**Curriculum Proposal**

Please type or select the requested information. Print completed forms, add appropriate paper attachments, and route through MSU's curricular process for recommendations and decisions.

<table>
<thead>
<tr>
<th>Proposal #</th>
<th>165</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective Date of Change:</td>
<td>(For Office Use Only)</td>
</tr>
<tr>
<td>Academic Year</td>
<td>07-08</td>
</tr>
</tbody>
</table>

### College, Department, Program, Type of Change, Proposed, Title, Current, Proposed, 24-Char. Abbrev:

- **College:** Science, Engineering and Technology
- **Department:** Physics and Astronomy
- **Program:** Astronomy B.S.
- **Type of Change:** PROGRAM PROPOSALS
- **Proposed:** Change in Requirements-Course(s) Added
- **Title Current:** Astronomy B.S.
- **Title Proposed:** Astronomy B.S.
- **24-Char. Abbrev:** Astronomy B.S.

Include a course or program description for the Bulletin (30-40 words maximum for courses, 100 for programs):

[This is unchanged except for the listing of required courses for the program. Please see the attached sheets for that detailed information.]

**Rationale or Justification for change:**

The reason for this revision is because of our proposed changes in our introductory, calculus-based physics sequence from one spanning two semesters to one spanning three semesters. This was done to give students more time to absorb the material, to improve student learning of the subject, and to increase retention.

### For General Education or Cultural Diversity Courses Only

- **GE Category #:**
  - N/A
  - N/A
  - N/A

  * For Writing Intensive Courses, attach a description of the kind and quantity of writing.
  * For Upper Division Courses, include a description of the respects in which it is broad and general rather than narrow and specific, and so suitable as GE.

Attach paper copies of the following:
- SYLLABUS or course outline.
- Course's student learning outcomes associated with each GE competency or CD designation.
- List of strategies to be used to assess students' achievement of each GE competency or CD designation.

### Cultural Diversity Course:

- Core (At least 75% devoted to topics of race, gender, sexual orientation, age, class, and disabilities as they occur in United States Society.)
- Related (At least 25% devoted to the above topics or to a global perspective on topics related to African American, Asian, Hispanic, and Native American inhabitants of the United States.)

### For New Courses

- **Instructional Type:** Lecture
- **Grading Format:** Grade
- **Other courses are being changed or eliminated.** (Explain.)

- **Course content or title is similar to courses in other departments.** (Attach copy of letter of agreement with other program(s) contacted. Indicate the nature of the discussions and/or resolution of differences or potential conflicts.)

Attach paper copies of the following:
- SYLLABUS or course outline.
- Course's student learning outcomes.
- A list of resources required to offer and support this course.
- A description of how teaching this course will affect department staffing.
- If 400/500 level course, an explanation of added expectations of graduate students.
# Minnesota State University, Mankato

## Curriculum Proposal

### For Program Proposals

Attach paper copies of the following:

- Student learning outcomes for the program.
- Minutes from department and college curriculum meetings in which action was taken on this proposal.
- Program Assessment Plan. Forms are available on the Academic Affairs Web site:
  - [http://www.mnsu.edu/acadaf/pra/forms/](http://www.mnsu.edu/acadaf/pra/forms/)
- List of program requirements for New programs, or a list of Current and Proposed program requirements for Redesigned programs.
- A list of resources required to offer and support this program.
- A description of how offering this program will affect department staffing.
- A list of additional library holdings required for this program.

Please include rationale for any proposed changes in number of program credits.

The number of discipline-specific credits required for the major has increased slightly (by 2 credits) because of the changes in the calculus-based, introductory physics sequence. Upon addition of the additional 36 credits required for General Education, the revised program (78cr + 36cr = 114cr) is seen to be compliant with the upcoming 120 credit requirement.

