# **Assessment of Learning Achievement** (Code: ….)
**Syllabus**

**Physics Education Study Program**
**Faculty of Mathematics and Science**

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**Course Number**: SED 595
**Credits:** Two (2), taught online through Blackboard instruction requiring student interaction for 16 weeks of the term

## Course Description

Achieving greater access to and participation in science and mathematics education by a broad cross section of students is a central theme guiding reform of curriculum and instruction in elementary to college level classrooms. Accompanying this challenge with the challenge of integrating mathematics, science and technology presents an even broader challenge. Assessment and evaluation is a major factor in achieving this goal of science and mathematics "for all" as well as integrating science, mathematics and technology.

While the terms 'assessment' and 'evaluation' are used interchangeably in colloquial usage, an important distinction has been made between them in education.

- **Assessment** has traditionally played a role in education analogous to the bottom line in business. Assessment refers to the collection of evidence to measure the degree of attainment of objectives.
- **Evaluation** refers to judgments made based on selected criteria using the results of assessments. For instance, at the end of the course, what point values are assigned what letter grades?

Reform minded science and mathematics educators must take a critical look at the role of assessment and the kinds of information used in making evaluations, particularly when stretching to integrate science, mathematics and technology.

The purpose of this course is to examine and design a wide variety of assessment techniques and various kinds of reasoning used to make valid and reliable evaluations and use the results of these examinations to design a range of assessment and evaluation instruments for different learning outcomes and educational contexts. Ultimately, the essential questions for the course are:

1. How can assessment support all students in learning in an interdisciplinary physics education context?
2. What are the challenges in capturing valid and reliable information of students' physics education knowledge, skills, reasoning, and products?
3. How are assessments designed to provide meaningful, valid and reliable evaluations of students' learning in an interdisciplinary context?
4. How are assessments evaluated to accurately describe students' knowledge, skills, reasoning, and products in an interdisciplinary context?

## Course Materials

**Textbooks**

**Required**

Stiggins, R. J. (2008). *Student-Involved Assessment FOR Learning 5th Edition*, Columbus, OH: Merrill Prentice-Hall.

Taylor, C. S. & Nolen, S. B. (2008). *Classroom Assessment: Supporting Teaching and Learning in Real Classrooms*, Upper Saddle River, NJ: Merrill Prentice Hall.

**Optional**

Popham, W. J. (2008). *Classroom Assessment: What Teachers Need to Know*, Boston, MA: Allyn & Bacon.

## Central Participant Actions During the Course

1. Participants engage in discourse to identify, clarify and defend valid and reliable assessments for guiding learning in an interdisciplinary context of science, mathematics, and technology.
2. Participants investigate key assessment challenges – validity, reliability, and the design of scoring guides to effectively describe students' knowledge, skills, reasoning, and products.
3. Participants and instructors strive to build a community of learners engaged in the exploration of developing a valid and reliable assessment plan within the context of learning in interdisciplinary science, mathematics and technology environment.

## Student Learning Outcomes

1. Develop an assessment plan portfolio for an educational program unit/sequence of lessons that describes assessment in an interdisciplinary science, mathematics and technology learning context. Apply key assessment concepts in developing the plan designed to determine learners' progress in an educational setting of your choice. Describe and defend the implementation of both formative and summative assessment strategies in your program plan.
2. Design and defend a variety of traditional, alternative, authentic assessments of student learning to be included in assessment plan for the educational program toward meeting specified achievement targets of science/mathematics knowledge, skills, reasoning and products,
3. Design and defend scoring guides for making appropriate judgments about students' display of science/mathematics/technology knowledge, skills, reasoning and products through the performance in each assessment.
4. Synthesize and analyze theoretical and practical issues arising in the design and results from a variety of assessments; defend the recommendation from the assessment plan for gathering evidence of student learning in an interdisciplinary science, mathematics, and technology context.

