

DEPARTMENT OF MECHANICAL ENGINEERING
SUNY KOREA

Introduction to Machine Design

Course Title: MEC 310 Introduction to Machine Design, Fall 2021 (3 credits)

Instructor: Prof. Changwoon Han, email: changwoon.han@sunykorea.ac.kr

Lecture: Tue/Thr 10:30-11:50 in BXXX or on-line

Office: B604, Phone: (032) 626-1817

Office Hours: Tue/Thr 13:30-15:00, or other time by appointment

Course Description: Application of graphical and analytical methods to the analysis and synthesis of mechanism. Covers concepts of degrees of freedom, graphical and analytical linkage synthesis, position, velocity, acceleration, and force analysis of linkage mechanisms. Introduces principles behind the operation of various machine elements such as gears and gear trains, cams, flywheels, and their design, and analysis techniques.

The prerequisites for the present course are MEC 102 (Engineering Computing and Problem Solving II) and Engineering Dynamics (MEC 262). MEC 203 (Engineering Graphics and CAD) is a co-requisite. The kinematic and dynamic analyses (velocity, acceleration, and force analyses) of machinery are essentially applications of the fundamentals presented in MEC 262. The results of these analysis, i.e., forces acting on each machine component, are important for a following course, Mechanical Design (MEC 410), in which the students will learn how to size or design machine components to prevent mechanical failure.

Course Main Topics:

1. Kinematics Fundamentals
2. Graphical Linkage Synthesis
3. Position analysis
4. Velocity and acceleration analysis
5. Analytical linkage synthesis
5. Cam Design
6. Gear and Gear Trains
7. Static and Dynamic Force Analysis of Mechanism
8. Balancing

Textbook:

- Robert L. Norton, “**Kinematics and Dynamics of Machinery**,” 2nd Edition in SI Units, McGraw Hill Education, 2013
ISBN: 9780071317092(0071317090)

- Assignments & Deadlines:**
- Homework will be assigned frequently in the class.
 - You should **hand-write** your solutions to homework on A4 sized papers.
 - Homework due date is 1 week unless otherwise stated.
 - Homework must be handed in at the beginning of the class on the specified due date unless otherwise stated.
 - Do not forget to write your name and ID on the top of the first page.
 - In case of on-line class, homework should be scanned on a PDF file will be e-mailed to instructor before the beginning of the class on the specified due date.
 - The title of PDF file should be “MEC316_HW##_Yourname.pdf”
 - Late homework will **not be accepted**.

Examinations: Two Midterm Exams in class
One Final Exam as scheduled

- Quizzes may be given often.
- All exams are scheduled in class (Final exam follow the schedule)
- No make-up exams unless in extreme scenarios with Doctor’s notes or police reports.

Grading: Semester letter grade is based upon your performance in the following categories.

1 st Midterm exam	20%
2 nd Midterm exam	20%
Final exam	20%
Design Projects	20%
Quizzes & Homework	10%
Attendance	10%

Grading Scale: It follows:

A: [100 - 92], A-: (92 - 88], B+: (88 - 84], B: (84 - 80],
B-: (80 - 76], C+: (76 - 72], C: (72 - 68], C-: (68 - 64],
D: (64 - 60], F: (60 or below)

- It is important to note that in addition to the above grading scale, for you to earn a passing grade in this class, you will also have to earn a passing grade (60/100 percentile) in all design projects.
- The reports are graded using rubrics that will be made available to you in class. Failure to comply with this requirement of design reports will result in a letter grade of “F” regardless how well you have done in all other categories.

Calculator: Only NCEES Allowed Calculators will be permitted to be used on all quizzes, midterm, and final exams. Please see the [Calculator Policy on Stony Brook](#) and [NCEES websites](#).

TA: TBD

Blackboard: It is required that you use the Blackboard for this course (<https://blackboard.stonybrook.edu/>). Blackboard is used for facilitation of communications between faculty and students, submission of assignments, posting of the course materials, important announcements, and grades.

