Welcome to EMEN 5400, a hands on, individual project course designed to teach engineering students the principals of product development and design (PD) in commercial, high-tech environments.

Whether you are part of a start-up or a Fortune-500 company, the success of your company depends on its ability to deliver commercially successful products, year after year after year. Having, developing, and using good PD tools, skills, and experiences will be important factors in your overall value as an engineering manager and leader. In this course, you will learn the basics of PD with an emphasis on developing a technology innovation from concept through early-prototype stages.

Because this course includes a great deal of student-instructor interaction, I have written this syllabus in the first person singular, where “you” are the student and “I” am your instructor. I have provided my contact information below.

1) Course Information
   a) Course Title: EMEN 5400 – Product Development; a course taught under the Lockheed Martin Engineering Management Program (EMP)
   b) Instructor: Eben Johnson
   c) Course Time and Place: Mondays, 11:00 – 13:30; ECCS 1B28
   d) Office Hours: Tuesdays and Thursdays, 9:00 – 11:00 MT
   e) Course managed through D2L <https://learn.colorado.edu/>

2) Course Goals
   a) To have fun and enjoy the learning experience
   b) To learn the principles of PD and how to apply them in high-tech commercial environments
   c) To learn the subtleties behind the principles through the course materials and interactions with classmates, me, guest speakers, and others
   d) To develop and apply your growing set of PD skills and tools through the course projects
   e) To prepare for later courses and your career

3) Course Structure:
   a) Part seminar part course project
   b) You will apply the session and course materials to your project
c) With guidance from me and input from classmates, you will choose your own projects

d) You will deliver Weekly Applications, designed to move your projects along at a healthy pace

e) Projects are individual efforts, not team projects; however, you will also deliver Weekly Critiques of the work submitted by your classmates; to assist in providing good critiques, you will be divided into groups so that you may follow and learn something about your classmates’ projects, challenges, decisions, etc.

f) You will complete weekly quizzes ahead of each session; this is to promote good quality discussions during course sessions

4) Session Structure

a) Administrative items and Q&A
b) Guest speakers, if any
c) New material and discussion with emphasis on students’ projects
d) Wrap up: next steps and take aways
e) A 10-minute break is included

5) Weekly structure

a) Weekly preparation: readings, materials, etc., to be complete before the weekly quiz
b) Weekly quiz: to be completed by Sunday night, before the applicable weekly session
c) Weekly session
d) Weekly critique: to be completed by Wednesday night, after the due-date for the relevant weekly contribution
e) Weekly contribution: to be completed by Sunday night, before the next session

6) Course Topics

a) Intros, PD Process, Honor Code, Admin
b) Opportunities & Planning
c) Identifying Customer Needs
d) Concept Generation
e) Concept Selection
f) Concept Testing
g) Product Specifications
h) Product Architecture
i) Industrial Design
j) Design for Manufacturing and Related Functions
k) Prototyping
l) Product Law and Intellectual Property
m) Economics
n) Final Presentations

7) Prerequisites
a) While not a prerequisite, I strongly encourage you to have completed the following or similar courses before enrolling in this one: EMEN 5010 – Introduction to Engineering Management, EMEN 5020 – Finance and Accounting for Engineering Managers, and EMEN 5090 – Technology Ventures and Marketing

b) Not previously having taken these courses might put you at a disadvantage and may reduce the quality of your interactions with your classmates

c) If you are not an EMP student, then you need my written permission to take this course

8) Confidentiality and Intellectual property:

   a) US intellectual property law generally recognizes that material presented during class or in a course is confidential; this is not a guarantee, and I cannot commit that work developed or presented through this course will be kept confidential

   b) My request and expectation is that you treat your classmates’ work as confidential and only used in the context of this class

   c) No company confidential or similarly proprietary material, information, or projects should be presented or used in this course; work submitted containing confidentiality statements or similar clauses will be returned and considered not-submitted for the purpose of grading (see Late Submissions)

   d) Unless previously agreed to treat material presented as confidential, guests will be asked to leave before material that would reasonably considered confidential is presented

   e) If in doubt about any of this confidential material, please contact the CU Tech Transfer Office at https://www.cu.edu/techtransfer/

