**ME 336ME Experimentation I**

Department of Mechanical and Civil Engineering

Minnesota State University, Mankato

Spring Semester, 2024

**ATTN: In-the-Lab-in-Person Only, No remote learning**

**Instructor:** Dr. Shaobiao Cai

Office: TE 228

Phone: 507-389-1918

Email: [Shaobiao.cai@mnsu.edu](mailto:Shaobiao.cai@mnsu.edu)

**Lab Meetings:** 1:00 – 4:50 p.m. Tuesday/Wednesday in TE110 (or Nelson Hall 101),

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**Office hours:** See attached schedule, appointment, and Open Door Policy (In addition to formal office hours, do not hesitate to schedule an appointment for team and/or one-on-one meetings.)

**Textbook:** N/A, Lab Instruction Manual will be provided by the instructor

**References:** Theory and design for mechanical measurements by Figliola, R. S; Beasley, Donald E. ME textbooks for Materials, Manufacturing, Machine design and Mechanics of materials,

**Requisites**: ME306

**Course Objectives**: To provide a background in mechanical testing and basic manufacturing operations. To collect, analyze, and interpret measured data and to present the results in the form of engineering reports.

**Course Outcome**:

* An ability to design and conduct experiments, as well as to analyze and interpret data.
* An ability to identify, formulate, and solve engineering problems.

**Grading: (No credit if No in-the-lab in-person participation)**

Lab reports\*: 60% (70% for Labs 1-8; 30% for labs 9-11)

Participation/Preparation\*\*/Lab preparation quizzes#: 30%

(Note: missing two lab classes without notice and valid reason(s) will lead to the loss of the total points for this portion)

In the lab working professionalism/attitude/safe operation/respectful/etc.: 10%

A [90-100%]; B [80-90%); C [70-80%); D [60-70%); F below 60%

\* A lab report should be created and submitted by team members who have started and completed a lab project in the lab in person. Lab reports are due by the beginning of the next lab meeting. No late report will be accepted (No exception!).

\*\* Attendance is required. **Each Student group should prepare a table with the required measurements (parameters) or job tasks listed**; No make-up labs. Alternate lab periods only by **prior** arrangement with instructor for extraordinary circumstances if possible (Documentations of evidence should be submitted.).

# There will be unannounced quizzes given at the beginning of some labs to check students’ preparation levels. There’s no make-up quiz.

Grading is based on the satisfaction of the requirements. Any questions of the grading must be submitted in writing to your instructor no more than two days after the graded material is returned.

**See Lab Report Requirements for details.**

**Laboratory Projects:**

**Labs in TE110**

L1 Metrology. Micrometers, calipers, gage blocks, etc. Full Report required.

L2 Hardness Evaluation. Rockwell, Brinell hardness testers. Full Report required.

L3 Tensile Test for Stress Strain Studies. *lab memo*.

L4 Fatigue-MTS. 22 kips MTS machine. Full Report required.

L5 Material heat treatment and property measurement. Full Report required.

L6 Fatigue-MTS & Buckling. 22 kips MTS machine. *lab memo*.

L7 Fatigue-Rotating beam. Rotating beam tester. *lab memo*.

L8 Structural deflections. Lab truss and weights. *lab memo*.

**Labs in Nelson Hall 101**

M1 Shop safety, practices, orientation. Demo of mill, lathe, welding and other machines.

L9(M) Welding & Brazing. MIG welder, braze equipment, Test results required. (Report required)

L10(M) Turning, Lathe. Shop metal lathes. Part and measurements required. (Product + report required)

L11(M) Milling. Shop Bridgeport mill. Part and measurements required. (Product + report required)

Academic Honesty Statement

Students assume the responsibility to fulfill their academic obligations in a fair and honest manner. Students found responsible for inappropriate activities, such as plagiarism, cheating or collusion, will face the appropriate academic and disciplinary sanctions.

ADA Compliance Statement

MSU provides students with disabilities reasonable accommodation to participate in educational programs, meet course requirements should first register with the Office of Disability Services (Tel: 380-2825, TDD 711) and then contact their instructor as soon as possible.

