**AOM 4314C**

**Power & Machinery Management**

***Spring 2025 Course Syllabus***

**Catalog Description:** *3 credits.  Functional requirements, operating principles, performance, safety and economic application of agricultural power units and field machines for citrus, vegetable and field crop production. (Offered Spring)*.

**Pre-requisites:***MAC 1147:**Precalculus – Algebra and Trigonometry, or (MAC 1114: Trigonometry & MAC 1140:* *Precalculus), or MAC 2233: Survey of Calculus I*

**Course Objectives:**By the end of the course students are expected to gain rudimentary skill proficiencies and knowledge that will enable them to:

* identify various farm, construction and processing machinery and explain the various applications of those pieces of equipment.
* differentiate different components and systems within equipment.
* select, recommend and manage equipment based on different needs.
* identify factors that influence production timelines, and improvements that can be made by machine usage.
* identify and communicate key aspects associated with equipment usage.

**Contribution of course to meeting the professional component:**This course contributes three (3) credit hours toward meeting the minimum 48 credit hours of basic-level curriculum for the Bachelor of Science Degree in Agricultural Operations Management.

**Relationship of course to program outcomes:** From the list of (1) through (4) program outcomes listed below, this course addresses outcomes (1) and (4). **Of these,**(1) and (3) will be assessed.

**Program Outcomes:**

1. an ability to select and apply a knowledge of mathematics, science, and technology to management challenges that require the application of principles and applied procedures or methodologies;
2. an ability to function effectively as a member or leader on a technical team;
3. an ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature;
4. an ability to engage in, and to understanding of the need for professional development

**Instructor:** Richard V. Scholtz, III

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* Office hours: TBD

**Teaching Assistant:**None.

**Lecture Meeting Times:**Tuesday and Thursday - Period 4 (10:40 – 11:30 am)

**Laboratory Meeting Times:**Tuesday - Periods 7-9 (1:55 – 4:55 pm)

**Meeting Location:** 110 Rogers Hall.

**Textbooks, Materials and Software Required:**(*no required text, notes will be provided on the course’s web site and UF E-learning page*)

1. Any scientific calculator.
2. Daily Calendar (e.g. Daytimer), PDA, phone or laptop computer w/ calendar application.
3. Access to Microsoft Office 365 or compatible Office Suite (word processor, spreadsheet, presentation programs compatible with the *\*.docx*, *\*.xlsx*and *\*.pptx* formats)

**Source Materials:**

1. Butler, D. and J.W. Davies. 2004. Urban Drainage. Taylor & Francis, Inc. New York. 568 pages. Bowers, Wendell, Benjamin Angus Jones, and Elwood F. Olver. 1973. Engineering applications in agriculture. Champaign, IL: Stipes.
2. Deere & Company. 2012. John Deere 7130 and 7230 Tractors. Moline, IL: Deere & Company.
Finner, Marshall F. 1969. Farm field machinery. Madison, WI: College Print. and Pub.
3. Hunt, Donnell, and Lester W. Garver. 1973. Farm machinery mechanisms. Ames, IA: Iowa State University Press.
4. Juvinall, Robert C., and Kurt M. Marshek. 1991. Fundamentals of machine component design. New York: J. Wiley.
5. Krutz, Gary, Lester Thompson, and Paul Claar. 1984. Design of agricultural machinery. New York: Wiley.
6. Liljedahl John B., Liljedahl John B., Turnquist Paul K., Smith David W., and Hoki Makoto. 2004. Tractors and their power units. St. Joseph, MI: American Society of Agricultural Engineers.
7. South, David W., and Jon R. Mancuso. 1994. Mechanical power transmission components. New York: Marcel Dekker.
8. Srivastava, Ajit K., Carroll E. Goering, and Roger P. Rohrbach. 1993. Engineering principles of agricultural machines. St. Joseph, MI: American Society of Agricultural Engineers.
9. Vickers, Incorporated. 1998. Vickers mobile hydraulics manual. Rochester Hills, MI: Vickers, Inc.

Instructional materials for this course consist of only those materials specifically reviewed, selected, and assigned by the instructor. The instructor is only responsible for these instructional materials.

**Course Schedule:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Week | Date | Lecture Topics | Laboratory Topic | Assignments |
| **1** | 1/14 | Course Introduction | Introduction & Power Calculation | --- |
|  | 1/16 | History of Agricultural Machinery | --- | Engine Cycles |
| **2** | 1/21 | Power | Comparison of Tractor Performances | --- |
|  | 1/23 | Nebraska Tractor Testing | --- | Power |
| **3** | 1/28 | Tire Selection | Risk Management | --- |
|  | 1/30 | Tractive Efficiency | --- | Traction |
| **4** | 2/4 | More Tractive Efficiency1 | Risk Management II/Tillage Lab‡ | --- |
|  | 2/6 | Review/Machine Safety | --- | Transmission I |
| **5** | 2/11 | Estimating Tillage Draft Requirements | Exam 1\* | --- |
|  | 2/13 | Tillage Selection | --- | Engine Efficiency |
| **6** | 2/18 | Mechanical Power Transmission | Communication and Presentations | --- |
|  | 2/20 | More Mechanical Power Transmission2 | --- | Tractor Operation |
| **7** | 2/25 | Fluid Power Transmission | Exam I\* | --- |
|  | 2/27 | More Fluid Power Transmission | --- | Transmission II |
| **8** | 3/4 | Skid Steer and Backhoe Loaders | Backhoe Lab at Citra‡ | --- |
|  | 3/6 | Field Capacity and Efficiency Estimation | --- | Field Capacity and Efficiency |
| **9** | 3/11 | Review | Exam II\* | --- |
|  | 3/13 | Seeders and Planters | --- | Carbon Credits |
|  | 3/18 | No Class – Spring Break | No Lab – Spring Break | --- |
|  | 3/20 | No Class – Spring Break | --- | --- |
| **10** | 3/25 | Forage Harvesting Equipment3 | Student Presentations† | --- |
|  | 3/27 | Grain Harvesting Equipment | --- | Field Losses |
| **11** | 4/1 | Review/Other Harvesters | Exam III\* | --- |
|  | 4/2 | Specialty Harvesting | --- | --- |
| **12** | 4/8 | Livestock Machinery | Student Presentations† | --- |
|  | 4/10 | Equipment for Controlled Environment | --- | --- |
| **13** | 4/15 | Component Reliability | Planter/Seeders/Harvesters at Citra‡ | --- |
|  | 4/17 | System Reliability4 | --- | Reliability |
| **14** | 4/22 | Review/Total Cost of Ownership and Value of Machine Storage | Exam VI\* | --- |

