



COURSE INFORMATION

time: MWF 2:00 – 3:50 pm
place: SL 240N
credits: 4

INSTRUCTOR

name: Dr. Robyn Mieke Dahl
she, her, hers
office: ES 340
hours: Tuesday 10:00 – 12:00 or
by appointment
email: dahlr4@wwu.edu

TEACHING ASSISTANT

name: Emily Schumacher
office: SMATE LRC
hours: Wednesday 11:00 – 1:00 or
by appointment
email: schumae3@wwu.edu

TEXTBOOK

NextGen Physical Science and Everyday Thinking

Goldberg, Robinson & Otero

- Unit EM: Energy-based model for interactions
- Unit PEF: Potential energy and fields
- Unit FM: Force-based model for interactions
- Unit CF: Combination of forces

Matter & Energy in Physical Systems

Science Education 201

COURSE OVERVIEW

This is a student-centered, lab-based physics course intended primarily for students pursuing a career in K-8 teaching. This course has two major learning outcomes:

Physics Content: *Students develop an understanding of basic physics concepts of energy and force based on their own investigations. Students apply these concepts to explain real world phenomena.*

Learning About Learning: *Students develop an awareness of how their own ideas change and develop, and reflect on specific ways the curriculum and instruction facilitate these changes.*

WHAT TO EXPECT DURING CLASS

This is a lab-based course in which students alternate between working through guided activities in small groups and participating in full-class discussions. During small group work, you will make predictions, conduct experiments, complete exercises, and work with computer simulations. You and your partners will be working collaboratively to make sense of the ideas and to formulate explanations. Then, during the full-class discussions, groups will share their ideas and results, allowing you to check, verify, and perhaps modify the ideas from your own small group work. Learning is student-directed and achieved through collaboration and consensus. ***This course has little to no lecturing.***

Instructors in the course will act as “learning coaches,” providing guidance and facilitating your work. Some specific roles the instructors may assume include: reflecting student ideas back to the class for further discussion, asking questions to draw out and clarify student ideas, summarizing ideas that have emerged during discussion, and providing feedback on student work. The instructors will not be a general source of answers, but instead will try to provide feedback and guide the next steps in learning.

The curriculum is designed for you to take charge of your own learning. I hope that you, as a learner, are excited about this approach, but I recognize that it may also be scary and/or frustrating at first. I hope you will find that many of the learning and teaching strategies employed in this course are valuable and appropriate for you to use when you begin your teaching career.

GRADE BREAKDOWN

Homework	25%
Quizzes	25%
Final Exam	15%
Participation	35%

LETTER GRADE ASSIGNMENTS

Your final letter grade will be assigned according to the following scale

A	> 94%
A –	90 – 94%
B +	87 – 89.9%
B	83 – 86.9%
B –	80 – 82.9%
C+	77 – 79.9%
C	73 – 76.9%
C-	70 – 72.9%
D+	67 – 69.9%
D	63 – 66.9%
D-	60 – 62.9%
F	< 60%

COURSE POLICIES

Attendance. Due to the collaborative nature of this class, it is important to attend all class meetings and arrive on time. Your learning depends on being present and participating. In addition, your partners are depending on you. A missed class cannot easily be made up and so all absences will be recorded, regardless of the reason. You are allowed one absence without penalty, and every absence thereafter will result in a 10% deduction from your participation grade. If there are extenuating circumstances, please communicate early.

Internet Access. Homework may require access to the internet, and your instructor will often use email and Canvas to communicate with you. You are expected to check your WWU email account and Canvas notification daily. There are computers available for use in the SMATE library as well as several other labs and libraries on campus.

COURSE WORK

Homework (25%) Homework will be assigned throughout the four units, usually after completing an activity. Homework may include online assignments and written problem sets. Homework assignments are intended to reinforce the concepts explored in each activity and help you learn to apply key ideas to new situations. Grading will involve a simple rubric with an opportunity for you to revise and resubmit an assignment if you did not receive full credit on the first try. The goal of this is to remove stress over grades and ensure that you are confident in your understanding of the concepts. Late assignments will not be accepted.

Unit Quizzes (25%) There will be three in-class quizzes, given on the Friday of weeks 3, 6, and 9. Each quiz will take approximately 45 minutes and will consist of three questions. Two questions will be on the most recent material covered (since the previous quiz) and one question will be a review question.

Participation (35%) In this course, students generate physics knowledge and understanding through a process of inquiry. Active engagement is thus essential, and includes asking questions, responding to the questions of other students, and offering your own ideas. Engagement is critical both during small group work, in which you will conduct experiments and develop explanations, as well as in the full-class summarizing discussions, which occur at the end of each activity. Participation grading is described in more detail on the following page.