**ME336 Laboratory Schedule (Tentative)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Lab Group** | | | | | | | | | | | |
|  |  | **1:00-3:00pm** | | | | **3:00-5:00pm** | | | |  |  |  |  |
| **Week #** | **Date (Day)** | **G1** | **G2** | **G3** | **G4** | **G5** | **G6** | **G7** | **G8** |  |  |  |  |
| 1 | **Jan 9** (T) | Lab Preparation, No lab meeting | | | | | | | | | | | |
| 10 (W) |
| 2 | 16 (T) |  | | | | | | | | | | | |
| 17 (W) | Introduction to ME 336 labs  Teams formed. All groups, meet from 1-4pm in room (TBD) | | | | | | | | | | | |
| 3 | 23 (T) |  |  |  |  |  |  |  |  |  |  |  |  |
| 24 (W) | L1 | L2 | L3 | L4 | L1 | L2 | L3 | L4 |  | L2 | L3 | L4 |
| 4 | 30(T) |  |  |  |  |  |  |  |  |  |  |  |  |
| 31 (W) | L2 | L3 | L4 | L1 | L2 | L3 | L4 | L1 |  | L3 | L4 | L1 |
| 5 | **Feb** |  |  |  |  |  |  |  |  |  |  |  |  |
| Feb 6(T) |  |  |  |  |  |  |  |  |  |  |  |  |
| 7(W) | L3 | L4 | L1 | L2 | L3 | L4 | L1 | L2 |  | L4 | L1 | L2 |
| 6 | 13(T) |  |  |  |  |  |  |  |  |  |  |  |  |
| 14(W) | L4 | L1 | L2 | L3 | L4 | L1 | L2 | L3 |  | L1 | L2 | L3 |
| 7 | 20 (T) |  |  |  |  |  |  |  |  |  |  | | |
| 21(W) | L5 | L6 | L7 | L8 | L5 | L6 | L7 | L8 |  |  |  |  |
| 8 | 27(T) |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 28 (W) | L6 | L7 | L8 | L5 | L6 | L7 | L8 | L5 |  |  |  |  |
| 9 | **Mar** 5(T) 1287(T) | Spring Break | | | | | | | | | | | |
| 6(W) |
| 10 | 12 (T) |  |  |  |  |  |  |  |  |  |  | | |
|  | 13(W) | L7 | L8 | L5 | L6 | L7 | L8 | L5 | L6 |  | L6 | L7 | L8 |
| 11 | 19(T) |  |  |  |  |  |  |  |  |  |  |  |  |
| 20(W) | L8 | L5 | L6 | L7 | L8 | L5 | L6 | L7 |  | L8 | L5 | L6 |
| Manufacturing Labs | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | |
|  | | **G1** | **G2** | **G3** | **G4** | **G5** | **G6** | **G7** | **G8** |  |  |  |  |
|  | | **1:00-3:00pm** | | | | **3:00-5:00pm** | | | |  |  |  |  |
| 12 | 26(T) | Manufacturing Shop Safety, Practices. 1-3 PM. **All Groups**, Nelson 101 | | | | | | | | | | | |
| 27(W) | L9(M) | L10(M) | L11(M) |  | L9(M) | L10(M) | L11(M) |  |  |  |  |  |
| 13 | **Apr** 2(T) |  |  |  |  |  |  |  |  |  |  |  |  |
| 3(W) |  | L9(M) | L10(M) | L11(M) |  | L9(M) | L10(M) | L11(M) | M4 | M5 | M6 |  |
| 14 | 9 (T) |  |  |  |  |  |  |  |  |  |  |  |  |
| 10(W) | L11(M) |  | L9(M) | L10(M) | L11(M) |  | L9(M) | L10(M) |  | M4 | M5 | M6 |
| 15 | 16(T) |  |  |  |  |  |  |  |  |  |  |  |  |
| 17(W) | L10(M) | L11(M) |  | L9(M) | L10(M) | L11(M) |  | L9(M) | M6 |  | M4 | M5 |
| 16 | 23(T) |  |  |  |  |  |  |  |  |  |  | | |
| 24(W) |  |  |  |  |  |  |  |  |  |  | | |