### For Programs Requiring MnSCU Approval

If any of the following changes are proposed, please fill out and attach MnSCU Program Approval Forms, which are available on the Academic Affairs Web site:

- [http://www.mnsu.edu/acadaf/Curriculum/currformsprocess.html](http://www.mnsu.edu/acadaf/Curriculum/currformsprocess.html)

1. **Creation** of an entirely new program.
2. **Redesign** of existing programs, which takes any of the following forms:
   - Addition or deletion of a program option. Options are part of program design in which 30-50% of the courses are required as part of a common core for all students, and which offers curriculum alternatives greater than 30% of the total number of credits in the major. Options are appropriate to baccalaureate or masters programs.
   - Addition or deletion of a program emphasis. Emphases are part of program design in which more than 50% of the courses are required as part of a common core for all students, and which offers curriculum alternatives with a minimum of nine credits. Emphases are appropriate to associate and baccalaureate programs.
   - Change in program name.
   - Change in program C/P #.
   - Change in TOTAL program credits.
   - Change in degree award. For example, changing a B.A. to B.S.
   - Creation of a new degree award in a related academic area. Examples include creation of a certificate program from an existing degree program, or a new degree program from an existing degree program (e.g., Art History BA from Art BA.)
3. **Relocation** of an existing program. This is a proposal to move an existing program from one site to be exclusively offered at another site, and requires closing the program offered at the original site. For example, a program offered both on-campus and through extended campus is to be offered only at the extended campus site.
4. **Replication** of an existing program. This is a proposal to offer an existing program at a new site, which may be an existing MnSCU-approved site, or another campus of the same institution. Replicated programs are offered at both the original site and the new location.
5. **Suspension** or reinstatement of a program. This proposal suspends admission of students into an existing program, and is good for three years. Reinstatement proposals request the reopening of student admissions into a given program.
6. **Closure** of a program. This proposal requests closure of an existing program and its from an institution's official inventory of academic programs. Unless a department seeks to re-open a suspended program, it should be closed within three years of suspension.

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Revised September 2002
### Signature Page

<table>
<thead>
<tr>
<th>Department</th>
<th></th>
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<tr>
<td><strong>Recommended</strong> (Category/ies)</td>
<td>9 Oct. 2007</td>
</tr>
<tr>
<td><strong>Not Recommended</strong> (Category/ies)</td>
<td></td>
</tr>
<tr>
<td><strong>Comments:</strong></td>
<td></td>
</tr>
</tbody>
</table>

| College Curriculum Committee                    |          |
| **Recommended** (Category/ies)                  | 10/30/07 |
| **Not Recommended** (Category/ies)               |          |
| **Comments:**                                    |          |

| College Dean                                    |          |
| **Recommended** (Category/ies)                  | 10/31/07 |
| **Not Recommended** (Category/ies)               |          |
| **Comments:**                                    |          |

| General Education Subcommittee                   |          |
| **Recommended** (Category/ies)                  |          |
| **Not Recommended** (Category/ies)               |          |
| **Comments:**                                    |          |

| Undergraduate Curriculum and Academic Policy Committee |          |
| **Recommended** (Category/ies)                     | 12/19/07 |
| **Not Recommended** (Category/ies)                  |          |
| **Comments:**                                       |          |

| Faculty Association Graduate Committee            |          |
| **Recommended**                                   |          |
| **Not Recommended**                                |          |
| **Comments:**                                      |          |

| Graduate Dean                                     |          |
| **Recommended**                                   |          |
| **Not Recommended**                                |          |
| **Comments:**                                      |          |

| Academic Affairs Council                          |          |
| **Recommended** (Category/ies)                    |          |
| **Not Recommended** (Category/ies)                 |          |
| **Comments:**                                      |          |

| Senior Vice President and Vice President for Academic Affairs |          |
| **Approved** (Category/ies)                         |          |
| **Not Approved** (Category/ies)                      |          |
| **Comments:**                                        |          |

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**Revised September 2002**
Astronomy BS Revision Proposal  
(5 Oct. 2007)

Rationale or Justification for change:

The reason for this revision is because of our proposed changes in our introductory, calculus-based physics sequence from one spanning two semesters to one spanning three semesters. This was done to give students more time to absorb the material, to improve student learning of the subject, and to increase retention.

a. Student Learning Outcomes:

Please see attached Assessment Plan for the Astronomy BS, second column.

b. Minutes from Department Meeting.