## Course Content

| ***Week*** | ***Focus*** | ***Key Questions*** |
|---|---|---|
| | Interdisciplinary science, mathematics, and | ▪ What does an interdisciplinary science, mathematics, and technology educational context mean? |

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| 1 | technology educational context | ▪ How are the goals/objectives for an interdisciplinary context different and similar to those in integrated and thematic contexts, using state and national standards for science, mathematics and technology?<br>▪ What elements support the rationale for using an interdisciplinary context for combining science, mathematics and technology in your specific curriculum at your specific level? |
| 2 | Establishing a community of learners in online educational experience | ▪ What strategies and technologies are useful in establishing a community of learners in an online educational experience? |
| 3 | Achievement targets and goal/objectives of an interdisciplinary educational experience | ▪ What kinds of achievements should an educator assess in the interdisciplinary educational experience?<br>▪ How are the goal/objectives of the interdisciplinary educational experience matched with achievement targets?<br>▪ How should the goals/objectives be revised to represent the key achievement targets in an interdisciplinary education experience? |
| 4 | Important assessment concerns: validity and reliability | • Why is reliability an important concept for educational assessment?<br>• Why is validity such a significant concept for educational assessment? |
| 5 | Important assessment concerns: Scoring assessments to gather evidence of progress toward achievement targets | ▪ What assessments are needed to gather data about students' progress with the goal and objectives in the interdisciplinary science, mathematics, and technology educational context?<br>▪ What different types of assessments need to be scored using detailed scoring rubrics? |
| 6 | Important assessment concerns: Scoring assessments to gather evidence of progress | ▪ How should scoring guides be designed to address validity and reliability issues and capture science, mathematics and technology goals/objectives in an interdisciplinary unit? |

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| | toward achievement targets | |
| 7 | Designing Quality Assessments: Performance Assessments<br>• Validity, reliability issues<br>• Scoring guides | ▪ What are different types of performance assessments and how do they match with the achievement targets?<br>▪ What are important features for developing performance items and tasks?<br>▪ What are validity and reliability concerns to consider with performance assessments?<br>▪ What are important features of scoring guides for performance assessments? |
| 8 | Designing Quality Assessments: Work samples<br>• Validity, reliability issues<br>• Scoring guides | ▪ What is a work sample and what makes it useful in assessing achievement targets in an interdisciplinary science, mathematics and technology educational experience?<br>▪ How do work sample assessments match with the achievement targets?<br>▪ What makes valid and reliable work sample assessments with respect to the achievement targets, the goals/objectives, and the integration of science, mathematics, and technology? |
| | MID TEST | |
| 9 | Designing Quality Assessments: Constructed response/essay assessments<br>• Validity, reliability issues<br>• Scoring guides | ▪ How are constructed response/essays useful in assessing achievement targets in an interdisciplinary science, mathematics and technology educational experience?<br>▪ How do constructed response/essays match with the achievement targets?<br>▪ What makes valid and reliable constructed response/essay with respect to the achievement targets, the goals/objectives, and the integration of science, mathematics, and technology? |
| 10 | Designing Quality Assessments: Portfolio<br>• Validity, reliability issues<br>• Scoring guides | ▪ What are the benefits of portfolios, projects and other long-term assessments in assessing achievement targets in an interdisciplinary science, mathematics and technology educational experience?<br>▪ How do portfolios, projects and other long-term assessments match with the achievement targets?<br>▪ What makes valid and reliable portfolios, projects and other long-term assessments with respect to the achievement targets, the |

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| | | goals/objectives, and the integration of science, mathematics, and technology? |
| 11 | Assessments: Projects, and other long-term assessments<br>• Validity, reliability issues<br>• Scoring guides | ▪ |
| 12 | ▪ Sharing assessment portfolios and conducting partner assessment and recommendations on Assessment Portfolios | |
| 13 | ▪ Revising your Assessment Portfolios and preparing a final portfolio reflection on assessment of students in an interdisciplinary science, mathematics, and technology learning experience. | |
| 14 | ▪ Submit final Assessment Portfolio for grading | |
| 15 | ▪ Final Assessment Portfolio | |
| QUIZ | | |

Course Requirements

Maintain a consistent presence in the course room where you make meaningful contributions to the discussions, reviews and other interactions. Your contributions are considered in the scoring rubric used in grading each assignment.

