North Central State College

MASTER SYLLABUS	2025-2026

A. Academic Division: Engineering Technology, Business & Criminal Justice Division

B. Discipline: Mechanical Engineering Technology

C. Course Number and Title: MECT4050 Mechanical Design II

D. Assistant Dean: Brooke Miller, M.B.A.

E. Credit Hours: 3

F. Prerequisites: MECT2230, MECT3050

G. Last Course/Curriculum Revision Date: Fall 2025 Origin date: 09/26/2018

H. Textbook(s) Title:

Shigley's Mechanical Engineering Design

- McGraw Hill
- Keith Nisbett and Richard Budynas
- 2024
- Print: 9781266731716

I. Workbook(s) and/or Lab Manual:

J. Course Description: This course covers design and application of mechanical components and machine elements including shafts, gears, gear drives, belt drives, chain drives, fasteners, power screws, clutches, brakes and machine frames.

K. College-Wide Learning Outcomes:

College-Wide Learning Outcome	Assessments - - How it is met & When it is met
Communication – Written	
Communication – Speech	
Intercultural Knowledge and Competence	
Critical Thinking	
Information Literacy	
Quantitative Literacy	

North Central State College

SYLLABUS ADDENDUM

Academic Division:	Engineering Technology, Business & Criminal Justice Division	**Discipline:**	Mechanical Engineering Technology
Course Coordinator:	Brooke Miller		
Course Number:	MECT-4050	**Course Title:**	Mechanical Design-II
Semester / Session:	Fall 2025/ Session A	**Start / End Date:**	8/11/2025 thru 10/03/2025

Instructor Information

Name:	Hemanta Dulal	**Credentials:**	MS in Mechanical Engineering
Phone Number:	419-755-4702	**E-Mail Address:**	hdulal@ncstatecollege.edu
Office Location:	Kehoe Center Room 005	**Office Hours:**	By Appointment (MW 1:45-5:00PM)

I. Topical Timeline / Course Calendar (Subject to Change):

Weeks	Topics	Assignment	Due Date
1	Introduction	Quizz-1	
2	Engineering Materials and Properties	Quizz-2	
3	Stress, Strain and Deformation	Quiz-3	
4	Failure Theories/Midterm	Quiz-4,Quiz-5	
5	Shafts and Attachments	Quiz-6	
6	Rolling and Sliding Bearings	Quiz-7	
7	Gears, Belt Chain Drives	Quiz-8	
8	Review, Final		

II. Grading and Testing Guidelines:

Final Grade Calculation

Activity	Qty	Points	Percentage
Attendance			10%
Homework/Quizzes			40%
Mid-term			25%
Final			25%

III. Examination Policy:

1. The reasons for which a student will be excused from taking an examination _____
   a. Hospitalization (with documented verification)
   b. Death in the immediate family (with documented verification)
   c. Personal illness or illness in immediate family - (doctor's excuse required).
2. A student who misses an examination for any reason is responsible for loss of the points.
3. No makeup opportunity will be given for absences of unscheduled quizzes.

IV. Class Attendance and Homework Make-Up Policy:

Attendance Requirements: All students are required to attend all scheduled classes and examinations.
Each faculty member has the right to establish regulations regarding attendance that he/she considers necessary for successful study.
Students who do not attend classes may be administratively withdrawn from those classes. However,

failure to attend classes does not constitute withdrawal, and students are expected to process a formal withdrawal though the Student Records Office in Kee Hall.

V. Classroom Expectations:

As a NC State Student, be it it online or hybrid, your conduct in this course is subject to the NC State Student Code of Conduct.Links to an external site.

As a future professional in your field, **you will be expected to conduct yourself as a professional in this course in ALL work and communications** - be it assignments, discussion forums, Canvas Inbox, emails etc.

This includes but is not limited to:

- **Being respectful of classmates' opinions, work and comments**
  Good test = Is this something I would/should say to a co-worker in person?
- **Being respectful in communications with the instructor**
  Good test = Is this something I would/should say to my boss in the workplace?
- **Being respectful of diversity**
  Good test = Is this a comment/joke that is at some other groups, ethnicity, political etc. expense?
  Note: Offensive "jokes", slurs or hate speechLinks to an external site. will NOT be tolerated
- **Using Non-Profane, Appropriate Language**
  Good test = Is this language you would use in the workplace or in front of your grandmother?
- **Using proper. NON-"Text speak" Language to make Yourself Easily Understood**
  Good test = Could my older boss understand what I have written?

