Minnesota State University, Mankato

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.

College: N/A Science, Eng. & Tech. Undergraduate
Department: N/A Physics & Astronomy Graduate
Program: Physics BS
Type of Change: N/A Change in Requirements for BS major
Proposed: Reduce from 55 to 53 Maj. Req.
Title Current: 
Title Proposed: 
24-Char. Abbrev: 
Proposal # 120
Effective Date of Change: 05
Academic Year: 05
Course Designator: 
Number of Credits: 
(For Office Use Only)

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

Drop Physics 453 (3) as a B.S. Major Requirement.
Add Physics 492 (1) as a B.S. Major Requirement.
This reduces the present 55 credit requirement to 53 credits.

Rationale or Justification for change:
Physics 453 (3) Solid State Physics is typically a graduate-level course. Physics 492 (1-3) Seminar is a typical senior-level course.

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

<table>
<thead>
<tr>
<th>GE Category #</th>
<th>GE Category Name (Maximum of 3 Categories)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
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<td>N/A</td>
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* 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.

**For New Courses**

Instructional Type: Lecture
Grading Format: [ ] Grade [ ] P/N

Course will be offered:
[ ] Fall Semester
[ ] Spring Semester
[ ] Summer Session

[ ] 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.

Received Nov 8 2004
ACADEMIC AFFAIRS MINNESOTA STATE UNIVERSITY, MANKATO

Revised September 2002
Minnesota State University, Mankato
Curriculum Proposal

***For Program Proposals***

Attach paper copies of the following:

- Student learning outcomes for the program. [NA Attached] 10/20/04
- 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: [NA Attached] 10/20/04
  http://www.mnsu.edu/acadaff/words/PRA_SamoSLOAssessPlan.doc
- 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. NA — No Additional
- A description of how offering this program will affect department staffing. NA — No Additional
- A list of additional library holdings required for this program. NA — No Additional

Please include rationales for any proposed changes in number of program credits: It will result in a minimal reduction in the depth of the curriculum. Since Physics 453 has been offered during alternate years, and Physics 492 has been offered full term.

***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/acadaff/html/currformsprocesses.htm

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.
# Curriculum Proposal

<table>
<thead>
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<tr>
<td>Not Approved</td>
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<td>Comments:</td>
</tr>
</tbody>
</table>

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**Signature Page**

**Department Chair**

**Committee Chair**

**Dean**

**General Education Subcommittee Chair**

**UCAP Faculty Chair**

**Faculty Association Graduate Chair**

**Graduate Dean**

**Assistant Vice President**

**Sr. Vice President / Vice Pres. Academic Affairs**

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Revised September 2002

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3
PROGRAM PROPOSAL DOCUMENTATION

Physics BS

PROGRAM REDESIGN

The changes being proposed are confined to the *Physics core courses* required for the major:

- We propose dropping PHYS 453 (3cr) *Solid State Physics* as a BS requirement.
- We propose adding PHYS 492 (1cr) *Seminar* as a BS requirement.

A photocopy of the content in the 2003-2004 Undergraduate Bulletin (p. 264) that will be changed by this proposal is attached.

The total number of credits required within the *Physics core courses* will drop from 55 to 53.

A comparison of the existing *Physics core* requirements with those proposed is detailed below:

<table>
<thead>
<tr>
<th>(Existing Program) Required for Major (55 credits):</th>
<th>(Proposed Program) Required for Major (53 credits):</th>
</tr>
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<tbody>
<tr>
<td>EE 230     Circuit Analysis (3)</td>
<td>EE 230     Circuit Analysis (3)</td>
</tr>
<tr>
<td>EE 240     Evaluation of Circuits (1)</td>
<td>EE 240     Evaluation of Circuits (1)</td>
</tr>
<tr>
<td>MATH122    Calculus II (4)</td>
<td>MATH122    Calculus II (4)</td>
</tr>
<tr>
<td>MATH223    Calculus III (4)</td>
<td>MATH223    Calculus III (4)</td>
</tr>
<tr>
<td>MATH321    Ordinary Differential Equations (4)</td>
<td>MATH321    Ordinary Differential Equations (4)</td>
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<tr>
<td>PHYS222    General Physics II (5)</td>
<td>PHYS222    General Physics II (5)</td>
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<tr>
<td>PHYS435    Modern Physics I (3)</td>
<td>PHYS435    Modern Physics I (3)</td>
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<tr>
<td>PHYS436    Modern Physics II (3)</td>
<td>PHYS436    Modern Physics II (3)</td>
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<tr>
<td>PHYS441    Mechanics (4)</td>
<td>PHYS441    Mechanics (4)</td>
</tr>
<tr>
<td>PHYS447    Electricity and Magnetism I (3)</td>
<td>PHYS447    Electricity and Magnetism I (3)</td>
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<td>PHYS448    Electricity and Magnetism II (3)</td>
<td>PHYS448    Electricity and Magnetism II (3)</td>
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<tr>
<td>PHYS453    Solid State Physics (3)</td>
<td>PHYS457    Optics (3)</td>
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<td>PHYS457    Optics (3)</td>
<td>PHYS461    Quantum Mechanics (4)</td>
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<td>PHYS461    Quantum Mechanics (4)</td>
<td>PHYS465    Computer Applications in Physics(3)</td>
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<td>PHYS465    Computer Applications in Physics(3)</td>
<td>PHYS465    Computer Applications in Physics(3)</td>
</tr>
<tr>
<td>PHYS473    Statistical Physics (3)</td>
<td>PHYS473    Statistical Physics (3)</td>
</tr>
<tr>
<td>PHYS475    Advanced laboratory (2)</td>
<td>PHYS475    Advanced Laboratory (2)</td>
</tr>
<tr>
<td>PHYS492    Seminar (1)</td>
<td>PHYS492    Seminar (1)</td>
</tr>
</tbody>
</table>
Philosophy

PHIL 496 (1) Senior Thesis II
The senior thesis begun in Philosophy 495 will be completed. A core goal of the philosophy major is that students be able to engage in sustained development and analysis of an important philosophical topic. The senior thesis serves as a culminating exercise in a student's undergraduate career that honours those skills central to the subject of philosophy. The senior thesis will also serve as a tool for assessing the major.

PHIL 499 (1-6) Individual Study
Individual study of a philospher or problem.

Physical Education

College of Allied Health & Nursing
Department of Human Performance
1400 Highland Center • 507-389-6313
Web site: www.mnsu.edu/dept/olahn/HPhp.html
See Human Performance

Physics

College of Science, Engineering & Technology
Department of Physics & Astronomy
141 Trufson Science Center N • 507-389-5743
Web site: www.mnsu.edu/dept/physass
Chair: Mark A. Pickar
Robert J. Herickhoff, Igor Kegoutiouk, Louis A. Schwatzkopf, Hai-Sheng Wu, Youwen Xu

The physics programs available to the student are designed to prepare the student for graduate work, for a career in industry or government, or for high school teaching. Degree requirements provide graduates with laboratory skills useful both in graduate work and in industry and business.

Admission to Major is granted by the department.
Minimum University admission requirements are:
- a minimum of 32 earned semester credit hours.
- a minimum cumulative GPA of 2.00 (C).
Contact the department for application procedures.

PHYSICS BS
This major is intended to prepare the student for work in industry or business after the bachelor's degree rather than for graduate work.

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

Recommended Support Courses (18 credits):
CHEM 201 General Chemistry I (5)
CHEM 202 General Chemistry II (5)

COMS 272 FORTRAN Programming (4)
ENG 271 Technical Communication (4)

Required for Major (46 credits):
EE 230 Circuit Analysis (3)
EE 240 Evaluation of Circuits (1)
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)
PHYS 436 Modern Physics II (3)
PHYS 441 Mechanics (4)
PHYS 447 Electricity and Magnetism I (3)
PHYS 457 Optics (3)
PHYS 461 Quantum Mechanics (4)
PHYS 465 Computer Applications in Physics (3)
PHYS 475 Advanced Laboratory (2)

Required Electives (3 credits):
Choose one of the following:
PHYS 453 Solid State Physics (3)
PHYS 473 Statistical Physics (3)

Other Requirements:
Modern Language (8)

Required Minor: None.