**Norms for learning in this class**

Although this class uses an online, asynchronous mode, we plan to establish and maintain a learning community such that you can share ideas and support each other as you are exploring the course ideas. Rather than face-to-face discussions as in a traditional class, students will use electronic means for engaging in the discussions. Students are expected to interact consistently through the course in the process of collaborating with each other in the development of the ideas for the class. Assignments will be made such that you are expected to attend to them throughout the 16 weeks of the course. Here are some pointers to keep in mind throughout the course.

1. If you are unable to submit an assignment on time, you need to inform the instructors prior to the due date. Students may request an extension or an incomplete because of illness or other extenuating circumstances-if they have been doing acceptable work prior to the request. The instructor will define the requirements and timelines to complete the work. This request must be made in advance of the due date.
2. We will provide you with readings (for most part can be read online or downloaded) as well as your textbook. We want you to extend beyond the readings that we provide. Consider the YSU Library, your own library, and the Internet as other possible sources.
3. Throughout the term you will be asked to learn about technologies that you may have had no previous work in using. You will be designing new ideas for integrating these technologies in

science and mathematics classes. More specifically, you will be designing websites, solving spreadsheet problems, creating engaging PowerPoint presentations, developing videos for engaging students in learning, and perhaps pursuing some of the Web 2.0 technologies. As a summative technology project, you will develop an Electronic Portfolio of your work through the course.

4. We want you to engage in discussions and cooperative projects with your classmates throughout this course. Keep in mind that you are in a graduate level class and that the interactions are among professionals from different learning environments. In these activities, we hope to see the following:
    - You synthesizing and analyzing the ideas in the readings, discussions, etc. rather than summarizing what you have read and discussed. Synthesis means to draw the ideas together, not just repeating the ideas. Analysis means to separate a whole idea into its constituent parts for individual study. In both, you are constructing new knowledge that has not been specifically presented.
    - You expressing your opinions and understandings.
    - You relating your new understandings to your personal situations but also extending beyond your personal situation. Some of you are focused in free-choice learning environments; some of you are focused in community college and college environments. Share your ideas and extend your knowledge to incorporate ideas from the different learning environments. The ideas will be much richer as a result.
    - You referencing the ideas that you use in developing your individual assignments from reading articles, peer discussions, and outside resources. You should reference each other's ideas when you incorporate them in your assignments. If the idea originates with another person, reference that person. If the idea is unique to you, indicate that.
    - You supporting class learning by providing feedback on their ideas that is more than "Good job." Think in terms of helping one another improve each other's work.
5. When you receive feedback, be sure to revise your work to reflect the ongoing discussions.

The key with access to these various means of communication is to maintain a consistent class presence where you are a part of establishing and maintaining a community of learners throughout the course. **However it is important to note that the quality of the communication is far more important than the quantity.**

## Grading Scale and Procedure

### Grading Procedure

There are 500 possible points for this course. The weightings of the assignments are approximately:

| **Assignments** | ***Points/ Percent*** |
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| **Week 1 - Readings/Discussions:** Propose an interdisciplinary sequence/unit for assessing student learning in science, mathematics and technology. Illuminate the Assessment Plan Portfolio expectations | 25/5% |