Failure to conduct yourself as a professional and meet standards above in this course will result in the following consequences in this course:

- **1st Instance** = Written warning from the instructor documenting issue
  (No points deductions)
- **2nd offense = Mandatory m**eeting with the instructor and or Department Chair or Division Dean
  (Related assignment/Participation subject to Point Deductions)
- **3rd offense:** College Disciplinary procedures filed with the NC State Judicial Committee as a violation of the Student Code of Conduct.
  (Course Grade subject to F)

Extreme or repeated unprofessional behavior will result in initiating college disciplinary procedures as outlined in the NC State Student Code of Conduct.Links to an external site. NCSC Disciplinary hearings can result in a variety of consequences, including and up to suspension or being expelled from the college.

L. Course Outcomes and Assessment Methods:

Upon successful completion of this course, the student shall:

Outcomes	Assessments – How it is met & When it is met
1. Demonstrate an ability to understand the functions and design requirements of several kinds of keys and flexible couplings and to recognize commercially available designs and apply them properly.	Problem based quizzes and exams.
2. Specify suitable seals for shafts and other types of machine elements and be able to describe several alternate methods of fastening machine elements to shafts.	Problem based quizzes and exams.
3. Develop a systematic approach to shaft design analysis, be able to perform calculations of the forces exerted on shafts by gears, belt sheaves, chain sprockets, and torque distribution.	Problem based quizzes and exams.
4. Apply the shaft design procedure to determine the required diameter of shafts at any section to resist the combination of torsional shear stress and bending stress.	Problem based quizzes and exams.
5. Identify the types of rolling bearings that are commercially available and analyze for selection as well as complete the basic design analysis required to ensure satisfactory operation.	Problem based quizzes and exams.
6. Demonstrate an ability to use appropriate tables and charts to determine and specify suitable sizes for power screws, and ball screw drives for a given application.	Problem based quizzes and exams.
7. Develop skills in designing and analyzing springs of the helical compression, helical tension, and torsional types.	Problem based quizzes and exams.
8. Analyze the performance of fasteners and select suitable types and sizes.	Problem based quizzes and exams.
9. Perform the design and analysis of plate-type, caliper disc, cone, drum shoe, and band, brakes, and clutches.	Problem based quizzes and exams.

ABET Outcomes:

- *Outcome a.* Application of principles of geometric dimensioning and tolerancing;
- *Outcome b.* Use of computer aided drafting and design software;
- *Outcome e.* Manufacturing processes;
- *Outcome f.* Material science and selection.
- *Outcome g.* Solid mechanics (such as statics, dynamics, strength of materials, etc.);
- *Outcome h.* Mechanical system design;
- *Outcome j.* Electrical circuits (ac and dc) and electronic controls;
- *Outcome k.* Application of industry codes, specifications and standards.

M. Recommended Grading Scale:

NUMERIC	GRADE	POINTS	DEFINITION
93–100	A	4.00	Superior
90–92	A-	3.67	Superior
87–89	B+	3.33	Above Average
83–86	B	3.00	Above Average
80–82	B-	2.67	Above Average
77–79	C+	2.33	Average
73–76	C	2.00	Average
70-72	C-	1.67	Below Average
67–69	D+	1.33	Below Average
63-66	D	1.00	Below Average
60-62	D-	0.67	Poor
00--59	F	0.00	Failure

N. College Procedures/Policies:

North Central State College believes that every student is a valued and equal member of the community.* Every student brings different experiences to the College, and all are important in enriching academic life and developing greater understanding and appreciation of one another. Therefore, NC State College creates an inclusive culture in which students feel comfortable sharing their experiences. Discrimination and prejudice have no place on the campus, and the College takes any complaint in this regard seriously. Students encountering aspects of the instruction that result in barriers to their sense of being included and respected should contact the instructor, assistant dean, or dean without fear of reprisal.

* *Inclusive of race, color, religion, gender, gender identity or expression, national origin (ancestry), military status (past, present or future), disability, age (40 years or older), status as a parent during pregnancy and immediately after the birth of a child, status as a parent of a young child, status as a foster parent, genetic information, or sexual orientation*

Important information regarding College Procedures and Policies can be found on the syllabus supplement located at https://ncstatecollege.edu/documents/President/PoliciesProcedures/PolicyManual/Final%20PDFs/14-081b.pdf