

ME496WI – Mechanical Design Synthesis II (3 credit hours)
Spring 2021 Syllabus

Instructor: Dr. Katherine H. Bloemker, Department of Civil & Mechanical Engineering

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Office Hours (FH 370B or via Zoom): M/W 8:30-10:30, F 8:30-10:00

*Link to join Zoom Office Hours: <https://umsystem.zoom.us/j/7156986770>

*e-mail for appointment times outside of scheduled office hours

COURSE DESCRIPTION:

Modern design theories and methodologies, with emphasis on the initial stages of the design process. Effect of design choices on the earth and living systems. Principles of embodiment design and the life-cycle considerations. A comprehensive group design project is required. The course satisfies the Writing Intensive requirement. Classroom Based, Lecture Required. Prerequisites: ME130, ME356, ANCH309 or ME492. NOTE: Students should be graduating seniors during the semester they are enrolled in this course (otherwise enrollment must be approved by the Undergraduate Academic Committee)

LECTURE: T/Th 8:30-9:45, MNLC room 151

Lecture attendance is required for this course. It is your responsibility to notify me if you will be missing lecture for any reason. Cell phones should be silenced and put away during class.

ATTENDANCE/PARTICIPATION/PROGRESS CHECKS:

Lecture attendance and participation is required for this course. Each student is allowed two lecture absences for the semester. There will be periodic discussion board postings, group meetings, and in-class participation required throughout the semester. Students should plan to attend all lectures and be prepared for team meetings and project updates.

HOMEWORK/DESIGN JOURNALS:

There will be a number of homework assignments throughout the semester including proposals, research assignments, concept generation assignments, and design journals. A design journal should be kept by each member of the team. Plan to keep this journal with you at all times so that if you ever get any ideas you can immediately write them down in the journal. The journal should be comprised of all your ideas pertaining to your projects. This includes: brainstorming, drawings, calculations, written entries, etc. Feel free to have fun with these journals – use color, put in pictures, whatever you want.

GROUP PROJECT:

There will be no exams in this course. The main aspect of the course is the group design project. You will work in student teams on an industry or research sponsored design project. Each group will be required to complete a final design report and a final presentation by the end of the semester. There will be a preliminary design review presentation where the team should present what has

been accomplished to date on the project and their long-term project plan. There will be an interim design review presentation where the team should present what has been accomplished to date on the project. All presentations will be given by the entire team, but each member should present on their own roles/tasks. In addition, each team will be required to turn in a rough draft for the group project report. These will be marked-up and returned to you before the final report is due.

GRADE BREAKDOWN:

Attendance, Participation, Progress Checks, etc. = 25%

Homework, Design Journals, etc. = 25%

Group Project = 50%

GRADE SCALE:

100-93 **A**, 92-90 **A-**

89-87 **B+**, 86-83 **B**, 82-80 **B-**

79-77 **C+**, 76-73 **C**, 72-70 **C-**

69-67 **D+**, 66-63 **D**, 62-60 **D-**, 59 & below **F**

REQUIRED BOOK:

**Engineering Design, 5th Edition.* George E. Dieter and Linda C. Schmidt.

ISBN-13 978-0-07-339814-3; MHID 0-07-339814-4

The book for this class can be purchased at the UMKC bookstore.

**Student Learning
Outcomes:**

As a result of taking this course, you will be proficient in mechanical engineering design concepts, including:

- Engineering Design Process
- Problem Definition and Need Identification
- Team Behavior and Tools
- Information Gathering
- Concept Generation
- Decision Making and Concept Selection
- Embodiment Design
- Detail Design
- Design for Manufacturing
- Risk, Reliability, and Safety
- Legal and Ethical Issues in Engineering Design
- Engineering Economics

ABET OUTCOMES:

Outcome	Definition	Student Activity
2	an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	Design Project Report & Presentation
3	an ability to communicate effectively with a range of audiences	Design Project Report & Presentation
4	an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgements, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	Professional and Ethical Guest Lecture Ethics Homework Assignment Design Project Budget In-class Activity on Environmental Issues
5	an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	Design Project & Team Evaluations
7	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies	Patent Research Homework Concept Map Homework Design Project Research & Benchmarking

