if possible. If your math background is insufficient to begin calculus you might consider taking a summer course. The student should proceed as quickly as possible with the recommended math and physics courses. Failure to do so may make it impossible to complete degree requirements in eight semesters.

The minimal course requirements for the B.S. degree in astrophysics are:

1. Completion of all University and College of Natural Science requirements.
2. Completion of the following astronomy courses.
 - a. Science of Astronomy (AST 207)
 - b. Planets and Telescopes (AST 208)
 - c. Stars (AST 304)
 - d. Galaxies and Cosmology (AST 308)
 - e. Senior Thesis (AST 410)
3. Completion of the following courses in physics that are additional to those needed to satisfy the College of Natural Science requirements.
 - a. Introductory Physics Laboratory, PHY 191 and 192.
 - b. Thermodynamics and Modern Physics, PHY 215.
 - c. Mechanics I, PHY 321.
 - d. Electricity and Magnetism I, PHY 481.
 - e. Quantum Mechanics I, PHY 471.
 - f. Thermal and Statistical Physics, PHY 410.
4. Mathematics beyond the minimum one year of calculus required by the College of Natural Science:

- a. Multivariate Calculus (MTH 234) and Differential Equations (MTH 235).

Most majors who are graduate school candidates will elect more than minimum of courses listed above. They are encouraged to take the second semester of the physics courses in the list and mathematics courses beyond differential equations.

5. All A/A majors must complete the senior level AST 410 (Senior Thesis, 4 credits). For the senior thesis project, the student is advised to select a thesis advisor before or at the beginning of the fall semester of the senior year.

The senior thesis project provides the student an opportunity to formulate a computational, observational, or technical problem and work toward its solution. Typical projects may involve observational techniques. Some students may become involved in the research programs of individual faculty advisors. Others may help design and build instruments for use at the 24" telescope at the MSU Observatory.

The thesis will be expected to measure what the student has learned and how it has been presented (see 6. below). The course grades for AST 410, the senior thesis, will be determined by the advisor and a 2nd reader chosen by the student from the P-A faculty. The senior level AST 410 credit distribution per semester should be decided during the fall semester in consultation with the thesis advisor.

6. Completion of the University's Tier 2 Writing Requirement. This is to be completed as part of the student's program in the major. The Senior Thesis satisfies the requirement.

7. Completion of the University requirement of a Capstone/Synthesis Experience in the major will be satisfied for Astronomy/Astrophysics majors by completion and acceptance of the Senior Thesis.

UNIVERSITY REQUIREMENTS
for an
UNDERGRADUATE DEGREE

The college and university requirements for a B.S. degree are listed in the MSU Catalog. On this and the following page they are listed as they explicitly apply to a physics or astrophysics major.

Completion of the University's Integrative Studies sequences and the First Year Writing course is required for each student. Courses must be completed in each of the following areas (for lists of approved courses, consult the current "Schedule of Courses and Academic Handbook").

- a) *First Year Writing (WRA)*. This course may be completed in the first or second semester, but for physics majors the first semester best suits scheduling, enabling the student to begin Physics, for example, in the second semester of the first year, after a semester of introductory calculus.
- b) *Tier II Writing*. This is to be completed in the major. See page 7 for how this is to be completed for astronomy majors.
- c) *Integrative Studies in the Social Sciences*. Two semesters, 8 credits are required -- one course at the 200-level and one course at the 300-level. Either the sophomore year or the junior year would be a suitable year to take these courses. It is also possible to take one semester in each of these two years.
- d) *Integrative Studies in the Arts and Humanities*. Two semesters, 8 credits are required. The junior and senior years are optimum times to include these courses in the program.
- e) *Integrative Studies in Biological and Physical Science*. This requirement is fulfilled by the College of Natural Science requirements on the next page.
- f) All students must complete a *Capstone/Synthesis course* or courses in the senior year which synthesizes the four-year experience. For astronomy majors the capstone requirement is satisfied by a Senior Thesis. See page 7.

