IE 6405: Integrated Product Development
– 3 Credits
Course Syllabus - Fall 2019

Instructor: Dr. Kyoung-Yun "Joseph" Kim
Email & Phone: kkykim@eng.wayne.edu, 313-577-4396
Time & Location: 129 Main, Tuesday 5:30 PM to 7:10 PM and Thursday 5:30 PM to 7:10 PM
Office Location: 4815 Fourth St
Rm 2067 (Manufacturing Engineering Building)
Office Hours: Tuesday 1:00 PM to 2:00 PM or by appointment
Teaching Assistant:
Prerequisites:

Course Description:
The aim of this course is to familiarize students with the current principles and philosophies of product development and realization. Modern industries cannot cope with the traditional over-the-wall method of product development. The goal is to achieve a more integrated and seamless development environment. This course will educate students about the importance of concurrent and collaborative engineering in a global economy and how to realize a true collaborative design environment. Students will learn how to operate effectively in a highly integrated, multidisciplinary environment.

Topics covered in the course will span product specification and conceptual design through detailed and domain specific design, including manufacturing process development. By covering such topics, students will learn the principles of system and quality engineering and value of capturing product information and implications explicitly. In addition, cutting-edge technologies and tools will be introduced to students to give them hands-on experience with a true collaborative engineering and design environment that supports product development processes including conceptual design, customer-oriented product design, multidisciplinary design, design for X, product architecture, virtual prototyping and simulation, design decision making, and intellectual property and patent related issues.

Upon completion of the course, students are expected to use the product development standard process and procedures to set final specifications based on customer needs. They will be able to generate detailed CAD drawings for all components and sub-assemblies comprising a product, showing all key dimensions, tolerances, other critical details, such that the detailed product design conforms to standard criteria for high-quality industrial designs for manufacturing and assembly as well as a production launch plan with complete documentation for each production process.

Course Learning Outcomes:
Upon completion of the course, students will be able to:
- Describe the systematic concept development process
- Determine customer needs by using the Quality Function Deployment process
- Identify product features through gathering product information and decomposing product.
- Construct product benchmarking study
- Establish target specification to satisfy customer needs
- Generate concepts to address the customer needs
- Select the most promising concepts for further consideration
- Test the concepts and set the final specifications
- Define product architecture
- Outline a product launch plan

Textbooks:
2. Class handout
Other Materials and Resources:


Grading:

- Term Projects: 30%
- Homework, quiz, and class participation: 30%
- Mid-term and final Exams: 40%

Homework Policy:

- Individual projects, exams, and homework might be curved.
- Project reports and special assignment reports have to be typed.
- Homework late by one class will be evaluated at 90% and more than one class at 70%.

Exams:

- All exams will be closed book and notes.

Projects:

- See the term project guideline shown below.

Attendance Policy:

- Reading assignments are given for each class session. You are expected to come to class prepared to discuss the readings and the suggested questions. Your individual class participation grade will be based upon your in-class remarks during discussions.

Wayne State University Policies and Procedures

Religious Holidays:

- Because of the extraordinary variety of religious affiliations of the University student body and staff, the Academic Calendar makes no provisions for religious holidays. However, it is University policy to respect the faith and religious obligations of the individual. Students with classes or examinations that conflict with their religious observances are expected to notify their instructors well in advance so that mutually agreeable alternatives may be worked out.

Student Services:

- The Academic Success Center (1600 Undergraduate Library) assists students with content in select courses and in strengthening study skills. Visit http://success.wayne.edu for schedules and information on study skills workshops, tutoring and supplemental instruction (primarily in 1000 and 2000 level courses).
- The Writing Center is located on the 2nd floor of the Undergraduate Library and provides individual tutoring consultations free of charge. Visit http://clasweb.clas.wayne.edu/writing to obtain information on tutors, appointments, and the type of help they can provide.

Class Recordings:

- Students need prior written permission from the instructor before recording any portion of this class. If permission is granted, the audio and/or video recording is to be used only for the student’s personal instructional use. Such recordings are not intended for a wider public audience, such as postings to the internet or sharing with others. Students registered with Student Disabilities Services (SDS) who wish to record class materials must present their specific accommodation to the instructor, who will subsequently comply with the request unless there is some specific reason why s/he cannot, such as discussion of confidential or protected information.

Academic Dishonesty – Plagiarism and Cheating:

- Academic dishonesty means any activity that tends to compromise the academic integrity of the institution or subvert the education process. All forms of academic misbehavior are prohibited at Wayne State University, as outlined in the Student Code of Conduct (http://www.doso.wayne.edu/student-conduct-services.html). Students who commit or assist in committing dishonest acts are subject to downgrading (to a failing grade for the test, paper, or other course-related activity in question, or for the entire course) and/or additional sanctions as described in the Student Code of Conduct.
  - Cheating: Intentionally using or attempting to use, or intentionally providing or attempting to provide, unauthorized materials, information or assistance in any academic exercise. Examples include: (a) copying from another student’s test paper; (b) allowing another student to copy from a test paper; (c) using unauthorized material such as a “cheat sheet” during an exam.
Fabrication: Intentional and unauthorized falsification of any information or citation. Examples include: (a) citation of information not taken from the source indicated; (b) listing sources in a bibliography not used in a research paper.

Plagiarism: To take and use another’s words or ideas as one’s own. Examples include: (a) failure to use appropriate referencing when using the words or ideas of other persons; (b) altering the language, paraphrasing, omitting, rearranging, or forming new combinations of words in an attempt to make the thoughts of another appear as your own.