SCHEDULE (subject to change):Week #1 (Jan. 19 & 21)

Class: Introduction and Present & Rank Projects
Group Design Project handed out

Week #2 (Jan. 26 & 28)

M, T, W, & Th Class: *Intro Zoom Meeting with Project Sponsors* (30 mins each: 8:30-10:00)

Week #3 (Feb. 2 & 4)

Class: Conceptual Design Review

Project Proposal Homework Due (Feb. 4)

Week #4 (Feb. 9 & 11)

Class: Conceptual Design Review

Benchmarking Homework Due (Feb. 11)

Week #5 (Feb. 16 & 18)

Class: Preliminary Group Project Presentations

Codes and Standards Homework Due (Feb. 18)

Week #6 (Feb. 23 & 25)

Class: Preliminary Group Project Presentations

Patent Search Homework Due (Feb 25)

Week #7 (Mar. 2 & 4)

Class: Embodiment Design Review

Concept Map Homework Due (Mar. 4)

Week #8 (Mar. 9 & 11)

Class: Embodiment Design Review, Engineering Economics

Week #9 (Mar. 16 & 18)

Class: Group Project Interim Design Review Presentations to Project Engineers

Week #10 (Mar. 23 & 25)

Class: Group Project Interim Design Review Presentations to Project Engineers

Engineering Economics Homework Due (Apr. 25)

SPRING BREAK WEEK – No Classes week of March 29th

Week #11 (Apr. 6 & 8)

Class: Engineering Ethics (Robynn Andracsek), Detail Design Review

Ethics Homework handed out

Week #12 (Apr. 13 & 15)

Class: *Zoom Group Project Progress Checks*

Ethics Homework Due (Apr. 15)

Week #13 (Apr. 20 & 22)

Class: Detail Design Review, Environmental Topics

Group Project Rough Draft Reports due for revisions (Apr. 22)

Week #14 (Apr. 27 & 29)

Class: *Zoom Group Project Progress Checks – Return Rough Drafts*

Week #15 (May 4 & 6)

Class: No Class – Group Work, *Design Journals Due, Course & Team Member Evaluations*

Finals Week (May 10-14) – Date and time TBD

Final Group Project Presentations, **Final Group Project Reports Due**

ADDITIONAL RESOURCES:

UMKC POLICY AND LINK TO RESOURCES:

<https://confluence.umkc.edu/pages/viewpage.action?pageId=55247899>

Learner Support

Students can get technical support from Instructional Technology Services either by calling 816-235-6700, emailing its@umkc.edu or by using the chat tool. Support is available from 7am-10pm, M-Th and 7am-6pm, M-F. Live chat is available on Sunday night from 6-10pm.

Course Time Commitment

Courses, both in person and on-line, can be varied in their design and expectations for student involvement and time. If this course were taught face-to-face during the 16-week session, one would expect to be in class (engaged in lecture and discussion) for approximately 3 hours/week and spend additional time outside of class in preparation for active course engagement and course assessment (reading, completing assignments). So, you should be prepared to spend similar amounts of time engaged in this course in an on-line format. Compared to traditional face-to-face learning environments, you should anticipate that in this course you will experience less time in passive learning activities (i.e., lecture) and more time engaged in active learning activities and communication with your peers and me (via blog and discussion board postings).

Expectations of Faculty in this Course

I will aim to respond to all email and voicemail questions within 48 hours. Assignments and projects in general will have a two-week grading turn-around timeframe.

COVID Resources

- Link to the UMKC COVID website for up-to-date information and FAQs: <https://www.umkc.edu/news/coronavirus.html>
- Contact information for Student Disability Services, should any student want to seek COVID-related academic accommodations: Scott Laurent: (816) 235-5696 or via email at laurentr@umkc.edu.
- Any student requesting an ADA accommodation for the University mask/face covering policy should contact Scott Laurent at laurentr@umkc.edu in Student Disabilities Services.”

Resources & University Policies

Please note that this is not a comprehensive policy listing. Students should become familiar with all policies included in the UMKC Catalog (<http://catalog.umkc.edu>).

