



**Mesabi Range Community & Technical College
Program/Discipline Review**

Physics

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The purpose of Program Review at Mesabi Range College is to study each program at the College every three years in a manner that will accommodate improvement, change, and recognition of a job well done. Programs that face challenges in respect to enrollment patterns, evolving business and industry practices, and other viability factors may be required to complete program review on an accelerated timeline as determined by Administration.

Program Review provides the opportunity to contemplate and reflect about what works and what does not work within our programs. The process can be a very productive and a worthwhile learning experience for instructors in the program being reviewed and the entire College. Only by taking the time to look thoughtfully at various aspects of all programs (instructional and non-instructional), can we assess the needs and determine the future direction of the College.

Program Review emphasizes the assessment of student learning at program and course level, and is another facet of assessment that helps Mesabi Range Community & Technical College improve learning.

Mesabi Range Community & Technical College Mission and Values Statement

Mission and Values

The MNSCU Board of Trustees adopted the Vision and Mission for Mesabi Range Community & Technical College in May 2000.

Mission

Mesabi Range Community & Technical College provides high quality education resulting in rewarding employment, lifelong learning, and the enriched lives of our students and community.

Values

Mesabi Range Community & Technical College values leadership in learning through innovation, excellence, integrity, and accountability.

Mesabi Range Community & Technical College Strategic Foundation

We are

- Learner Focused and Customer Service Oriented
- Leaders and Innovators in Technology and Learning Tools
- Focused on Integrity through Community and Environmental Stewardship

Program Review

Instructional Guidelines

Chapter 1 Overview of the Program

The Physics Department's mission:

The mission of the Physics Department at Mesabi Range Community and Technical College is to provide students rigorous courses in the subject of physics, so they will acquire a strong understanding of the physical laws of nature.

The Physics Department's purpose:

Provide students with diverse backgrounds and needs the physics classes at varying levels with a variety of teaching methods.

The Physics Department's philosophy:

Make physics approachable and applicable so students can be successful in their courses and beyond.

The Physics Department's program description:

Our physics department offers conceptual courses (PHYS 1541, PHYS 1551, and PHYS 1567), algebra based physics (PHYS 1561 and PHYS 1562), and calculus based physics (PHYS 1571 with PHYS 1581 and PHYS 1572 with PHYS 1582).

Communicate Effectively

The Physics Department's curriculum develops the student's ability to Communicate Effectively in the following ways:

Students will communicate with one another during class, lab, and outside of class. Students will communicate with the instructor during class, office hours and by e-mail and D2L by asking and answering questions related to their class.

Think Critically

The Physics Department's curriculum develops the student's ability to Think Critically in the following ways:

- Students will be asked to answer questions during class, lab, and outside of class that are both quantitative and conceptual.
- Questions that are asked on homework, quizzes, lab, and exams can vary from single step problems to multistep problems and will build off the topics that were covered during class.
- In order to complete the objectives for a laboratory, students may need to formulate their own procedure to complete the goals of the lab.
- Students will also need to consider the possible sources of error in a lab and how those errors could be eliminated under different circumstances.

Demonstrate Mathematical Skills

The Physics Department's curriculum develops the student's ability to Demonstrate Mathematical Skills in the following ways:

Mathematical skills are a prerequisite for most classes and are necessary to solve problems and interpret the laws of nature on a consistent basis in all classes.

Use Information Technology

The Physics Department's curriculum develops the student's ability to Use Information Technology in the following ways:

- Students will be using technology in the physics courses on a consistent basis to access course materials (PowerPoint notes, equation sheets, practice exams) on D2L, type lab reports, make graphs, calculate solutions to problems, and use state of the art lab equipment to take measurements.

The Physics Department's primary program/discipline outcomes and assessment methods are:

Outcome One

Students will need to understand the patterns of nature

- This will be assessed via homework, quizzes, exams, and lab assignments

Outcome Two

Students will be asked to apply physics to their world

- Knowing students interests, the instructor can apply physics to their interests
- Students will be asked to apply their knowledge of physics to real world problems on homework, quizzes, and exams

Outcome Three

Students have the understanding to succeed in their future classes and on professional entrance exams

- Students will be asked questions on homework, quizzes, and exams that will help students in their future classes and possible entrance exams in programs
- Standardized exams could be given to compare students scores to those across the nation
- Following up with students
- Practice Exams (pre-professional entrance exams) could be given to students

Outcome Four

Problem solving. Solving mathematical and real problems that could face them.