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| **Week 2 - Readings/Discussions:** Reframe goals/objectives with respect to responding to the achievement targets | 25/5% |
| **Week 3 – Readings/Discussions/Assessment Plan Portfolio:** Explore the concepts of validity and reliability as important issues for assessing student learning. | 50/10% |
| **Week 4 - Readings/Discussions/ Assessment Plan Portfolio:** Exploring scoring assessments to assure that the assessments scoring are both valid and reliable | 50/10% |
| **Week 5 – Readings/Discussions/ Assessment Plan Portfolio:** Exploring assessments, validity, reliability and scoring guides focused on Performance assessments. | 50/10% |
| **Week 6 – Readings/Discussions/ Assessment Plan Portfolio:** Exploring assessments, validity, reliability and scoring guides focused on work samples | 50/10% |
| **Week 7 – Readings/Discussions/ Assessment Plan Portfolio:** Exploring assessments, validity, reliability and scoring guides focused on constructed response/essay | 50/10% |
| **Week 8 – Readings/Discussions/ Assessment Plan Portfolio:** Exploring assessments, validity, reliability and scoring guides focused on portfolios projects and other log term assessments. | 50/10% |
| **Week 9 – Sharing your Assessment Plan Portfolio and conducting partner assessment and recommendations on Assessment Plan Portfolios.** | 50/10% |
| **Week 10 – Readings/Discussions/Assessment Plan Portfolio:** Preparing the Final Portfolio Reflection on assessing student knowledge, skills, dispositions and products | |
| **Final Assessment Plan Portfolio in an Interdisciplinary Science, Mathematics and Technology Context** | 100/20% |

## Grading Scale

**Note to students**: Keep a copy of everything you submit. Letter grades for assignments in the course will be determined using the following scale:

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| 98% < = A+ <= 100% | 88% < = B+ < 90% | 78% < = C+ < 80% |
| 94% < = A < 98% | 84% < = B < 88% | 74% < = C < 78% |
| 90% < = A- < 94% | 80% < = B- < 84% | 70% < = C- < 74% |
| | | 60 % < = D <70% |

All assignments have due dates. **Since this course is an online course, the times for submission on those due dates is no later than midnight the identified date.** If you need to request an extension for an assignment, a request must be made to the instructor by email prior to the due date. Late points may be deducted at the instructor's discretion.

A letter grade (A, A-, B+, B, B-, C+, C, C-, D+, D, D-, F) is awarded if the student completes all work, including the final project.

## Learning Resources


International Society for Technology in Education. (2007). *National Educational Technology Standards for Students: Connecting Curriculum and Technology.* Eugene, OR: ISTE. Available online: http://cnets.iste.org/students/

International Society for Technology in Education. (2002). *National Educational Technology Standards for Teachers: Preparing Teacher to Use Technology.* Eugene, OR: ISTE. Available online: http://cnets.iste.org/teachers/

National Council of Teachers of Mathematics (2006). *Curriculum Focal Points for K-8.* Free download at http://www.nctm.org/standards/content.aspx?id=270&LangType=1033

National Council of Teacher of Mathematics. (2000). *Principles and Standards for School Mathematics*, Reston, VA: NCTM. Link to 120-day free access to full document of *Principles and Standards* http://standards.nctm.org/

National Academy of Sciences (1996). *National Science Education Standards*. National Academy Press, Washington, D.C. On-line: http://books.nap.edu/catalog/4962.html

National Research Council (2000). *Inquiry and the National Science Education Standards*. Washington, D.C.: National Academies Press. Available on-line at: http://fermat.nap.edu/catalog/9596.html To read on line at no cost http://books.nap.edu/catalog.php?record_id=11625 - toc

National Science Teachers Association: www.nsta.org

Oregon State Department of Education Standards for Mathematics: http://www.ode.state.or.us/teachlearn/real/newspaper/Newspaper_Section.aspx?subjectcd=ma

Oregon State Department of Education Standards for Science: http://www.ode.state.or.us/teachlearn/real/newspaper/Newspaper_Section.aspx?subjectcd=sc

Popham, W. J. (2008). *Classroom Assessment: What Teachers Need to Know*, Boston, MA: Allyn & Bacon.

Stiggins, R. J. (2004). Student-Involved Assessment FOR Learning 5th Edition, Columbus, OH: Merrill Prentice-Hall.

Taylor, C. S. & Nolen, S. B. (2008). Classroom Assessment: Supporting Teaching and Learning in Real Classrooms, Upper Saddle River, NJ: Merrill Prentice Hall.

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