DEPARTMENT OF MECHANICAL ENGINEERING

SUNY KOREA

MEC 101: Freshman Design Innovation

Course Title: MEC 101 Freshman Design Innovation, Spring 2022 (3 credits)

Instructor: Prof. Y. Eugene Pak
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Guest Lecturer on Arduino
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Lecture: Tue./Thur. 12:30~1:50 PM

- Class will meet in person (A312) and all students should come to class
- In case of classes going online, lectures will be broadcasted via Zoom
  Prof. Y. Eugene Pak's Personal Meeting Room
  https://stonybrook.zoom.us/j/8054297300?pwd=Uit6Sk9Tck83ZHRwelFoL0krb0g4UT09
  Meeting ID: 805 429 7300
  Passcode: 655705

Office Hours: Tue./Thur. 3:30 ~ 5:00 PM (or by appointment)

Course Description: This course presents an overview of mechanical engineering profession, engineering ethics, basics of computation via correct usage of dimensions, units, and significant digits, and engineering documentation. Furthermore, this course introduces the students to the process of engineering design and provides a project-based design experience wherein the students design, build, and program a micro-controller driven autonomous mechatronic device, Arduino. In doing so, they are provided an early exposure to the systematic approach to engineering problem solving that brings together fundamental concepts of force, motion, energy, materials, manufacturing processes, and machines & mechanisms as well as basic electronics, sensing & actuation, and computer programming.

Course Main Topics:

1. Mechanical Engineering Profession
2. Mechanical Design
3. Technical Problem-Solving: Units, Conversions, and Significant Digits
4. Forces in Structures and Machines
5. Materials and Stresses
6. Mechanical Energy, Work, and Power
7. Heating Value, Specific Heat, Heat Conduction, and Thermal Efficiency
8. Basic Electronics, Sensing, and Actuation
9. Microcontroller Programming Using Arduino

Textbook:

- Jonathan Wickert and Kemper Lewis, "**An Introduction to Mechanical Engineering**," SI Edition, 4th Edition, Cengage Learning, 2016 (ISBN10: 1-305-63575-2, ISBN13: 978-1-305-63575-3)
- Jeremy Blum, "**Exploring Arduino: Tools and Techniques for Engineering Wizardry**," John Wiley & Sons, 2013 (ISBN: 978-1-118-54936-0)

MEC101 Mechatronics Kit:

Each student needs to have a mechatronics kit to do homework assignments, in-class exercises, and term project for the course. A list of contents of the kit will be available on the course website. More information about providing the kit will be announced (Cost: approximately 80,000 KRW).

Assignments & Deadlines:

- Homework assignments will be assigned on the Blackboard.
- Homework must be handed in by the due date and time by uploading it on the Blackboard. The graded homework will also be returned on the Blackboard.
- Homework should be done on A4 sized papers and scanned neatly.
- Do not forget to write your name and ID on the top of the first page.
- You can either hand-write your homework solutions or type them.
- Late homework will not be accepted.

Exams:

Midterm Exam No. 1 (in class)
Midterm Exam No. 2 (in class)
Final Exam (in class)
- Date: June 14 (Tue.), 12:30~3:00 PM
- No make-up exams unless in extreme scenarios with doctor's note or police report

Term Project: Using Arduino kit
- Presentation (in class, open to public)
- Date: June 2 (Thur.), 12:30~1:50 PM
- Evaluation based on idea/difficulty, execution and presentation

Grading:

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

1st Midterm Exam	15%
2nd Midterm Exam	15%
Final Exam	20%
Homework	10%
Arduino Projects	40%

(Arduino homework, project proposal, and final project)

Grading Scale Guideline:
(Your final grade may depend on the overall performance of the class)

90 ≤ A < 100	70 ≤ C+ < 74
86 ≤ A- < 90	65 ≤ C < 70
82 ≤ B+ < 86	60 ≤ C- < 65
78 ≤ B < 82	55 ≤ D+ < 60
74 ≤ B- < 78	50 ≤ D < 55

Course Website: Supplementary materials will be posted on the Blackboard https://blackboard.stonybrook.edu/

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.

Course Learning Objectives & Assessment Tools

Course Learning Objectives	Assessment Tools
Articulate an overview of the Mechanical Engineering profession, the design process, and the ethics in Engineering	Homework and Exams
Demonstrate proper use of dimensions, units, conversion, and estimation in engineering calculation	Homework and Exams
Draw free body diagram, analyze static equilibrium	Homework and Exams
Calculate Stress, Strain, and failure for mechanical components loaded in tension, compression or shear, and fundamental material properties for material selection	Homework and Exams
Calculate mechanical energy, work, and power	Homework and Exams
Calculate heating value, specific heat, heat conduction, and thermal efficiency	Homework and Exams
Analyze and draw basic electronic circuits	Homework, Exams and Project
Demonstrate Microcontroller programming	Arduino Project
Work in a team-based project to design and fabricate an autonomous, microcontroller driven machine	Arduino Project

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.

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.

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.