ABEN 478 – MACHINERY ANALYSIS AND DESIGN  
Spring Semester, 2017


Class Info: 3 credits. Lectures 1:00 to 1:50 p.m. M & W. ABEN 208. Lab 3:00-5:30 p.m. M. Service Center.

Instructor: Dr. Tom Bon, Office ABEN 202, phone 701.231.7275  
Email: Thomas.Bon@ndsu.edu

Office Hrs: 10:00 – 10:50 a.m. M, W, & F, also 2:00 – 2:50 p.m. T.  
Also you can call for an appointment or drop by and see if I am in my office, I am usually available if I am in my office unless it is just before a class or meeting.

Pre-Reqs: ME 221 and ME 222.

References:


Overview: Agricultural and off-road machinery design and development includes both synthesis and analysis. Synthesis is the collection and building up of ideas into an over-arching concept such as the development of a large round baler or a combine. Analysis is the detailed study and selection of components. Both aspects are important to the successful development of machinery and equipment that provides value and function to the owner/user. Both aspects will be included in this course. However, the greatest area of study will be the analysis portion.

Components can include the frame, parts, assemblies, bearings, springs, etc. to form the final machine or piece of equipment. Fasteners can also be included.
Objectives:

1. Apply knowledge of mathematics, science, and engineering (abet a)
2. Design a system, component, or process to meet desired need within realistic constraints such as economic, environmental, social, political, ethical, health, and safety, manufacturability, and sustainability. (abet c)
3. Identify, formulate, and solve engineering problems (abet e)
4. Use techniques, skills, and modern engineering tools necessary for engineering practice. (abet k)
5. Write laboratory reports and make short presentations (abet g and k)

Grading:

The course will be graded with the following weights:

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<tr>
<td>1 hr exams and quizzes (2 or 3) (478)</td>
<td>35%</td>
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<tr>
<td>laboratory reports</td>
<td>10%</td>
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<tr>
<td>homework</td>
<td>10%</td>
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<td>project</td>
<td>10%</td>
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<td>Presentations</td>
<td>10%</td>
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<tr>
<td>final exam</td>
<td>25%</td>
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<td><strong>Total</strong></td>
<td>100%</td>
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Final Exam is scheduled for 1:00 – 3:00 p.m. Monday, May 8, 2017

I use a straight grading system. The breaks are, 90% (A), 80% (B), 70% (C), 60% (D), and below failing.

Homework is due by 5:00 p.m. on the due date. Homework must be given to me in class or placed in my mailbox. My mailbox is located in ABEN 100. Late homework will be discounted 10% if I receive it before I have graded the assignments and 30% if I receive it after I have graded the assignments.

Quizzes may be given anytime. They may be announced or unannounced. They are worth about 10 pts each. Quizzes will be used to test the understanding of concepts and to encourage students to keep up with the material. **If a quiz is missed, it cannot be made up.** Generally, I drop the lowest quiz from the grades. If a quiz is missed, that is the one dropped. Extenuating circumstances may be considered at the instructor's discretion. If you expect to miss a class due to items such as interviews, professional trips, etc., please inform me by e-mail before
the event. If you are caught in sudden events such as illnesses, family emergencies, etc. please inform me as soon as possible.

**Anyone in the class who has a diagnosed disability or other special need should inform the instructor as soon as possible. The counseling center should also be notified so the counseling center can work with the instructor and student to best accommodate the situation.**

**ACADEMIC HONESTY:**

**Students with disabilities needing special consideration are requested to alert me at the first class.**

All work in this course must be completed in a manner consistent with NDSU University Senate Policy, Section 355: Code of Academic Responsibility and Conduct available at [http://www.ndsu.nodak.edu/policy/335.htm](http://www.ndsu.nodak.edu/policy/335.htm) and the Honor System of the College of Engineering and Architecture (CEA) available at [http://www.ndsu.nodak.edu/ndsu/cea/](http://www.ndsu.nodak.edu/ndsu/cea/). You are expected to read and abide by both policies, which are incorporated herein by reference. A signature sheet indicating your agreement to abide by the CEA Honor Pledge will be distributed in class. The CEA Honor Code states the following about violations: “If, from the evidence presented, the [Honor] Commission determines that a violation has taken place, it will recommend disciplinary action. Disciplinary action may include, but is not limited to, failure or a grade reduction in the course; failure or grade reduction on the examination, quiz, paper or project in question; or a recommendation for suspension or expulsion.”

**Lectures:**

My plans are to start a major revision of this course. Student feedback and suggestions will be sought during the course.

**Laboratory exercises:**

Will be developed and will hopefully include some tours. Laboratory periods will also be used for presentations and tests.

**Some information concerning ABET:**

ABET is the Accreditation Board for Engineering and Technology. ABET is a specialized accreditation agency meaning it certifies specific programs at a college or university as compared institutional accreditation agencies that examine an entire college or university. Each accredited department must be reviewed by a site visit at least once every six years. The
method of accreditation has changed with the ABET 2000 initiative. Every department has a set of evaluation criteria it has developed and submits to ABET. These criteria form the evaluation basis for the department by the ABET reviewers.

Educational Objective 1: Provide students with technical knowledge, design, and problem solving skills that are foundational to their engineering careers by ensuring that graduates have ability to:

a. Apply knowledge of mathematics, science, and engineering.
b. Design and conduct experiments, as well as to analyze and interpret data.
c. Design a system, component, or process to meet desired needs.
e. Identify, formulate, and solve engineering problems.
k. Use techniques, skills, and modern engineering tools necessary for engineering practice.

Educational Objective 2: Provide learning and practice experiences that build student interpersonal and collaborative skills and the capacity for productive careers by ensuring that graduates have:

d. An ability to function on multi-disciplinary teams.
f. An understanding of professional and ethical responsibility.
g. An ability to communicate effectively.
h. The broad education necessary to understand the impact of engineering solutions in the global and societal context.
i. A recognition of the need for and an ability to engage in lifelong learning.
j. A knowledge of contemporary issues.

Educational Objective 3: Provide students with specialized (discipline-specific) knowledge, educational depth, and breadth to meet the challenges of changing careers and opportunities in agricultural and closely related biological industries by ensuring that graduates have competencies in one or more of the following areas:
l(i) Apply engineering skills to agricultural systems.
l(ii) Apply engineering skills to biomaterials systems.
l(iii) Apply engineering skills to environmental systems.

Criterion 4. Professional component from the 2003-2004 Criteria for Accrediting Engineering Programs also states the following:

Students must be prepared for engineering practice through the curriculum culminating in a major design experience based on the knowledge and skills acquired in earlier course work and incorporating engineering standards and realistic constraints that include most of the following considerations: economic; environmental; sustainability; manufacturability; ethical; health and safety; social; and political.