Please see attached.

c. Program Assessment Plan:

Please see attached.

d. List of Current and Proposed program requirements:

Please see attached.

e. Resources required to offer and support program:

No new resources required, the program already exists.

f. Effect on Department Staffing:

No new staffing is required.

g. Additional library holdings required

None.

Please include rationale for any proposed changes to number of program credits:

The number of discipline-specific credits required for the major has increased slightly (by 2 credits) because of the changes in the calculus-based, introductory physics sequence. Upon addition of the additional 36 credits required for General Education, the revised program (78cr + 36cr = 114cr) is seen to be compliant with the upcoming 120 credit requirement.
**CURRENT**
ASTRONOMY BS Program Requirements:

**Required General Education (9 credits):**
MATH 121 Calculus I (4)
PHYS 221 General Physics I (5)

**Required Support Courses (20 credits):**
MATH 122 Calculus II (4)
MATH 223 Calculus III (4)
MATH 321 Ordinary Differential Equations (4)
PHYS 222 General Physics II (5)
PHYS 335 Modern Physics I (3)

**Required for Major (Core, 47 credits)**
AST 201 Spherical Astronomy (2)
AST 215 Astronomy and Astrophysics I (4)
AST 225 Astronomy and Astrophysics II (4)
AST 353 Photometry I (2)
AST 354 Photometry II (2)
AST 355 Astrometry (2)
AST 357 Spectroscopy (2)
AST 420 Stellar Astrophysics (3)
AST 421 Stellar Structure (3)
AST 430 Galactic Structure (3)
AST 431 Extragalactic Astronomy (3)
PHYS 441 Mechanics (4)
PHYS 447 Electricity & Magnetism I (3)
PHYS 448 Electricity & Magnetism II (3)
PHYS 461 Quantum Mechanics (4)
PHYS 465 Computer Applications in Physics (3)

Required Minor: None.

*(Total credits = 76 cr)*

**PROPOSED**

**ASTRONOMY BS Program Requirements:**

**Required General Education (8 credits):**
MATH 121 Calculus I (4)
PHYS 221 General Physics I (4)

**Required Support Courses (23 credits):**
MATH 122 Calculus II (4)
MATH 223 Calculus III (4)
MATH 321 Ordinary Differential Equations (4)
PHYS 222 General Physics II (3)
PHYS 232 General Physics II Lab (1)
PHYS 223 General Physics III (3)
PHYS 233 General Physics III Lab (1)
PHYS 335 Modern Physics I (3)

**Required for Major (Core, 47 credits)**

[NO CHANGES HERE]

Required Minor: None.