Course Learning Objectives & Assessment Tools

Course Learning Objectives	Assessment Tools
1. Know how to determine the mobility of a mechanism	Exam questions
2. Know how to synthesize a linkage by using graphical methods	Exam questions
3. Know how to analyze the movement of a linkage using loop closure equations	Exam questions
4. Know how to analyze the velocity and acceleration of a linkage using vector equations	Exam questions
5. Know how to design a cam profile from a given displacement curve graphically	Exam questions
6. Know how to analyze a compound gear train	Exam questions
7. Know how to analyze an epicyclic gear train	Exam questions
8. Know how to formulate and solve a mechanism design problem	Rubrics of evaluation on design report

Class Guidelines for Fall 2021 in COVID-19 situation

- (1) Masks should be worn at all times while on campus. Students who do not wear masks should leave the classroom immediately.**
- (2) After entering the room, make sure to have as much distance as possible between individuals. If seat movement or temperature check is required, please cooperate.**
- (3) Students should use only designated seats in order to maintain the distance between individuals.**
- (4) The distance between students should be maintained during group discussions and intermission.**
- (5) Students who have fever or respiratory symptoms (coughs, difficulty breathing, etc.) during the class should immediately notify the instructor of the incident and move to the designated classroom for COVID-19.**

SUNY Korea Attendance Policy

- (1) All SUNY Korea students are required to attend every class.
- (2) Unexcused absences will significantly affect seriously the student's final course grade.
- (3) Students who are absent without a valid excuse (see below) from more than 20% of scheduled class meetings will receive a grade of "F" for the course as follows:
 - i) For 150-minute classes meeting once a week, the 4th unexcused absence
 - ii) For 75-minute classes meeting twice a week, the 7th unexcused absence**
 - iii) For 50-minute classes meeting three times a week, the 10th unexcused absence
 - iv) For Intensive English (IEC) Courses, students who miss more than 40 hours during a semester will receive a grade of "F" for the course.
- (4) Students should report the reason for absences to the instructor in advance, or immediately after the absence.
- (5) Absences may be classified as "excused" at the instructor's discretion.
- (6) For an absence to be "excused," the student must provide the instructor with acceptable documentation for the reason for the absence.
- (7) The course instructor may excuse the absence if the submitted documentation fulfills the conditions below:
 - i) Extreme emergencies (e.g., death in the family)
 - ii) Major medical reasons with doctor's note (not minor ailments)
 - iii) Very important events (e.g., national conferences, official school events)
- (8) At the end of semester, the course instructor will submit the class attendance record to the Academic Affairs Office.
- (9) If a student experiences fever(37.5°C or higher) or respiratory symptoms (such as coughing, difficulty breathing, etc.), he or she should not come to school and notify the instructor of the fact via email. If the instructor is not reachable, please contact the Academic Affairs or the Department Coordinator.**
- (10) For students who have left the class due to suspected symptoms or who are unable to attend the class due to the COVID-19 symptoms, they should not get any disadvantage in attendance score due to the absence of the class.**

Disability Support Services (DSS) Statement:

If you have a physical, psychological, medical or learning disability that may impact your course work, please contact One-Stop Service Center, Academic Building A201, (82) 32-626-1117. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential.

In addition, this statement on emergency evacuation is often included, but not required: Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and One-Stop Service Center.

Academic Integrity Statement:

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty are required to report any suspected instances of academic dishonesty to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the [academic judiciary website](#).

Critical Incident Management Statement:

The State University of New York, Korea expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn.

Subject to Change Notice

All material, assignments, and deadlines are subject to change with prior notice. It is your responsibility to stay in touch with your instructor, review the course site regularly, or communicate with other students, to adjust as needed if assignments or due dates change.

Syllabus Disclaimer

The instructor views the course syllabus as an educational understanding between the instructor and students. Every effort will be made to avoid changing the course schedule but the possibility exists that unforeseen events will make syllabus changes necessary. The instructor reserves the right to make changes to the syllabus as deemed necessary. Students will be notified in a timely manner of any syllabus changes via email or in the course site Announcements. Please remember to check your email and the course site Announcements often.