PHYSICS BS
Students interested in physics preparation leading to professional opportunities or graduate study are encouraged to select this major.

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

Recommended Support Courses (22 credits):
CHEM 201 General Chemistry I (5)
CHEM 202 General Chemistry II (5)
COMS 272 FORTRAN Programming (4)
ENG 271 Technical Communication (4)
MATH 422 Partial Differential Equations (4)

Required for Major (26 credits):
EE 230 Circuit Analysis (3)
EE 240 Evaluation of Circuits (1)
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)
PHYS 436 Modern Physics II (3)
PHYS 441 Mechanics (4)
PHYS 447 Electricity and Magnetism I (3)
PHYS 448 Electricity and Magnetism II (3)
PHYS 453 Solid State Physics (3)
PHYS 457 Optics (3)
PHYS 461 Quantum Mechanics (4)
PHYS 465 Computer Applications in Physics (3)
PHYS 473 Statistical Physics (3)
PHYS 475 Advanced Laboratory (2)

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DEPARTMENT OF PHYSICS AND ASTRONOMY
Minutes of Department Meeting
Wednesday, 10/15/03


Meeting called to order by Chair, M. Pickar at 9:01 AM

1) Minutes of 10/1/03 were approved.

2) Announcements:
   -- The Spring 2004 schedule is on the web. The chair requests that all faculty check the posted schedule for accuracy.
   -- The Dean supports the PHYS 480/PHYS 100 room switch for Spring 2004, and has pledged student support money to help with the move. The Dean also supports the proposed TN-166 remodeling, and expects to be able to start this in Summer 2004.
   -- Faculty who use State vehicles for professional travel should use their Professional Development account numbers for vehicle reservation.

3) R. H. reviewed the proposal of the Dept. Curriculum Committee, adopted by the committee on 10/8/03, to revise the curriculum for the physics B.S. major. Three changes were proposed by the curriculum committee:
   1) Add PHYS 492 (Seminar) as a 1 credit requirement for the B.S. physics major.
   2) Drop PHYS 453 (Solid State Physics, 3 credits) as a requirement for the B.S. physics major.
   3) Change the B.S. physics major requirement from 55 to 53 credits (as a result of changes 1 and 2)

   R.H. moved that the department adopt these changes. J.P. and M.P. seconded simultaneously. There was a brief discussion. When called to a vote, the proposal outlined above was approved.

4) Who’s Who nominations have been requested from the department. We have fewer eligible students than the limit for nomination (ten). M.P. moved that the department nominate all six eligible students in rank order of their cumulative GPA’s. P.E. seconded. The motion carried. The chair requests that faculty urge the nominated students to submit their applications to the department office by 10/21/03.

5) The College Equipment budget for 2003/2004 has been determined. The Dean’s Office has allocated $7380 to Physics for its four highest priority items, and $3,300 to Astronomy for its two highest priority items.

   The total Summer 2003 profits for the College are $260,749. Of this, the Dean will reserve about $65,000 to fund student help for the college. The remainder will be distributed to the departments.

6) The Chair presented a draft of the Physics alumni questionnaire to be used as a part of the Physics program review. Faculty proposed and discussed a number of amendments and changes to the form. The Chair will incorporate these, and distribute a revised version to the faculty.

7) Wiley Publishing has developed a web-based homework grading system that is keyed to the texts that the department uses in PHYS211/212 and PHYS221/222. They have offered the department a one-semester free trial of the service. After the trial semester, the service would cost students only $5 per year (with the purchase of a new textbook) or $15 per year (without a new book purchase). The faculty teaching PHYS 211, 212, and 221 during the Spring 2004 semester have agreed to a trial-run of this new service.