*(Total credits = 78 cr)*
<table>
<thead>
<tr>
<th>Student Learning Outcomes (performance, knowledge, attitudes)</th>
<th>Related College/University Goals</th>
<th>Method of Assessment</th>
<th>Who Assessed</th>
<th>When Assessed</th>
<th>Standard of Mastery Criterion of Achievement</th>
<th>What is Hoped to Be Learned?</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1 Students should have an understanding of the basic body of knowledge of astronomy.</td>
<td>C1, U1</td>
<td>Student Surveys</td>
<td>Astronomy Majors</td>
<td>Spring Semester</td>
<td>≥ 70% of respondents will rate ≥ 70% satisfaction</td>
<td>Degree of student confidence and competence in astronomy.</td>
</tr>
<tr>
<td>#2 Students should have a working knowledge of topics in general physics and required advanced physics courses.</td>
<td>C1, U1</td>
<td>Student Surveys</td>
<td>Astronomy Majors</td>
<td>Spring Semester</td>
<td>≥ 70% of respondents will rate ≥ 70% satisfaction</td>
<td>Degree of student confidence and competence in physics.</td>
</tr>
<tr>
<td>#3 Students should be able to utilize mathematics up through calculus and differential equations.</td>
<td>C1, U1</td>
<td>Student Surveys</td>
<td>Astronomy Majors</td>
<td>Spring Semester</td>
<td>≥ 70% of respondents will rate ≥ 70% satisfaction</td>
<td>Degree of student confidence and competence in mathematics.</td>
</tr>
<tr>
<td>#4 Students should be able to communicate their ideas in writing.</td>
<td>C1, U1</td>
<td>Student Surveys</td>
<td>Astronomy Majors</td>
<td>Spring Semester</td>
<td>≥ 70% of respondents will rate ≥ 70% satisfaction</td>
<td>Degree of student confidence and competence in writing.</td>
</tr>
<tr>
<td>#5 Students should be able to communicate their ideas orally.</td>
<td>C1, U1</td>
<td>Student Surveys</td>
<td>Astronomy Majors</td>
<td>Spring Semester</td>
<td>≥ 70% of respondents will rate ≥ 70% satisfaction</td>
<td>Degree of student confidence and competence in oral communication.</td>
</tr>
<tr>
<td>#6 Students should acquire general problem-solving skills.</td>
<td>C1, U1</td>
<td>Student Surveys</td>
<td>Astronomy Majors</td>
<td>Spring Semester</td>
<td>≥ 70% of respondents will rate ≥ 70% satisfaction</td>
<td>Degree of student confidence and competence in problem solving.</td>
</tr>
<tr>
<td>#7 Students should be able to employ a variety of computational tools to solve advanced problems.</td>
<td>C1, U1</td>
<td>Student Surveys</td>
<td>Astronomy Majors</td>
<td>Spring Semester</td>
<td>≥ 70% of respondents will rate ≥ 70% satisfaction</td>
<td>Degree of student confidence and competence in computing.</td>
</tr>
<tr>
<td>#8 Students should understand basic observational techniques.</td>
<td>C1, U1</td>
<td>Student Surveys</td>
<td>Astronomy Majors</td>
<td>Spring Semester</td>
<td>≥ 70% of respondents will rate ≥ 70% satisfaction</td>
<td>Degree of student confidence and competence in observing.</td>
</tr>
<tr>
<td>#9 Students should understand methods of statistical data reduction.</td>
<td>C1, U1</td>
<td>Student Surveys</td>
<td>Astronomy Majors</td>
<td>Spring Semester</td>
<td>≥ 70% of respondents will rate ≥ 70% satisfaction</td>
<td>Degree of student confidence and competence in data reduction.</td>
</tr>
<tr>
<td>#10 Students should develop and maintain a positive attitude toward their astronomy education at MSU.</td>
<td>Student Surveys; Alumni Surveys</td>
<td>Astronomy Majors &amp; Alumni</td>
<td>Spring Semester; Program Review Years</td>
<td>≥ 70% of respondents will rate ≥ 70% satisfaction</td>
<td>Student/alumni attitudes toward the program.</td>
<td></td>
</tr>
<tr>
<td>#11 Students should be prepared for advanced study in astronomy or astrophysics.</td>
<td>C1, U1</td>
<td>Grad School Apps; Student Surveys; Alumni Surveys</td>
<td>Astronomy Majors &amp; Alumni</td>
<td>Senior Yr; Spring Semester; Program Review Years</td>
<td>≥ 70% of respondents will rate ≥ 70% satisfaction</td>
<td>Degree of student confidence and competence in preparation for graduate studies.</td>
</tr>
<tr>
<td>#12 Students should be well prepared for careers in astronomy, math, physics or related fields.</td>
<td>C1, U1</td>
<td>Student Surveys; Alumni Surveys</td>
<td>Astronomy Majors &amp; Alumni</td>
<td>Spring Semester; Program Review Years</td>
<td>≥ 70% of respondents will rate ≥ 70% satisfaction</td>
<td>Degree of student confidence and competence in preparation for a career in science.</td>
</tr>
</tbody>
</table>

**CSET Goal:**

"Providing degree programs that give students in-depth knowledge, inspire critical thinking skills, problem solving skills, oral and written communication skills and laboratory skills."

