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>College: Science, Engineering and Technology</th>
<th>Proposal #: 14-18</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department: Physics and Astronomy</td>
<td>Effective Date of Change:</td>
</tr>
<tr>
<td>Program: Astronomy</td>
<td>Academic Year: 05</td>
</tr>
<tr>
<td>Type of Change: PROGRAM PROPOSALS</td>
<td>(For Office Use Only)</td>
</tr>
<tr>
<td>Proposed: Redesign—Change in Total Program Credits</td>
<td></td>
</tr>
<tr>
<td>Title Current: Astronomy BS</td>
<td></td>
</tr>
<tr>
<td>Title Proposed:</td>
<td></td>
</tr>
<tr>
<td>24-Char. Abbrev:</td>
<td></td>
</tr>
</tbody>
</table>

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

Rationale or Justification for change:
The course being removed (COMS 272) is not being offered frequently enough (it was last taught in the spring of 1999) to provide any benefit to students in the program. The course being added (PHYS 465) will provide majors with experience in applying computers to solve scientific problems in a field fundamental to astronomy.

***For General Education or Cultural Diversity Courses Only***

<table>
<thead>
<tr>
<th>General Education Course:</th>
<th>Cultural Diversity Course:</th>
</tr>
</thead>
<tbody>
<tr>
<td>GE Category #</td>
<td>GE Category Name (Maximum of 3 Categories)</td>
</tr>
<tr>
<td>N/A</td>
<td>Core (At least 75% devoted to topics of race, gender, sexual orientation, age, class, and disabilities as they occur in United States Society.)</td>
</tr>
<tr>
<td>N/A</td>
<td>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.)</td>
</tr>
<tr>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

* 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:

a. Syllabus or course outline.

b. Course’s student learning outcomes associated with each GE competency or CD designation.

c. List of strategies to be used to assess students’ achievement of each GE competency or CD designation.

***For New Courses***

<table>
<thead>
<tr>
<th>Instructional Type: Lecture</th>
<th>Course will be offered:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course is an elective.</td>
<td>Fall Semester</td>
</tr>
<tr>
<td>Course is required for program</td>
<td>Spring Semester</td>
</tr>
<tr>
<td>Pre- or Co-requisites:</td>
<td>Summer Session</td>
</tr>
<tr>
<td>Other courses are being changed or eliminated. (Explain.)</td>
<td></td>
</tr>
</tbody>
</table>

* 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:

a. Syllabus or course outline.

b. Course’s student learning outcomes.

c. A list of resources required to offer and support this course.

d. A description of how teaching this course will affect department staffing.

e. If 400/500 level course, an explanation of added expectations of graduate students.
**For Program Proposals**

Attach paper copies of the following:

a. Student learning outcomes for the program.

b. Minutes from department and college curriculum meetings in which action was taken on this proposal.

c. Program Assessment Plan. Forms are available on the Academic Affairs Web site:
   [http://www.mnsu.edu/acadaff/words/PRA_SampSLOAssessPlan.doc](http://www.mnsu.edu/acadaff/words/PRA_SampSLOAssessPlan.doc)

d. List of program requirements for New programs, or a list of Current and Proposed program requirements for Redesigned programs.

e. A list of resources required to offer and support this program.

f. A description of how offering this program will affect department staffing.

g. A list of additional library holdings required for this program.

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

A 4-credit course (COMS 272) is being replaced by a 3-credit course (PHYS 465), thus reducing the total number of program credits by 1.

---

**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:


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 CIP #.
   
   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.

---

2  
Revised September 2002
<table>
<thead>
<tr>
<th><strong>Signature Page</strong></th>
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</thead>
<tbody>
<tr>
<td><strong>Department</strong></td>
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<tr>
<td>X. Recommended</td>
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<td>Not Recommended</td>
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<tr>
<td>Comments:</td>
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<tr>
<td><strong>College Curriculum Committee</strong></td>
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<td>X. Recommended</td>
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<td>Not Recommended</td>
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<td>Comments:</td>
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<td><strong>College Dean</strong></td>
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<td>Not Recommended</td>
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<td>Comments:</td>
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<td><strong>General Education Subcommittee</strong></td>
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<td>X. Recommended</td>
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<tr>
<td>Not Recommended</td>
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<tr>
<td>Comments:</td>
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<td><strong>Undergraduate Curriculum and Academic Policy Committee</strong></td>
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<td>X. Recommended</td>
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<td>Not Recommended</td>
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<td>Comments:</td>
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<td><strong>Faculty Association Graduate Committee</strong></td>
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<td>X. Recommended</td>
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<td>Comments:</td>
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<td><strong>Graduate Dean</strong></td>
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<td>X. Recommended</td>
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<tr>
<td>Not Recommended</td>
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<tr>
<td>Comments:</td>
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<tr>
<td><strong>Academic Affairs Council</strong></td>
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<tr>
<td>X. Recommended</td>
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<tr>
<td>Not Recommended</td>
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<tr>
<td>Comments:</td>
</tr>
<tr>
<td><strong>Senior Vice President and Vice President for Academic Affairs</strong></td>
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<tr>
<td>X. Approved</td>
</tr>
<tr>
<td>Not Approved</td>
</tr>
<tr>
<td>Comments:</td>
</tr>
</tbody>
</table>
Student Learning Outcomes for the Astronomy Major (B.S.)