COURSE SCHEDULE

Subject to change – check Canvas for the most up to date schedule and deadlines

Week 1 (Jan 8, 10)

EM 1: Interactions and motion

Week 2 (Jan 13, 15, 17)

EM 2: Motion and energy

EM 3: Slowing and stopping

Week 3 (Jan 22, 24)

EM 4: Friction as an interaction

EM 5: Electric circuit interactions

Quiz 1

Week 4 (Jan 27, 29, 31)

EM 6: Keeping track of energy

EM 7: Conservation of Energy

Week 5 (Feb 3, 5, 7)

PEF 1: Elastic objects and energy

PEF 4: Gravitational interactions

Week 6 (Feb 10, 12, 14)

FM 1: Interactions and force

FM 2: Motion w/ continuous force

Quiz 2

Week 7 (Feb 17, 19, 21)

FM 3: Pushes and slowing down

FM 4: Friction and slowing

FM 5: Changing force strength & mass

Week 8 (Feb 24, 26, 28)

FM 6: Falling objects

CF 1: Combination of forces

Week 9 (Mar 2, 4, 6)

CF 2: Motion with balanced forces

CF 3: Comparing forces

CF 4: Explaining phenomena

Quiz 3

Week 10 (Mar 9, 11, 13)

Final: Tuesday, Mar 17, 3:30-5:30 pm

At the start of the quarter, all students will begin with 80% score for participation. If you attend class and participate fully, your participation score will remain at 80%. In order to raise your participation grade above 80%, you may choose to participate in the following types of activities. Participation in each activity will raise your grade by 5%.

Extra discussions about physics: At any point after week 1, you may attend office hours of the professor (Robyn) or the TA (Emily) to discuss topics or assignments from class. You must come prepared with questions of your own and you must

review all relevant class material beforehand. You must attend office hours at least once per week for 3 weeks (not necessarily consecutive) in order for this activity to count for credit, and at least 1 discussion must be with Robyn.

Learning commentaries: Within a week of receiving a graded quiz, you may write a brief (500 word) essay reflecting on your understanding of energy- or force-based models of interactions. There are additional guidelines for learning commentaries posted on Canvas.

Participation commentaries: Within a week of completing a self-evaluation and receiving peer and instructor evaluations of your class participation, you may write a brief (500 word) essay reflecting on your engagement in this course. There are additional guidelines for participation commentaries on Canvas.

Physics in the news: Physics research is often featured in the news. You may choose to share an interesting example of physics research that has been featured in the news (i.e., a newspaper or magazine article, or on TV, radio or a podcast). To receive credit, you must share the story with the class and submit a brief (500 word) summary of the news item. Additional guidelines are on Canvas.

Final Exam (15%) A comprehensive final exam will be given on Tuesday, March 17.

STUDENT SERVICES

Disability Access Center (DAC)

Wilson Library 170
360.650.3083
drs@wwu.edu
<https://disability.wwu.edu>

Health Center Campus Services

2001 Bill McDonald Parkway
360.650.3400
<https://studenthealth.wwu.edu>

Counseling Center

Old Main 540
360.650.3164
<https://counseling.wwu.edu>

Consultation & Sexual Assault Support (CASAS)

Old Main 585B
360.650.3700

LGBTQ+ Western

Multicultural Center
Viking Union 753
360.650.7500
<https://lgbtq.wwu.edu>

Dean of Students

360.650.3450
<https://wp.wwu.edu/students>

University of Police

Campus Services
2001 Bill McDonald Parkway
University.police@wwu.edu
360.650.3555

UNIVERSITY POLICIES

Academic Integrity

You are expected to be familiar with, and to abide by, Western's Academic Honesty Policy and Procedure, and Student Rights and Responsibilities Code. These are published in the Western catalog in Appendix C, University Academic Policies. Refer to Plagiarism Policies and Guidelines (libguides.wwu.edu/plagiarism).

Accommodations

Disability Resources for Students. Accommodations for persons with documented disabilities can be established through the Disability Access Center (DAC): 360.650.3083; drs@wwu.edu; <https://disability.wwu.edu>

Religious Accommodations: Western provides reasonable accommodation for students to take holidays for reasons of faith or conscience or for organized activities conducted under the auspices of a religious denomination, church, or religious organization. Students seeking such accommodation must provide written notice to their faculty within the first two weeks of the course, citing the specific dates for which they will be absent. "Reasonable Accommodation" means that faculty will coordinate with the student on scheduling examinations or other activities necessary for completion of the course or program and includes rescheduling examinations or activities or offering different times for examinations or activities.

Title IX and Sex Discrimination

Title IX makes it clear that violence and harassment based on sex which includes sexual harassment, gender-based harassment, and sexual violence (sexual assault, domestic violence, dating violence, stalking) is prohibited. Under Title IX, rape and sexual assault are forms of illegal sex discrimination.

Survivors of sexual violence have the right to file a discrimination complaint or seek advice and assistance from the Equal Opportunity Office (EOO) in Old Main 345 (360.650.3307); University Police (emergency: 360.650.3911, report: 360.650.3555); Bellingham Policy (emergency: 911, report: 360.778.8800).

Children in the Classroom

Children of students are allowed in the classroom under the supervision of the parent or guardian when: A) alternative arrangements are impractical or impossible, such as the illness of a day care provider; and B) the faculty member responsible for the classroom has given prior approval.