9) Expenses and paid support: the EMP provides no budget for your course project; expenses incurred are your expenses and not reimbursed by the EMP, CU, or other entities; additionally, outside of the classroom, the EMP provides no video-conferencing or related assistance; however, experience suggests that Google Hangouts, Skype, GoTo Meeting, and BlueJeans work well in places that are not blocked by company or related fire walls; if meeting with me and you give me time to prepare, I can arrange meetings on my accounts

10) Required Text


   • Additional materials made available by me and located in D2L and other sites on an as-needed basis

11) Guest Speakers: meeting and hearing from guest speakers is an important part of your learning experience; I am working to schedule several speakers; you should take time to research all guest speakers prior to their sessions; I may ask students to introduce our guests

12) General Course Policies and Other
a) Please, while not a requirement, you should make every effort to attend every session; please
do not request permission to miss a session; however, your attendance during the final session
is required; here is one instance where you should coordinate with other courses, family, and
work colleagues now, before your attendance becomes an issue
b) We will use name cards to help identify students; please bring your cards to every session
c) Having a deep and accurate understanding of your industry, market, and customers is critical to
successful product development, and to help gain an appreciation of this, your classmates and I
might ask you, from time to time, to participate in surveys and similar exercises; your
participation is expected
d) On occasion, and in an effort to help teach, I might use submitted or presented work as
examples of things to do or not do; in doing so, I might use an individual’s name; I might carry
such examples from semester to semester and course to course
e) I have created a Google+ Community Page for this and other courses I teach; a link to this
private community is provided through this course’s D2L page
f) I might, from time to time, host a Google Hangout or similar session; attendance is voluntary
and not graded; I will try to keep the session open for the duration of the scheduled time,
however, if I have no participants, I might close it earlier than scheduled
g) In addition to the Addendum section regarding recording EMP sessions, please note that I might,
from time-to-time take pictures of students, speakers, or other interesting subjects; these
pictures, video recordings, etc. may appear later in class, our D2L page, our Google Community
page, or emails to our class list
h) At my discretion, I may upload assignments to Turnitin.com
i) Access: I welcome emails and phone calls, and I do what I can within reasonable professional
norms to respond as quickly as possible to your needs; please make sure your correspondence
includes all relevant information
j) Course management website and communication:
   i) The course website is managed through D2L (https://learn.colorado.edu/), and recorded
   sessions are managed through CAETE
   ii) Communication outside of scheduled sessions will use combinations of D2L, e-mail, in-
   person meetings, conference and video calls, and our Google Community site; you are
   responsible for managing your D2L page and e-mail account(s) on a frequent basis; D2L is
   the official source of information for the course; you should not request separate forms of
   correspondence as I cannot commit to keep everyone’s personal preferences separate and
   properly managed; phone numbers and electronic correspondence, such as emails, will use
   the addresses from our CU Course roster; if you do not know your CU addresses or need to
   update them, then please contact OIT (+1 303 495-HELP); additional information on this
   topic is included in the addendum

13) Grading

<table>
<thead>
<tr>
<th>Assignments</th>
<th># Graded</th>
<th>% Each</th>
<th>Sub-Total (%)</th>
<th>Total (%)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th></th>
<th>10</th>
<th>3</th>
<th>30</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Weekly quizzes</strong>¹</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Course project</strong></td>
<td></td>
<td></td>
<td></td>
<td>60</td>
</tr>
<tr>
<td><strong>Weekly contributions</strong>²</td>
<td>12</td>
<td>3</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td><strong>Weekly critiques</strong>²</td>
<td></td>
<td>2</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td><strong>Class participation</strong></td>
<td></td>
<td></td>
<td></td>
<td>10</td>
</tr>
<tr>
<td><strong>D2L profile &amp; community bio</strong></td>
<td>1</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>Student behavior</strong>³</td>
<td></td>
<td>7</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>

a) **Notes**
   i) ¹ best 10 of 12 quizzes; your 2 worst quiz scores will be dropped; quizzes are open book, open notes, individual efforts, timed events that are to be completed on your own time, outside of class
   ii) ² best 12 of 14 scores; 2 lowest-graded items will be dropped; grading rubric will be provided
   iii) ³ while engaged in this course, professional behaviors and courtesies are expected and required at all times; evidence of a lack of such professional behavior is likely to result in a student losing grade points; as an example of improper behavior, the use of laptops, cellphones, eating in class, etc. during class sessions without specific permission from me will likely result in lost points (especially while guests are attending!)