8) Other:
   -- Y. X. presented a letter from Phi Kappa Phi requesting nominations for membership of qualified graduate students. The department agreed that Nataliya Kovalchuk and Max Wang should both be nominated. Forms must be filled out by the advisors and submitted by 11 November 2003.

   -- L.S. and S.K. both report that the requisite 2/3 of the 2003/2004 book money was successfully committed by the deadline.

The meeting was adjourned at 9:43 AM

Respectfully submitted,
P. Eskridge
# Physics B.S., B.A. Program Review and Assessment

<table>
<thead>
<tr>
<th>LEARNING OUTCOMES</th>
<th>Method of Assessment</th>
<th>Persons Responsible for Conducting Assessment</th>
<th>Frequency of Assessment</th>
<th>Persons Receiving Assessment Report</th>
<th>Related Dept (D), College (C), and University (U) Mission or Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>'1 Ability to use knowledge of basic physics principles and of appropriate mathematics to frame and solve simple problems about everyday phenomena and about modern physics.</td>
<td>2</td>
<td>Physics faculty</td>
<td>Every other year</td>
<td>Physics faculty</td>
<td>D1, D2, C1, C2, U1</td>
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<tr>
<td>2 Knowledge of the fundamental theories and the unanswered questions of modern physics.</td>
<td>2</td>
<td>Physics faculty</td>
<td>Every other year</td>
<td>Physics faculty</td>
<td>D1, D2, C1, C2, U1</td>
</tr>
<tr>
<td>'3 Ability to solve more complex mathematical problems about classical and modern physics.</td>
<td>2</td>
<td>Physics faculty</td>
<td>Every other year</td>
<td>Physics faculty</td>
<td>D1, D2, C1, C2, U1</td>
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<tr>
<td>'4 Ability to analyze and interpret experimental results.</td>
<td>4, 5</td>
<td>Physics faculty</td>
<td>Every other year</td>
<td>Physics faculty</td>
<td>D1, D2, C1, C2, U1</td>
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<tr>
<td>'5 Ability to operate the electronic instruments used in experimental physics.</td>
<td>3</td>
<td>Physics faculty</td>
<td>Every other year</td>
<td>Physics faculty</td>
<td>D1, D2, C1, C2, U1</td>
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<tr>
<td>6 Ability to use computers for obtaining and analyzing data.</td>
<td>3, 4</td>
<td>Physics faculty</td>
<td>Every other year</td>
<td>Physics faculty</td>
<td>D1, D2, C1, C2, U1</td>
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<tr>
<td>'7 Ability to use computers to solve a mathematical problem, once posed.</td>
<td>1, 2</td>
<td>Physics faculty</td>
<td>Every other year</td>
<td>Physics faculty</td>
<td>D1, D2, C1, C2, U1</td>
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<tr>
<td>8 Ability to design experiments to test hypotheses, and/or to estimate model parameters.</td>
<td>4, 5</td>
<td>Physics faculty</td>
<td>Every other year</td>
<td>Physics faculty</td>
<td>D1, D2, C1, C2, U1</td>
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<tr>
<td>'9 Success in employment or graduate work.</td>
<td>7</td>
<td>Physics faculty</td>
<td>Every five years</td>
<td>Physics faculty</td>
<td>D1, D2, C1, C2, U1</td>
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Learning outcomes are the same for the B.A. and the B.S. degrees.

Codes for methods of assessment: 1, Homework; 2, Embedded questions on exams; 3, Lab report check lists; 4, Lab log books; 5, Formal papers; 6, Course evaluations; 7, Alumni surveys

Codes for Missions and Goals

**Department Mission:**
D1 "To train students for careers in science and industry."
D2 "To prepare students for graduate study in physics, engineering, and related sciences."

**College Goal:**
C1 "Providing degree programs that give students in-depth knowledge, inspire critical thinking skills, problem solving skills, oral and written communication skills and laboratory skills."
C2 "Producing graduates that are recognized for their high quality and readiness to enter the workforce."

**University Goal:**
U1 "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."