Credits to satisfy basic University requirements: 23-24

**COLLEGE OF NATURAL SCIENCE
B.S. DEGREE REQUIREMENTS**

To satisfy the requirements for a B.S. degree in one of the disciplinary areas in the College of Natural Science a student must:

a) Complete one course from the following list:

BS 110	Organisms and Populations	4 Credits
BS 111	Cells and Molecules	3 Credits
ENT 205	Pests, Society and Environment	3 Credits
MMG 205	Allied Health Microbiology	3 Credits
PLB 105	Plant Biology	3 Credits
PSL 250	Introductory Physiology	4 Credits
ZOL 141	Introductory Human Genetics	3 Credits

b) Complete:

CEM 161, General Chemistry I Laboratory	1 Credit
CEM 141, General Chemistry I or CEM 151	4 Credits
CEM 142, General Chemistry II or CEM 152	3 Credits

c) Complete:

MTH 132, Calculus	3 Credits
MTH 133, Calculus II	4 Credits

d) Complete:

PHY 183, Physics for Scientists and Engineers I	4 Credits
or	
PHY 193H, Honors Physics I – Mechanics	3 Credits
AND Complete:	
PHY 184, Physics for Scientists and Engineers II	4 Credits
or	
PHY 294H, Honors Physics II -- Electromagnetism	3 Credits

Total credits to satisfy College requirements: 25-28

TIER II WRITING REQUIREMENT
for
ASTRONOMY & ASTROPHYSICS MAJORS

To complete the University's Writing requirements for an undergraduate degree, a student must satisfy a Tier II Writing in the Major requirement after having completed the Tier I First Year Writing (WRA) course. Astronomy and Astronomy and Astrophysics majors will satisfy this requirement by completing AST 410, Senior Thesis.

The senior thesis will require some laboratory and observational research on the part of the student which will take two semesters of enrollment and effort. The completed thesis will be graded not only on the basis of its content and accomplishment, but also for style and grammar. It is expected that there will be several iterations of the thesis with feedback from the instructor about the content and the writing.

The writing styles called for are appropriate to the discipline of Astronomy and represent the writing expected of professionals in the field.

CAPSTONE/SYNTHESIS EXPERIENCE
for
ASTRONOMY & ASTROPHYSICS MAJORS

The University's bachelor's degree requirements strongly recommend that all students round out their undergraduate experience with a senior capstone course or courses in the major which draw together in focus the pieces of the four-year program as a synthesizing experience. The Physics and Astronomy Department's implementation of the capstone experience for astronomy and astrophysics majors emphasizes the development of the science and where it might lead in the future for the science as well as for the individual. This is expected to be achieved with the thesis project.

AST 410, Senior Thesis 4 Credits

The senior thesis will require some laboratory or observational research on the part of the student which normally will take two semesters of enrollment and effort. It is expected that the scope of the project will be such that knowledge and experience gained in previous courses will be drawn upon and brought into focus. The completed thesis will be graded not only on the basis of its content and accomplishment, but also for style and grammar, satisfying the Tier II writing requirement as well. In the course of the writing it is expected that there will be several iterations of the submitted material with feedback from the instructor about the content and the writing. Please come to 1312 Biomedical Physical Sciences for authorization to enroll in class. You will need to complete a form and have signed by your faculty advisor before authorization is given.

FOREIGN LANGUAGE

No foreign language is required to complete a degree in the College of Natural Science. However, each student should decide on the individual basis whether her/his future plans may include situations where facility in one or more foreign languages may be advantageous to success in her/his career. In that case, the place to begin gaining proficiency in a foreign language is while in an undergraduate program.

OVERSEAS STUDY

There are many overseas exchange programs in the University which enable students to spend one or two semesters at a university abroad while earning MSU Graduation credits. The ideal year in which to take a year abroad would be the Junior Year. Students participating in such overseas study will be able to do so without having to spend an additional year in the bachelors program if they arrange the courses when studying overseas such that they complete the equivalent of our first semester quantum mechanics course (PHY 471), the equivalent of our thermal and statistical physics (PHY 410) while they complete 15 MSU per semester at the overseas site. In recent years students have attended the University of Lancaster in England and were enthusiastic about the experience when they returned for their senior year at MSU.