- Students will be able to solve single to multistep problems on homework, quizzes, and exams

Outcome Five

Lab skills

- Writing lab reports
- Working with modern lab equipment
- Understanding goals and developing a plan to complete the goals
- Following instructions
- Safety

The Physics Department delivers courses and programs in the following ways:

In person, online, and ITV.

The Physics Department incorporates information technology in the following ways:

Posting on D2L, online courses, ITV, PowerPoint notes, writing lab reports, graphing.

Chapter 3 General Program Assessment and Goals

The Physics Department's faculty and/or staff have participated in the following professional development and its impact is as follows:

Taking courses (chemistry, math, physics) and reading articles that build on my background and add content to my lectures.

Chapter 4 Program Efficiency Assessment and Goals

The Physics Department's assessment of program efficiency in relation to instructional cost:

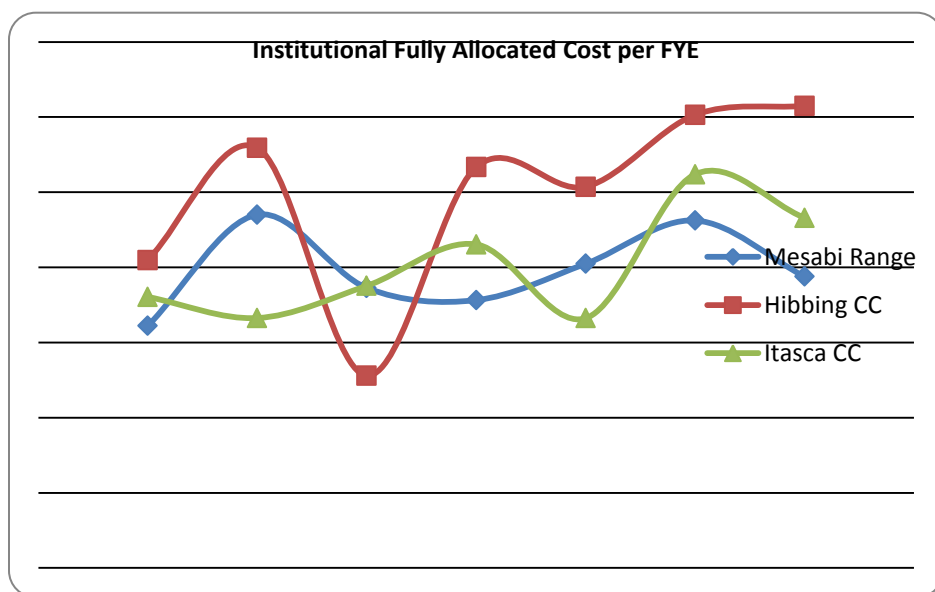
The efficiency of the physics department has fluctuated some over the last 7 years. Courses like Introductory Physics, Physical Science, and Introductory Astronomy have increased the efficiency of the department. Introductory Physics was developed to meet the needs of the Industrial Technology program and had large enrollments until the IT students starting taking Physical Science instead. Physical Science was developed to meet the needs of the Wind Energy program and has also had good enrollment. The enrollment in Astronomy increased when I started to offer the class online and has reached capacity each year it has been offered online.

College Physics has fluctuated quite a bit even as an ITV course, so a few years ago, I offered the courses online and enrollment was up, but went down the second year and students expressed their concerns of taking an online course. This year, I offered College Physics over ITV and had decent enrollment. I think alternating College Physics between ITV and Online will help the enrollment numbers in the College Physics sequence.

Engineering Physics I and II has had low enrollment over the years. The course was being sent to MRCTC via ITV from Hibbing CC, but then I taught the course for only Mesabi Range students in 2007 and while the enrollment was fair (over 10 students each semester) it was inefficient since most students were PSEO. Engineering Physics I and II are being offered again as MRCTC tries to start a two year engineering program.

Compared to the other colleges that have their own physics department in NEHED (Hibbing CC and Itasca CC), Mesabi Range's physics department has faired pretty well (see graph below). The data that I am looking at is Institution Fully Allocated Cost per FYE. 2007 (2008 on the graph) was up quite a bit due to the Engineering Physics sequence.

Overall, I think the physics department has remained efficient due to developing new courses to meet the needs of the students at MRCTC, sharing courses with other colleges, and making the courses flexible for the students.



The Physics Department's assessment of program recruiting:

Every year, I travel to area high schools to inform potential students about Mesabi Range's Science and Math departments. I usually include an activity to show how science can be interesting. I'm not sure how many students have been recruited this way.