Academic Calendar: Students are encouraged to review important add, drop or withdraw dates: <http://www.umkc.edu/registrar/acal.asp>

Academic Integrity

The Board of Curators of the University of Missouri recognizes that academic honesty is essential for the intellectual life of the University. Faculty members have a special obligation to expect high standards of academic honesty in all student work. Students have a special obligation to adhere to

such standards. Academic dishonesty, including cheating, plagiarism or sabotage, is adjudicated through the [University of Missouri Student Conduct Code](#) and [Rules of Procedures in Student Conduct Matters](#).

Academic Inquiry, Course Discussion and Privacy: (Choose one of the following to include in the syllabus—Faculty allowing recording or Faculty not allowing recording.)

Faculty allowing recording - University of Missouri System Executive Order No. 38 lays out principles regarding the sanctity of classroom discussions at the university. The policy is described fully in [Section 200.015 of the Collected Rules and Regulations](#). In this class, students may make audio or video recordings of course activity unless specifically prohibited by the faculty member. However, the redistribution of any audio or video recordings of statements or comments from the course to individuals who are not students in the course is prohibited without the express permission of the faculty member and of any students who are recorded, including those recordings prepared by an instructor. Students found to have violated this policy are subject to discipline in accordance with provisions of Section 200.020 of the Collected Rules and Regulations of the University of Missouri pertaining to student conduct matters.

Attendance Policy: Students are expected to attend and participate in classes. In order to comply with federal regulations associated with eligibility rules for federal financial aid, students not attending a course during the first three weeks of the term will be administratively dropped from the specific course. Advance notice of attendance policies of academic units and individual instructors should be given, and such notice should be in writing. Students should notify instructors of excused absences in advance, where possible. Students who have an excused absence are expected to make arrangements with instructors for alternative or make-up work. Such arrangements should be made in advance of the absence, where possible. Instructors should accommodate excused absences to the extent that an accommodation can be made that does not unreasonably interfere with the learning objectives of the course or unduly burden the instructor. Attendance policies shall be applied in a non-discriminatory manner. Enrollment as a student is required to attend any class unless otherwise pre-approved by the instructor. Instructors are responsible for verifying the class roster in Pathway throughout the term. <https://catalog.umkc.edu/undergraduate-academic-regulations-information/attendance-policy/>

Campus Safety: Inclement weather, mass notification, and emergency response guide: <http://www.umkc.edu/umkcalert/>

Counseling Services and Student Health & Wellness

UMKC students may experience many challenges in their lives while attending college – stress, depression, suicidality, trauma, relationship issues, health concerns, etc. As your professor, I care about your success and well-being, and want to make you aware of some helpful resources on campus. UMKC Counseling Services (<https://info.umkc.edu/counseling-services/>), located at Brookside 51 Building, 5110 Oak Street, Suite 201, offers a wide range of supportive services to students. Appointments can be made by calling 816-235-1635. UMKC Student Health and Wellness (<http://info.umkc.edu/studenthealth/>), located at Brookside 51 Building, 5110 Oak Street, Suite 237, offers a full range of health care and promotion services. Appointments can be scheduled online or by calling 816-235-6133. The MindBody Connection (www.umkc.edu/mindbody) is located in the Student Union, room 413 and offers a variety of stress-reduction services.

Students are encouraged to review **UMKC's Policy on Suicide Prevention Resources** (<https://info.umkc.edu/saem/wp-content/uploads/2019/10/UMKC-Suicide-Prevention-Policy.pdf>), which provides resources, referral information, and training opportunities to help recognize signs of distress in yourself and your peers as well as how to make appropriate referrals for support and assistance.

UMKC Student HelpLine: students may contact the UMKC Student HelpLine (816-235-2222 or <https://info.umkc.edu/saem/helpline/>) with any questions or concerns. Students may also utilize the Complaint Policy (<https://info.umkc.edu/saem/helpline/student-complaint-policy/>) to file a complaint online.