HONORS COLLEGE STUDENTS

A student who is a member of the Honors College may replace many of the required courses (and especially general education courses) by other courses with the approval of his or her academic adviser and the Honors College Office. The expectation is that such substitutions will enable the student to advance in breadth and depth (within his major and outside of his major) at a maximum rate commensurate with his abilities and in directions dictated by his individual interests and future needs.

TEACHING CERTIFICATE FOR SECONDARY EDUCATION

If the student wishes to qualify for a teaching certificate for secondary school education, he/she should consult the College of Education about the certification requirements during the freshman or sophomore year. Information on the teaching certificate program at MSU in the College of Education can be obtained from the web site www.educ.msu.edu.

LYMANN BRIGGS COLLEGE

If a student enrolled in the Lyman Briggs program elects to obtain a B.S. degree in astrophysics, he or she is also enrolled in the Department of Physics and Astronomy and is assigned an astronomy academic adviser from among the Department's faculty. Special LB courses are substituted for many of the courses offered elsewhere in the University. Interested students are referred to the Lyman Briggs College office in Holmes Hall.

SAMPLE SCHEDULE for the B. S. ASTRONOMY PROGRAM

<i>FIRST YEAR</i>			
FALL SEMESTER		SPRING SEMESTER	
WRA ^(a)	4	PHY 183 OR 193H ^(f)	4 or 3
PHY 101 ^(b)	1	PHY 102 ^(b)	1
MTH 132 ^(c)	3	MTH 133 ^(c)	4
CEM 151 or 141 ^(d)	4	CEM 152 or 142 ^(d)	3
		CEM 161 ^(d)	1
Elective ^(e)	3 OR 4	Elective ^(e)	3 or 4
TOTAL CREDITS^(g)	~15	TOTAL CREDITS^(g)	~15

NOTES and COMMENTS

(a) WRA is a first-year writing course that every student must complete. For majors in astronomy/astrophysics the first semester of the first year is the best time to satisfy this requirement, but the second semester is also possible.

(b) PHY 101, Concepts in Physics, is a 1-credit seminar course whose purpose is to introduce students to basic concepts of physics providing a broad overview of the field. There is one hour of lecture or discussion seminar per week. PHY 102, Physics Computations I, is a 1-credit computation laboratory in which computational techniques, software, etc., will be introduced to enable students to develop skills with using computers to solve physics problems. These courses are not required but recommended to all freshman physics and astrophysics majors.

(c) The calculus sequence MTH 132, MTH 133, MTH 234, and MTH 235 are to be completed by an astronomy/astrophysics major in the first two years in the program. Students who begin the sequence in the first semester of the freshman year will begin the calculus-level introductory physics sequence in the Spring Semester of this first year.

A student who does not start calculus until the Spring Semester (who begins with the 5-credit course, MTH 116, College Algebra) will delay the start of the introductory physics until the Sophomore year. Honors College students with exceptional math skills have honors courses available (MTH 152H and MTH 153H) which may be taken in place of the above listed courses. A mathematics adviser should be consulted before a student enrolls in such honors courses.

(d) With standard high school preparation a student normally completes the minimum College of Natural Science requirement in chemistry in the first year. CEM 151 and CEM 152, plus the laboratory course, CEM 161 will satisfy this College requirement. Students may also satisfy the requirement by completing the CEM 141 and CEM 142 sequence instead of CEM 151 and CEM 152. The 141-sequence is for engineering students and other students who do not expect to take additional chemistry courses. Honors College Students with a strong interest in

chemistry have the option of satisfying the College requirement with the Honors Chemistry sequence, CEM 181H and CEM 182H, plus a laboratory course.