b) **Weekly contributions and critiques are graded on a five-point scale, where the nominal score is a “four”; a score is of “five” is given for complete work that is very well done**

c) **Due dates and late submissions:**
   i) Assignment due dates are posted in D2L; assignments delivered late receive a score of zero; the submitted date and time of record is defined by the D2L-time-stamp; the assignment must be readable and posted in the correct Dropbox for it to be considered “submitted”
   ii) All due dates and associated times are US Mountain Time (Boulder, Colorado); be sure to understand if and how D2L has converted due dates to match your time zone
   iii) Absences, sickness, and related topics: as noted above, D2L will drop one or more of your lowest-scored assignments and quizzes; this feature of your grading scheme is to help you manage this course within the context of “life”; therefore, please do not write to me asking for additional time, exceptions to grading schemes, permission to miss class, trying to explain late submissions, etc.; if something happens such that you will likely miss an assignment or do not well (e.g. sickness or business travel), then simply take the “drop” and move on; should you send me such requests, I might reduce your class participation grade
d) **There is no final exam and no opportunities for additional or make-up work for course credit**
e) **Quality**
   i) We are expected to perform at high levels of quality; this includes in-class behaviors plus written and oral work; points are subtracted from assignments when students fail to meet
these standards; guidance documents to help you with written and oral assignments will be included with this course

ii) Grading for all assignments, even pass/fail assignments, will consider the submission’s conformance to guidelines and specifications, inclusion of supporting information (such as dates, titles, and page numbers), layout and aesthetics, spelling, grammar, table formats, and proper citations; should I receive an assignment that I believe has not been adequately proof-read, I might return it ungraded and marked as not submitted, at which point it may be late

iii) Written submission are to be in un-protected pdf format; all work is to submitted in the correct D2L folder; submissions that can’t be opened, are not located in the correct D2L folder, are the wrong assignment, or marked “confidential” will receive a grade of zero

f) Percent to letter-grade conversion:

<table>
<thead>
<tr>
<th>Percent Grade</th>
<th>Letter Grade</th>
<th>Percent Grade</th>
<th>Letter Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥94%</td>
<td>A</td>
<td>≥74% to &lt;77%</td>
<td>C</td>
</tr>
<tr>
<td>≥90% to &lt;94%</td>
<td>A-</td>
<td>≥70% to &lt;74%</td>
<td>C-</td>
</tr>
<tr>
<td>≥87% to &lt;90%</td>
<td>B+</td>
<td>≥67% to &lt;70%</td>
<td>D+</td>
</tr>
<tr>
<td>≥84% to &lt;87%</td>
<td>B</td>
<td>≥64% to &lt;67%</td>
<td>D</td>
</tr>
<tr>
<td>≥80% to &lt;84%</td>
<td>B-</td>
<td>≥60% to &lt;64%</td>
<td>D-</td>
</tr>
<tr>
<td>≥77% to &lt;80%</td>
<td>C+</td>
<td>&lt;60%</td>
<td>F</td>
</tr>
</tbody>
</table>

14) Contact Information

Eben Johnson
Lockheed Martin Engineering Management Program
College of Engineering and Applied Science
433 UCB, ECOT 424
University of Colorado Boulder
Boulder, Colorado, USA 80309-0433
Office: +1 303 492-7519
Mobile: +1 303 775-4932
Email: eben.johnson@colorado.edu

Change Log

<table>
<thead>
<tr>
<th>Date</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>29 Dec 2013</td>
<td>Initial release, no changes</td>
</tr>
<tr>
<td>30 Dec 2013</td>
<td>Added image of textbook; included statements about expenses 31</td>
</tr>
<tr>
<td>Dec 2013</td>
<td>Moved course structure to individual projects; added course topics</td>
</tr>
<tr>
<td>27 Dec 2014</td>
<td>Updates for the new semester</td>
</tr>
</tbody>
</table>