Disability Services: To obtain disability related accommodations and/or auxiliary aids, students with disabilities must contact the Office of Disability Services as soon as possible by calling 816-235-5612. Once verified, our office will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. For more information go to: <https://info.umkc.edu/disability-services/>.

English Proficiency Statement: Students who encounter difficulty in their courses because of the English proficiency of their instructors should speak directly with their instructors. If additional assistance is needed, students may contact the UMKC Help Line at 816-235-2222 for assistance.

Grade Appeal Policy: Students are responsible for meeting the standards of academic performance established for each course in which they are enrolled. The establishment of the criteria for grades and the evaluation of student academic performance are the responsibilities of the instructor.

The [University grade appeal procedure](#) is available only for the review of allegedly capricious grading and not for review of the instructor's evaluation of the student's academic performance. Capricious grading, as that term is used here, comprises any of the following:

- The assignment of a grade to a particular student on some basis other than the performance in the course;
- The assignment of a grade to a particular student according to more exacting or demanding standards than were applied to other students in the course; (Note: Additional or different grading criteria may be applied to graduate students enrolled for graduate credit in 300- and 400-level courses.)
- The assignment of a grade by a substantial departure from the instructor's previously announced standards.

Discrimination Grievance Procedures for Students: Discrimination Grievance Procedures for Students can be found here:

https://www.umsystem.edu/ums/rules/collected_rules/equal_employment_educational_opportunity/ch600/600.070_policy_related_to_students_with_disabilities

Privacy and Accessibility Policies can be found here: <https://www.umkc.edu/web-policy/privacy.asp>

Statement of Equal Opportunity: The UM System Board of Curators and UMKC are committed to providing equal opportunities to all students without unlawful discrimination on the basis of their race, color, national origin, ancestry, religion, sex, pregnancy, sexual orientation, gender identity, gender expression, age, disability, protected veteran status, or any other status protected by

applicable state or federal law. Compliance with [Chapter 600.010](#) of the UM System Collected Rules and Regulations is monitored by the [Office of Affirmative Action](#), but it is the responsibility of the entire university community to provide equal opportunity through relevant practices, initiatives, and programs. If you or someone you know has experienced discrimination or harassment based on their protected identity, you can make a report using UMKC's online complaint form: <https://info.umkc.edu/title9/affirmative-action-discrimination-report/>.

Title IX & Sexual Misconduct: UM System Collected Rules and Regulations [Chapter 600.020](#) prohibits all students, employees, volunteers, and visitors at UMKC from engaging in sexual misconduct, sexual harassment, stalking on the basis of sex, dating/intimate partner violence, and sexual exploitation. If you or someone you know has experienced sexual misconduct, you can access the Roos Respond Resource Guide by visiting <http://info.umkc.edu/title9/> or by contacting UMKC's Title IX Coordinator, Dr. Sybil Wyatt, at 816-235-6910 or wyatts@umkc.edu. Additionally, you can make a report of sexual misconduct using UMKC's online complaint form: <https://info.umkc.edu/title9/reporting/report-online/>.

Nearly all UMKC employees, including your course instructors, are required to report any known or suspected sexual misconduct to the Office of Affirmative Action and cannot offer confidentiality in regard to any disclosures of sexual misconduct. However, students may seek confidential guidance from these resources:

- [Violence Prevention & Response](#): 108 Haag Hall; 816-235-1652/5560
- [Counseling Services](#): Brookside 51, 5110 Oak Street, Suite 201; 816-235-1635
- [Student Health & Wellness](#): Brookside 51, 5110 Oak Street, Suite 237; 816-235-6133

UMKC Connect: Important information is available to undergraduate students in UMKC Connect accessed through Canvas. Throughout the term, students may receive emails regarding course grades or academic performance. Students are expected to address information posted in a timely fashion. This information may be shared with the student's Success Network made up his or her academic advisor(s) and other campus resources so that UMKC may fully support the student's success.

Technology Requirements

The following are minimum recommended specifications in order to run the required software (Laptop requirements as provided in the undergraduate handbook):

- Intel i5 or i7 processor
- 8GB RAM
- Solid State Drive
- Dedicated graphics
- 1920x1080 display (recommended)