#1 Students should have an understanding of the basic body of knowledge of astronomy.

#2 Students should have a working knowledge of topics in general physics and required advanced physics courses.

#3 Students should be able to utilize mathematics up through calculus and differential equations.

#4 Students should be able to communicate their ideas in writing.

#5 Students should be able to communicate their ideas orally.

#6 Students should acquire general problem-solving skills.

#7 Students should be able to employ a variety of computational tools to solve advanced problems.

#8 Students should understand basic observational techniques.

#9 Students should understand methods of statistical data reduction.

#10 Students should develop and maintain a positive attitude toward their astronomy education at MSU.

#11 Students should be prepared for advanced study in astronomy or astrophysics.

#12 Students should be well prepared for careers in astronomy, math, physics or related fields.
<table>
<thead>
<tr>
<th>#</th>
<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</td>
<td>Students should have an understanding of the basic body of knowledge of astronomy.</td>
<td>C1, U1</td>
<td>Student Surveys; 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>
<td></td>
</tr>
<tr>
<td>#2</td>
<td>Students should have a working knowledge of topics in general physics and required advanced physics courses.</td>
<td>C1, U1</td>
<td>Student Surveys; 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>
<td></td>
</tr>
<tr>
<td>#3</td>
<td>Students should be able to utilize mathematics up through calculus and differential equations.</td>
<td>C1, U1</td>
<td>Student Surveys; 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>
<td></td>
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<tr>
<td>#4</td>
<td>Students should be able to communicate their ideas in writing.</td>
<td>C1, U1</td>
<td>Student Surveys; 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>
<td></td>
</tr>
<tr>
<td>#5</td>
<td>Students should be able to communicate their ideas orally.</td>
<td>C1, U1</td>
<td>Student Surveys; 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>
<td></td>
</tr>
<tr>
<td>#6</td>
<td>Students should acquire general problem-solving skills.</td>
<td>C1, U1</td>
<td>Student Surveys; 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>
<td></td>
</tr>
<tr>
<td>#7</td>
<td>Students should be able to employ a variety of computational tools to solve advanced problems.</td>
<td>C1, U1</td>
<td>Student Surveys; 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>
<td></td>
</tr>
<tr>
<td>#8</td>
<td>Students should understand basic observational techniques.</td>
<td>C1, U1</td>
<td>Student Surveys; 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>
<td></td>
</tr>
<tr>
<td>#9</td>
<td>Students should understand methods of statistical data reduction.</td>
<td>C1, U1</td>
<td>Student Surveys; 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>
<td></td>
</tr>
<tr>
<td>#10</td>
<td>Students should develop and maintain a positive attitude toward their astronomy education at MSU.</td>
<td>Student Surveys; Alumni Surveys; Astronomy Majors &amp; Alumni</td>
<td>Spring Semester; Program Review Years</td>
<td>Senior Yr; 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</td>
<td>Students should be prepared for advanced study in astronomy or astrophysics.</td>
<td>C1, U1</td>
<td>Grad School Apps; Student Surveys; Alumni Surveys; 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>
<td></td>
</tr>
<tr>
<td>#12</td>
<td>Students should be well prepared for careers in astronomy, math, physics or related fields.</td>
<td>C1, U1</td>
<td>Student Surveys; Alumni Surveys; 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>
<td></td>
</tr>
</tbody>
</table>

**C1 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."
Current Requirements for the Astronomy BS

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

Required Support Courses (Prerequisites, 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 435 Modern Physics I (3)

Required for Major (Core, 48 credits):
• AST 201 Spherical Astronomy (2)
• AST 215 Astronomy & Astrophysics I (4)
• AST 225 Astronomy & 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)
• COMS 272 FORTRAN Programming (4)

Total Required: 77 credits

Required Minor: None

Proposed Requirements for the Astronomy BS

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

Required Support Courses (Prerequisites, 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 435 Modern Physics I (3)

Required for Major (Core, 47 credits):
• AST 201 Spherical Astronomy (2)
• AST 215 Astronomy & Astrophysics I (4)
• AST 225 Astronomy & 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)
• COMS 272 FORTRAN Programming (4)

Total Required: 76 credits

Required Minor: None

Rationale for proposed changes in credit requirements

A 4-credit course is being replaced by a 3-credit course, thus lowering the number of required credits by 1.
Statement of Resources Pertaining to the Astronomy Major (B.S.)