(e) All students in the College of Natural Science must complete one course in Biology to satisfy the University's Integrative Studies requirements in General Science. An alternative track for satisfying this requirement for majors in astronomy and astrophysics includes a choice along several options of courses which are at a level which is more interesting to science majors and more at their skill level than the standard Integrative Studies courses in Biology that are designed for non-science majors. For a list of possible courses see page 6 of this booklet.

(f) Instead of PHY 183 and PHY 184, Astrophysics Majors who are in the Honors College, who have good math skills and receive a grade of 3.5 or better in the calculus course in the Fall Semester, will be advised to enroll in the Honors course, PHY 193H, in the Spring. The sequence PHY 193H and PHY 294H is a higher level introductory sequence, covering the various topics in more depth and with a greater reliance on calculus skills than the PHY 183 and PHY 184 sequence.

(g) Students who do not wish to have a 16- or 17-credit semester in the first year may choose to take only 12 or 13 credits in that first semester. In such cases, Biology may be delayed until the Spring Semester and ISS may be delayed to another year. If this is done, it may be necessary for the student to enroll for at least one summer semester to maintain the 15 credits per semester average necessary to graduate in four years.

SAMPLE SCHEDULE for the B. S. ASTRONOMY PROGRAM

<i>SECOND YEAR</i>			
FALL SEMESTER		SPRING SEMESTER	
AST 207 ^(a)	3	AST 208 ^(a)	4
PHY 184 or 294H ^(b)	4 or 3	PHY 215 ^(c)	3
PHY 191 ^(d)	1	PHY 192 ^(d)	1
		PHY 321 ^(e)	3
MTH 234 ^(f)	4	MTH 235 ^(f)	3
Elective ^(g)	3 OR 4	Elective ^(g)	3 or 4
TOTAL CREDITS	~15	TOTAL CREDITS	~15

NOTES and COMMENTS

(a) AST 207, The Science of Astronomy, provides an introduction to modern astrophysics. AST 208, Planets and Telescopes, includes both lecture and observing.

(b) PHY 184, or the honors section 294H, is the second semester of calculus-based general physics.

(c) PHY 215, Thermodynamics and Modern Physics, may be taken in the Fall Semester or the Spring. The logical place in the sequence would be after the completion of the two semester introductory series, i.e., in the Spring as in the example.

(d) PHY 191 and 192 are required introductory laboratory courses, which should be taken in the sophomore year.

(e) PHY 321, Mechanics I, is a required course for all students completing the B.S. in Astronomy and Astrophysics. PHY 321 is offered as a lecture course only in the spring semester. (It is offered as an independent-study course in summer school, but the full lecture course is preferred.) It is important for astronomy majors to complete PHY 321 in the sophomore year as a prerequisite for higher-level courses.

(f) MTH 234 and 235 are the third and fourth semesters of calculus. These are required for A/A majors.

(g) Electives include required courses, such as the Biology requirement in the College of Natural Science, and Integrative Studies courses (ISS and IAH). These requirement should be taken throughout the student's four-year program to complete them in time for graduation.

SAMPLE SCHEDULE for the B. S. ASTRONOMY PROGRAM

<i>THIRD YEAR</i>			
FALL SEMESTER		SPRING SEMESTER	
AST 304 or 308 ^(a)	3		
PHY 471 ^(b)	3	{PHY 472 ^(b) }	3
		PHY 410 ^(c)	3
{MATH ^(d) }	3	{MATH ^(d) }	3
Elective ^(e)	4 to 6	Elective ^(e)	4 to 6
TOTAL CREDITS	~15	TOTAL CREDITS	~15

NOTES and COMMENTS

(a) Astrophysics majors must complete a four semester sequence of courses---AST 207, 208, 304, and 308. AST 304 and 308 will be given in alternate years. In Fall 2006, AST 304 will be offered. The junior and senior years are the appropriate time to take AST 304 and 308. Because of the alternate year format, *it will be important to take each course as it is offered, so that the full sequence can be completed in time to graduate.*

(b) PHY 471, Quantum Physics I, is a B.S. degree requirement. PHY 472, Quantum Mechanics II, is a recommended elective for students who plan to go on for an advanced degree. PHY 471 is a prerequisite for PHY 410, which is also a required course. {Courses enclosed in brackets are elective courses, not required for the degree; a student planning graduate work should seriously consider taking many of the courses recommended above.}

(c) PHY 410, Thermal and Statistical Physics, is also required for the B.S. degree. The Spring Semester of the junior year is the best time to take this course.