Other forms of academic misbehavior include, but are not limited to: (a) unauthorized use of resources, or any attempt to limit another student’s access to educational resources, or any attempt to alter equipment so as to lead to an incorrect answer for subsequent users; (b) enlisting the assistance of a substitute in the taking of examinations; (c) violating course rules as defined in the course syllabus or other written information provided to the student; (d) selling, buying or stealing all or part of an un-administered test or answers to the test; (e) changing or altering a grade on a test or other academic grade records.

Student Disability Services:
If you have a documented disability that requires accommodations, you will need to register with Student Disability Services for coordination of your academic accommodations. The Student Disability Services (SDS) office is located at 1600 David Adamany Undergraduate Library in the Student Academic Success Services department. SDS telephone number is 313-577-1851 or 313-577-3365 (TTD only).

Once you have your accommodations in place, I will be glad to meet with you privately during my office hours or at another agreed upon time to discuss your needs. Student Disability Services’ mission is to assist the university in creating an accessible community where students with disabilities have an equal opportunity to fully participate in their educational experience at Wayne State University. Please refer to the SDS website for further information about students with disabilities and the services we provide for faculty and students: [http://studentdisability.wayne.edu/](http://studentdisability.wayne.edu/)

Students who are registered with Student Disability Services and who are eligible for alternate testing accommodations such as extended test time and/or a distraction-reduced environment should present the required test permit to the professor at least one week in advance of the exam. Federal law requires that a student registered with SDS is entitled to the reasonable accommodations specified in the student’s accommodation letter, which might include allowing the student to take the final exam on a day different than the rest of the class.

Course Drops and Withdrawals:
In the first two weeks of the (full) term, students can drop this class and receive 100% tuition and course fee cancellation. After the end of the second week there is no tuition or fee cancellation. Students who wish to withdraw from the class can initiate a withdrawal request on Academica. You will receive a transcript notation of WP (passing), WF (failing), or WN (no graded work) at the time of withdrawal. No withdrawals can be initiated after the end of the tenth week. Students enrolled in the 10th week and beyond will receive a grade. Because withdrawing from courses may have negative academic and financial consequences, students considering course withdrawal should make sure they fully understand all the consequences before taking this step. More information on this can be found at: [http://reg.wayne.edu/pdf-policies/students.pdf](http://reg.wayne.edu/pdf-policies/students.pdf)

Deferred Grade:
A grade of 'I' can only be assigned if all of the following criteria are met:

1. the student IS NOT currently failing the class and,
2. there is NOT a substantial quantity of work yet to be completed,
3. there is no extra work required of the instructor beyond the normal duties of grading the paper/exam,
4. there is no need for the student to attend the class in subsequent terms.

The final decision to assign an incomplete grade rests with the instructor. An 'I' grade MUST be made up within one year of assignment of the grade.

Course Schedule:

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Term Project Guideline

Objective:

Your challenge in the project portion of this course is to design and to product a prototype version of it. The goal of this exercise is to learn principles and methods of product development in a realistic context. Most product development professionals work under tremendous time pressure and do not have an opportunity to reflect on the development process. In this course, the project stress level will be low enough that there will be time to experiment and learn. Guidelines and requirements for reasonable projects are given below. The project proposal process is explained in the course schedule.

Project Teams:

In the second week of the course, we will form project teams on the based of expressed student preferences. Teams will consist of about two or three students. Once you are assigned to a project team, we expect you to stay in the course for the entire term.

Guidelines for Projects:

While special cases will be considered, you are strongly encouraged to choose a project satisfying all of the following constraints:

- There should be a demonstratable market for the product in five years. One good way to verify a market need is to identify existing products that attempt to meet the need. Your product need not be a variant of an existing product, but the market need addressed by your product should be clearly evident. The product does not need to have a tremendous economic potential, but should at least be an attractive opportunity for an established firm with related products and/or skills. Design and development process should be justified in the context of the potential market.
- Most products developed in this class are material goods (discrete products) and not services. While many of the ideas in the course apply to services and software products, many do not (e.g., design for assembly). Nevertheless, the faculty are willing to hear project proposals from students interested in developing software, services, and internet-based enterprises.
- The product should have a high likelihood of containing fewer than ten parts. Although you cannot anticipate the design details, it is easy to anticipate that an electric drill will have more than ten parts and that a wine opener can have fewer than ten.
- The product should require no basic technological breakthrough. (Yes, a more compact airbag would be a nice, but can you do it without inventing a new chemical?) You do not have time to deal with large technological uncertainties.
- The product must be user-driven. You should have access to more than five potential lead users (focus group) of the product (more than 20 would be nice).
- The final project report and presentation is required. The final report should be no more than 40 pages.

A few more hints:

- Save any highly proprietary ideas for another context; we will be quite open in discussing the projects in class and do not wish to be constrained by proprietary information.
- Most successful projects tend to have at least one team member with strong personal interest in the target market.
- Most products are really not very well designed. This is evidenced by the seemingly poor quality of common consumer products (e.g., wine opener, garlic presses, and ice cream scoops). The experience in this class is that if you pick almost any product satisfying the above project guidelines, you will be able to develop a product that is superior to other products currently on the market. A book titled “The Design of Everyday Things” by Donald A. Norman (Doubleday, 1990) discusses good and bad examples and provides principles and guidelines for good design.
- Just because you have used a lousy product, it doesn’t mean that a better one doesn’t exist. Do some thorough research to identify competitive products and solutions. If any existing competitive ones are found in later stage of your project, it can be very problematic and will affect your design and prototype.