The proposed revision of the Astronomy B.S. will require no additional Department, College, or University resources.

As no new courses are being created and no new sections of existing courses will be offered, the revision will have no effect on Departmental staffing.

No additional library materials are required for the revised program.
Department of Physics and Astronomy
Minutes of Department Meeting
Wednesday 2/2/05


The meeting was called to order by Chair, M. Pickar at 1:00 PM.

1) The Minutes of the meeting of 1/25/05 were approved with one small correction.

2) Announcements:
   a) There will be a Faculty Development Seminar on Tenure & Promotion on Friday, February 25, from 1:00 – 4:30 PM. New probationary faculty are encouraged to attend.
   b) The deadline for submission of curricular proposals to the CSET Curriculum Committee is 4:00 PM on Monday, February 14.
   c) H.-S. Wu has recently updated the webpages of individual faculty on the Department website.
   d) Book requests are due to H.-S. Wu or P. Eskridge by Friday, February 11.
   e) The deadline to sign up to judge the Junior/Senior High Regional Science Fair is Friday, February 4.
   f) The deadline for students to submit applications for College scholarships to the CSET Office is Monday, February 28. Faculty are asked to announce the availability of scholarships to their classes.
   g) M. Pickar asked that all interactions regarding a disciplinary action involving a graduate student in the Department be through the Chair; other Department faculty should not discuss the action with the graduate student at this time.
   h) Y. Xu announced that any T.A. who is unable to teach a lab or to make any other committed assignment (lab meeting, Physics 100/105 testing) must request an absence by notifying his or her immediate supervisor and filling out a form. A copy of the form was circulated.

   M. Pickar presented a proposed teaching schedule for Spring 2006 (attached) for consideration by the Department. L. Schwartzkopf moved, I. Kogoutiouk seconded, that the proposed schedule be approved. Motion passed unanimously. M. Pickar noted that requests for reassigned time will be considered, but that his recommendation in favor of a request will depend on whether he can find someone to teach the lab from which the applicant will be reassigned.

4) Astronomy curriculum proposal
   J. Pierce presented a proposal to delete COMS 272(4) FORTRAN Programming and to add PHYS 465(3) Computer Applications in Physics as requirements for the Astronomy BS (proposal attached). The proposal also included the removal of COMS 272 from the pre-requisites for AST 430. J. Pierce moved, L. Schwartzkopf seconded, to adopt this proposal. Motion passed unanimously.

5) Special physics prize for Junior/Senior High Science Fair
   For the past few years, the Department has given a $50 award to the best physics project at the Junior/Senior High Science Fair. M. Pickar moved to increase the amount of this award to $100. Y. Xu seconded. The motion passed unanimously.

6) Program Review response and report.
   M. Pickar reported on the procedure for the Department response to the reviewer’s Program Review Report. The Dean has asked the Department to prepare a written response, a final set of recommendations, a tentative action plan in the form of a set of proposed 5-year goals, and an implementation strategy for program improvement. Then the Department will meet with Dean Frey and Dean Delgado to discuss these documents. M. Pickar solicited comments from the Department concerning his approach to our response. There was some discussion. He will draft the documents and present them to the Department when he is done.

Meeting adjourned at 1:53 PM.

Respectfully submitted,

Louis Schwartzkopf
To: Mark Pickar, Chair, Physics and Astronomy  
From: Colin Wightman, Chair, Computer & Information Sciences  
Date: 22 February 2005

Re: Astronomy Program Redesign

With regard to your memorandum of 16 February: I have reviewed the proposed changes to the Astronomy BS program and the elimination of COMS 272 as requirement, in particular. After consulting with my department, I can report that there will be no impact on the C&IS department as a result of the proposed change and we support the revisions. We have not taught COMS 272 more than once in the past five years due to chronically low enrollments. Consequently, elimination of the course will not affect our teaching loads or credit generation.
DATE: 16 February 2005
TO: Colin Wightman, Chair, Dept. of Computer and Information Sciences
FROM: Mark Pickar, Chair, Dept. of Physics and Astronomy
RE: Astronomy BS Program Redesign

Dear Colin,

Our department is submitting a curriculum proposal to redesign the Astronomy BS Program. In the proposal a 4-credit course from your department (COMS 272, Fortran Programming) is to be dropped from the program requirements and to be replaced by a 3-credit course from our department (PHYS 465, Computer Applications in Physics).

As part of the curriculum proposal procedure, we kindly ask your acknowledgement of receipt of this information and your department's acceptance of our proposal.

In the interest of expediency, I am initiating this correspondence by email. However, in observance of proper form, I am sending you the same request via ordinary mail on department letterhead.

Thank you,
Mark

Mark A. Pickar, Professor and Chair
Dept. of Physics and Astronomy
Minnesota State University, Mankato
tel. (507) 389-5741
fax (507) 389-1095
mark.pickar@mnsu.edu