(d) For the B.S. in Astronomy and Astrophysics the mathematics requirement is satisfied after the student has completed MTH 235. However, students who plan to continue their studies after the B.S. are encouraged to take additional mathematics. Our recommendation is that the graduate school bound students consider courses in Linear Algebra (MTH 309), Partial Differential Equations (MTH 442), Boundary Value Problems (MTH 443), Complex Analysis (MTH 425), Advanced Calculus (MTH 424), and Applied Linear Algebra (MTH 415). Of course, the student is urged to follow her or his own interests in mathematics in satisfying this requirement.

(e) Eight credits of Integrative Studies in the Arts & Humanities (IAH) is a University requirement that, for a major in astrophysics, is best satisfied in the junior and/or senior years. The Fall Semester of the junior year is an appropriate time to begin this two-semester sequence. The first course should be one of the introductory IAH courses; then an advanced

IAH course must be taken. See the University catalog for a listing of courses which are available for satisfying this requirement.

Physics electives are an important consideration for students who expect to go on to graduate school in a Ph. D. program. Students planning graduate study are advised to take both semesters of the Mechanics sequence (PHY 321 in the Spring of the sophomore year and PHY 422, Mechanics II, in the Fall of the junior year), the Quantum Physics sequence (PHY 471 and 472), and the electromagnetism sequence (PHY 481 and 482).

SAMPLE SCHEDULE for the B. S. ASTRONOMY PROGRAM

<i>FOURTH YEAR</i>			
FALL SEMESTER		SPRING SEMESTER	
AST 308 or 304 ^(a)	3		
AST 410 ^(b)	2	AST 410 ^(b)	2
PHY 481 ^(c)	3	{PHY 482 ^(c) }	3
Elective ^(d)	6 to 8	Elective ^(d)	6 to 8
TOTAL CREDITS	~15	TOTAL CREDITS	~15

NOTES and COMMENTS

(a) Astrophysics majors must complete a four semester sequence of courses---AST 207, 208, 304, and 308. AST 304 and 308 will be given in alternate years. In Fall 2006, AST 304 will be offered. The junior and senior years are the appropriate time to take AST 304 and 308. Because of the alternate year format, *it will be important to take each course as it is offered, so that the full sequence can be completed in time to graduate.*

(b) A senior thesis is required for all students who are completing the Astrophysics B.S. degree. Students should enroll for AST 410, Senior Thesis, during both semesters of the senior year for a total of 4 credits. The Senior Thesis is also the prescribed way to complete the Tier II writing requirement and the Capstone/Synthesis requirement. It is an important experience for students who plan further study as graduate students or who expect to choose industrial or government laboratory employment after graduation.

(c) PHY 481, Electricity & Magnetism I, is a B.S. degree requirement. {Courses enclosed in brackets such as PHY 482, Electricity & Magnetism II, are elective courses, not required for the degree; students planning graduate work should seriously consider taking such courses which are listed in the sample schedules.}

(d) Electives should include all integrative studies requirements in social studies (ISS) and humanities (IAH), in addition to electives in physics and mathematics.

Eight credits of ISS courses (one 200 level course and one 300 level course) and eight credits of IAH courses (one introductory and one advanced) are a University graduation requirement. For students who haven't completed the sequence in the sophomore or junior years, this requirement must be completed in the senior year. In fact, if it hasn't been completed by the end of *this* year, the student will be denied graduation!