

# Mechanized Systems Management

University of Nebraska-Lincoln  
MSYM 109L Physical Principals in Agriculture Lab

## INSTRUCTOR:

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## CATALOG DESCRIPTION:

109L. Physical Principals in Agriculture Lab (1 cr I,II) Lab 3. Pre-req or Parallel: MSYM109 or PHYS 151.

Laboratory experiments on mechanics, fluid mechanics, heat, electricity, and their relationship to energy utilization and conservation in the agricultural industry. This course is intended to give students “hands-on” practical experience with concepts presented in an introductory physical principals course (MSYM 109).

## OBJECTIVES:

Upon completion of this course a student should be able to:

- A. Make reasonably accurate physical measurements and report those measurements with the appropriate number of significant digits and correct units.
- B. Perform analyses of raw data to determine desired results.
- C. Determine errors by comparing experimental results with results predicted from theory.
- D. Clearly present data and results in tabular and graphical form.
- E. Prepare a written report of physical experiments and the results obtained.

## METHODS:

One 2-hour laboratory per week. Laboratory exercises utilize and/or illustrate fundamental physical principals and their applications to practical agricultural and life science problems.

## GRADING:

Lab Exercises (13 labs*, 15 pts each)	180
Lab Practical	<u>45</u>
Total Points Possible	225

\* Your lowest lab exercise score will be dropped

### *Final grades*

Each student’s final grade will be assigned based on the percentage of the points earned. This percentage will be compared to the grade scale below.

### *Pass/No Pass Option*

Students must achieve at least a C to receive a passing (P) grade.

Grade	Percentage	Grade	Percentage
A+	97%	C+	77%
A	93%	C	73%
A-	90%	C-	70%
B+	87%	D+	67%
B	83%	D	63%
B-	80%	D-	60%

## LABORATORY ASSIGNMENTS

For each lab there will be an assigned report. **Each lab report should be completed and submitted via Canvas by 4 pm on Friday.** Make sure if you photocopy your lab, everything is still legible and all pages are included. A single document should be submitted as your lab report. **No late lab reports will be accepted.** If you cannot make your scheduled lab due to extenuating circumstances, notify the instructor in advance. Make sure you are involved each week using the equipment, making the measurements, and calculating the results.

## LAB EXERCISE EXPECTATIONS

All work must be shown. All units must be included. The written portion of all reports must be typed. Data and analysis sheets may be attached as an appendix. Use correct grammar and spelling. Think critically.

## LABORATORY PRACTICAL

Students will individually complete previous lab exercises during the final lab session demonstrating learning during the course of the semester. The final practical is worth 20% of the final lab grade.

## COURSE POLICIES

### *Attendance*

Attendance at all laboratory sessions is required for completion of this course. Each student is responsible for all material covered in laboratory exercises. Arrangements must be made with the lab instructor in advance if you cannot attend a regularly scheduled lab.

### *Academic Dishonesty*

Although group problem solving is encouraged, copying from another person's lab assignments will not be tolerated. Any student found guilty of dishonesty or cheating in academic work shall be subject to disciplinary action based upon the level of dishonesty. In this course the UNL Code of Conduct (UNL Undergraduate Bulletin) dealing with academic dishonesty will be followed.

**All faculty, staff, and students on campus are expected to follow all campus policies and procedures related to Covid-19 which can be found at <https://covid19.unl.edu/>. Please visit this website which includes information about testing, vaccinations, and use of the Safer Community App for access to campus buildings and activities**

*Students in this course must work in close physical proximity to one another for extended periods of time in order to achieve the academic goals of the course. For this reason, the Department of Biological Systems Engineering and the College of Agricultural Sciences and Natural Resources have determined that face coverings will be required in this course. If you are unwilling to comply with this requirement, please visit with your advisor about possible alternative courses that you might take in lieu of this one.*

## TENATIVE LABORATORY SCHEDULE – FALL 2021

8/23, 24	Quantitative Problem Solving (1)
8/30, 31	Force Vectors (50)
9/6, 7	No Lab - Labor Day
9/13, 14	Acceleration of Gravity (19), Projectile Motion (77)
9/20, 21	Friction (55), Center of Gravity (28)
9/27, 28	Torque (97), Tractor Stability (101)
10/4, 5	Conservation of Linear Momentum (40), Centrifugal Forces (33)
10/11, 12	Simple Machines (83), Conservation of Angular Momentum (38)
10/18, 19	No Lab – Fall Break
10/25, 26	Simple Harmonic Motion (79), Pressure Measurement with Manometers (74)
11/1, 2	Density and Specific Gravity of Solids (43), Specific Gravity of Liquids (90), Atmospheric Pressure Measurements (23)
11/8, 9	Air Velocity (16), Latent Heat of Vaporization (121), Latent Heat of Fusion (118)
11/15, 16	Water Flow Measurements Lab – See Handout
11/22, 23	Conduction Heat Transfer (105), Gas Law Relationships (115),
11/29, 30	Relative Humidity (128), Second Law of Thermodynamics (132), Freezing Point Temperatures (113)
12/6, 7	<b>Lab Practical</b>