I haven't had much time in the fall semester to recruit students, so I have done most of my recruiting in the spring semester. I think this is a problem since many of the students have already made up their mind of where they want to attend college, so in the upcoming year, I will be doing some recruiting in the fall semester.

The Physics Department's assessment of program enrollment trends:

Enrollment has fluctuated in the College Physics sequence, so as I mentioned above, I think enrollment will be more consistent if I alternate between offering the sequence online and over ITV.

Enrollment in the Engineering Physics sequence has been low, but as an engineering program develops, enrollment will increase.

Enrollment in the other classes in the physics department have been consistently high.

The Physics Department's assessment of program retention data:

Not much data has been taken, but from keeping track of attendance and looking at the grade sheets those students who attend class on a regular basis and turn in all assignments on time are very likely to be successful in class.

What does the assessment of recruiting, placement, enrollment, and retention mean to your department and students:

This assessment is important, especially for recruiting, enrollment, and retention since there is an emphasis on class sizes due to budget cuts.

The Physics Department's assessment of facilities and equipment:

The classrooms, labs, and equipment at Mesabi Range CTC are excellent. They rival those of a university.

Chapter 5 Summary of Strengths and Challenges

The Physics Department's assessments of program strengths are:

Strength One

Offering three different levels of physics.

Strength Two

Continuing my education and incorporating other science areas into physics.

Strength Three

State of the art lab equipment

Strength Four

Sharing courses with other colleges.

The implications of these strengths for the Physics department and student learning are:

- Students pursuing various degrees can attend Mesabi Range CTC, because we offer three different levels of physics.
- By increasing my knowledge in science, I can incorporate more applications into my courses and gain students interest and help them to understand why the classes they are taking are important to their degree.
- Students gain quality lab skills by working with state of the art lab equipment.
- By sharing courses with other colleges, we are able to offer more courses and provide more students with the necessary physics courses.

In order to maintain these strengths, these things must be considered:

- We should try to keep three levels of physics
- Keep up to date lab equipment
- All the science and math classes are intertwined and if one class is lost, it will affect the others

The Physics Department's assessments of program challenges are:

Challenge One

Student retention

Challenge Two

Enrollment

Challenge Three

Enrollment in the correct physics class

The implications of these challenges for the Physics department and student learning are:

- By retaining students, they are more likely to become successful and if they are successful they will have positive things to tell people about MRCTC, not to mention how it will help enrollment in other classes
- By keeping up the enrollment in the physics classes, we can offer different levels of physics, but if we lose one, it will not only affect the physics departments, but other departments
- Once in while, a student signs up for the wrong level physics class and it can be hassle to get them into the correct one and the student might take more time to complete their degree

Strategies for closing the gap between the challenges and department goals and student learning are:

- I can work on student retention by meeting with the students a couple of times during the semester to discuss their progress in the course and how they can improve in the class
- I can work on enrollment by visiting area high schools and by visiting our college's courses to inform them about the course offerings
- I can avoid students enrolling the wrong physics class by speaking to advisors and checking with students on the first day of class

Chapter 6 Future Direction

The Physics Department's short term (1-2 years) direction is:

- Add more content the courses
- Integrate more applications into the classes
- Improve class sizes
- Recruit in the fall semester

The Physics Department's long term (up to 4 years) direction is:

- Develop courses that will benefit students and other programs

Enrollment Cost Data for Physics

Subj	Cou_Nbr	Abbr_Title	Fy	Yrtr	No of Students	FYE	Total Cost	Cost per FYE
PHYS	1541	Phys Science	2010	20103	19.00	2.5	\$ 6,171.00	\$ 2,435.95
PHYS	1541	Phys Science	2011	20113	18.00	2.4	\$ 13,824.00	\$ 5,760.00
PHYS	1551	Intro Phys	2008	20083	73.00	9.7	\$ 26,712.00	\$ 2,744.36
PHYS	1551	Intro Phys	2009	20093	31.00	4.1	\$ 12,760.00	\$ 3,087.12
PHYS	1551	Intro Phys	2009	20095	13.00	1.7	\$ 12,760.00	\$ 7,361.68
PHYS	1551	Intro Phys	2010	20103	31.00	4.1	\$ 21,434.00	\$ 5,185.69
PHYS	1551	Intro Phys	2010	20105	26.00	3.5	\$ 12,342.00	\$ 3,560.16
PHYS	1551	Intro Phys	2011	20115	21.00	2.8	\$ 13,824.00	\$ 4,937.14
PHYS	1555	Fund of Physics	2010	20103	3.00	0.0	\$ (1,688.00)	NA
PHYS	1561	Col Phys I	2006	20063	79.00	10.5	\$ 11,223.00	\$ 1,065.48
PHYS	1561	Col Phys I	2007	20073	67.00	8.9	\$ 31,920.00	\$ 3,573.11
PHYS	1561	Col Phys I	2008	20083	7.00	0.9	\$ 6,678.00	\$ 7,155.26
PHYS	1561	Col Phys I	2009	20093	10.00	1.3	\$ 6,380.00	\$ 4,785.12
PHYS	1561	Col Phys I	2010	20103	9.00	1.2	\$ 6,171.00	\$ 5,142.50
PHYS	1561	Col Phys I	2011	20113	13.00	1.7	\$ 6,912.00	\$ 3,987.77
PHYS	1562	Col Phys II	2006	20065	7.00	0.9	\$ 9,102.00	\$ 9,752.49
PHYS	1562	Col Phys II	2007	20075	1.00	0.1	\$ 7,980.00	\$ 59,864.97
PHYS	1562	Col Phys II	2008	20085	3.00	0.4	\$ 6,678.00	\$ 16,695.00
PHYS	1562	Col Phys II	2009	20095	3.00	0.4	\$ 6,380.00	\$ 15,950.00
PHYS	1562	Col Phys II	2010	20105	2.00	0.3	\$ 6,171.00	\$ 23,138.36
PHYS	1562	Col Phys II	2011	20115	5.00	0.7	\$ 6,912.00	\$ 10,367.48
PHYS	1567	Intro Astro	2006	20063	9.00	0.9	\$ 6,827.00	\$ 7,585.56
PHYS	1567	Intro Astro	2006	20065	17.00	1.7	\$ 6,827.00	\$ 4,015.88
PHYS	1567	Intro Astro	2007	20073	13.00	1.3	\$ 5,985.00	\$ 4,603.85
PHYS	1567	Intro Astro	2009	20095	36.00	3.6	\$ 4,785.00	\$ 1,329.17
PHYS	1567	Intro Astro	2010	20105	36.00	3.6	\$ 4,628.00	\$ 1,285.56
PHYS	1567	Intro Astro	2011	20115	36.00	3.6	\$ 5,184.00	\$ 1,440.00
PHYS	1571	Engr Phys I	2006	20063	3.00	0.4	\$ 707.00	\$ 1,767.50
PHYS	1571	Engr Phys I	2007	20073	3.00	0.4	\$ 1,026.00	\$ 2,565.00
PHYS	1571	Engr Phys I	2008	20083	11.00	1.5	\$ 6,678.00	\$ 4,553.08
PHYS	1571	Engr Phys I	2010	20103	2.00	0.3	\$ (844.00)	\$ (3,164.60)
PHYS	1571	Engr Phys I	2011	20115	7.00	0.9	\$ 6,912.00	\$ 7,405.98
PHYS	1572	Engr Phys II	2006	20065	1.00	0.1	\$ 707.00	\$ 5,303.83
PHYS	1572	Engr Phys II	2007	20075	4.00	0.5	\$ 1,026.00	\$ 1,923.87
PHYS	1572	Engr Phys II	2008	20085	7.00	0.9	\$ 6,678.00	\$ 7,155.26
PHYS	1572	Engr Phys II	2009	20095	1.00	0.1	\$ 371.00	\$ 2,783.20
PHYS	1581	Phys I Lab	2006	20063	3.00	0.1	\$ 177.00	\$ 1,770.00
PHYS	1581	Phys I Lab	2007	20073	3.00	0.1	\$ 256.00	\$ 2,560.00
PHYS	1581	Phys I Lab	2008	20083	11.00	0.4	\$ 1,669.00	\$ 4,551.40
PHYS	1581	Phys I Lab	2010	20103	2.00	0.1	\$ (211.00)	\$ (3,163.42)
PHYS	1581	Phys I Lab	2011	20115	7.00	0.2	\$ 1,728.00	\$ 7,406.77
PHYS	1582	Phys II Lab	2006	20065	1.00	0.0	\$ 2,276.00	\$ 68,348.35
PHYS	1582	Engineering Phys II Lab	2007	20075	4.00	0.1	\$ 256.00	\$ 1,920.48

Enrollment Cost Data for Physics

Subj	Cou_Nbr	Abbr_Title	Fy	Yrtr	No of Students	FYE	Total Cost	Cost per FYE
PHYS	1582	Phys II Lab	2008	20085	7.00	0.2	\$ 1,669.00	\$ 7,153.88
PHYS	1582	Phys II Lab	2009	20095	1.00	0.0	\$ 93.00	\$ 2,792.79