**University Goal:**

"The University will prepare students for careers and for life-long learning by providing a clearly defined general education program and focused undergraduate pre-professional, professional, and liberal arts programs."
Department of Physics and Astronomy
Minutes of Meeting
Friday, October 3, 2007, 4:00 PM Trafton E-210


1. Minutes of department meeting of 9/14/07 were approved as written.
2. Announcements:
   a. The Clint Crosby/Lockheed Martin Physics & Astronomy Lecture series dedication was a big success.
      -Astronomy will have a public viewing session on Friday, Oct. 19 if it is clear.
      -CSET Open house is on Saturday, Oct. 20, from 10:30 AM to 12 noon. M. Pickar will be there representing our department. S. Kipp will take visitors to tour the observatories.
   c. Marching faculty for the Fall commencement are M. Pickar, I. Kogoutiouk, and A. Roberts.
   d. Clint Crosby asked for a publication list of the department faculty for the past 5 years. Faculty please send their publications to M. Pickar by Friday, Oct. 12.
   e. K. Trauger visited M. Pickar about concurrent offering of introductory physics courses at New Prague High School and MSU. The high school needs a college faculty mentor. If any faculty are interested in being a mentor, please talk to M. Pickar.
   f. Iowa State University’s Speaker’s bureau list will be circulated among department faculty.
   g. New physics and astronomy brochures have been printed and were shown to the department.

3. Student travel award.
   There is a request from an undergraduate student, Jake Simones, for funding to attend a national research conference to present a poster. The Dean agreed to match the department’s support up to $500. L. Schwartzkopf moved to use $300 from the department foundation account to support the student to attend the conference, P. Eskridge seconded, motion carried unanimously.

4. A draft of the equipment plan was distributed and discussed. Minor modifications were made. T. Brown moved, A. Roberts seconded to accept the modified equipment plan. Motion carried unanimously. Please see the approved equipment plan which is attached.

5. Physics 211 and 212 lab: time.
   There was some discussion about the duration of Phys 211 and 212 lab sections. It was decided to reduce the lab meeting time from 3 hours to 2 1/2 hours. This change will make the lab teaching scheduling easier.

6. The new 3-semester calculus-based physics course proposals were presented to the department.
   P. Eskridge moved, L. Schwartzkopf seconded to accept the proposals. Motion carried unanimously. Please see the attached proposals.

7. Due to the change of the calculus-based physics, both physics and astronomy will have to change their program requirements for majors and minors. The department curriculum committee presented several program change proposals to the department.
   -J. Pierce moved, S. Kipp seconded to approve the proposed astronomy program changes for the astronomy B. S. and astronomy minor. Both motions were passed unanimously by the department.
   -Y. Xu moved, L. Schwartzkopf seconded to approve the proposed program changes for the physics B. S. Motion carried unanimously.
   There was some discussion about the requirements for physics minors. Minor adjustments were made. P. Eskridge moved, A. Roberts seconded to approve the proposed program changes for a physics minor with modification. Motion carried unanimously.
   Please see attached approved program change proposals.
8. The Phys 221, 222 sequence was an option in the core courses for the physics teaching B.S. In light of the new calculus-based physics, T. Brown proposed to use the new proposed 5-courses (Phys. 221, 222, 232, 223, and 233) to replace the old Phys 221 and Phys 222 sequence in the core courses. This will result in 2 additional credit hours for that option. P. Eskridge moved, H. Wu seconded to accept the proposal. Motion carried unanimously.

9. The prerequisites for physics and astronomy courses have to be changed due to the new proposed introductory physics courses. The department curriculum committee presented a proposal to change the prerequisites of affected courses. There were some discussions and modifications to the proposal. P. Eskridge moved, S. Kipp seconded to accept the proposal with the modification. Motion carried unanimously. The approved proposal is attached.

Meeting adjourned at 5:30 PM.

Respectively submitted,
Youwen Xu