\*Examinations will be composed of two equally weighted parts. Part I consists of True/False, Matching, Fill in the blank and short answer questions. Part II consists of between four and six multiple part calculation questions.1End of material covered on Exam I, 2 end of material covered on Exam II, 3 end of material covered on Exam III, and 4 end of material covered on Exam IV.
†All students must be prepared to a presentation starting on the first day of the dates scheduled, only the instructor will know the order, make-ups will only be entertained in cases of extreme emergencies or for schedule conflicts reported prior.
‡These laboratory periods will be in the field; most will be conducted at the outside. All students must wear both long pants and closed-toed shoes to these labs. Attendance is mandatory during these periods.

**Attendance and Expectations:**Attendance is required – Lectures will cover material from various references, so it is imperative that students make every effort to attend classes and take good notes. Students are especially encouraged to ask questions during lectures.

All deliverables will comply with the requirements and due date specified at the time of assignment (no deliverable will be due earlier than 3 business days after assignment).

The student is expected to manage their time efficiently, and should anticipate spending three times the length of lectures studying and preparing deliverables outside the classroom. The student should focus on the following: assignments, review of notes and lecture materials, and any additionally assigned readings.

This class will predominately utilize USCS units, though there is some interaction with SI units. Mastery of both systems is strongly suggested.

**Announcement Policy:**Students will be held responsible for *all* announcements made in class, which includes *any and all* changes to this syllabus and the course lecture schedule. All will be posted in Canvas. Students are expected to attend all lectures and laboratory periods scheduled.

**Grading Policy:**Official individual grades will only be available at the end of the semester. Exam and homework grades will be posted on Canvas as they are completed.

800 points – Examinations.

*There will be four equally weighted examinations throughout the semester. Examinations will be composed of two equally weighted parts (100 points for each part).*

*Part I consists of True/False, Matching, Fill in the blank and short answer questions; questions will test the students grasp of nomenclature, ability to identify equipment and components, and ability to identify concepts related machine selection, in particular the key factors that influence production and performance. Students must complete Part I by Friday before 11:00 PM EST, on the week it is8 assigned. Students are encouraged to review materials ahead and take Part I as soon as it populates on Canvas.*

*Part II consists of between three and four multiple part calculation questions; each question will focus on those concepts related machine selection, in particular the key factors that influence production and performance. During Part II, students may refer to any class related printed material on student notes during the exam. However no electronic devices are permitted, except for a calculator, preferable models should be capable of exponents and logarithms. Exams are not timed but are intended to be completed within one hour.*

100 points – Homework Assignments.

*There will be eleven homework assignments that will range from requiring the students to due independent research, to guided coursework that will serve as topical reinforcement. All assignments are due 1 week after they are assigned (unless otherwise noted) and should be submitted electronically.*

50 points – Laboratory Assignments.

*There will be ten laboratory assignments. The majority of laboratory assignments will consist of attendance and participation, and in some cases an executive summary on what was covered. Other laboratory assignments will consists of in-class assignments geared to assuring students are comfortable with the level of mathematics necessary for success in this class. Some laboratory periods will be in the field. All students must wear both long pants and closed-toed shoes to these labs and attendance is mandatory during these outside periods for a grade. All assignments will be turned in at the end of the lab period (unless otherwise noted).*

50 points – Student Presentation.

*Each student will prepare and delivery a presentation, to cover a piece of agricultural, construction, or industrial equipment. Each presentation will last between 12 and 18 minutes. All students must be prepared to a presentation starting on the first day of the dates scheduled, only the instructor will know the order, make-ups will only be entertained in cases of extreme emergencies or for schedule conflicts reported prior. Students will have the opportunity to assess the performance of teammates. Student participation and attendance will be monitored.*

**Grading Scale:**

                A:            921-1000 Points

                A-:          891-920 Points

                B+:         861-890 Points

                B:            821-860 Points

                B-:          791-820 Points

                C+:         761-790 Points

                C:            721-760 Points

                C-:          691-720 Points

                D+:         661-690 Points

                D:            621-660 Points

                D-:          591-620 Points

                E:            < 590 Points

**Grade Points:** For information on current UF policies for assigning grade points, see  [https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/Links to an external site.](https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/).

**Attendance and Make-Up Work:**Requirements for class attendance and make-up exams, assignments and other work are consistent with university policies that can be found at: [https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/Links to an external site.](https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/).

**Professionalism:** Students should also strive to think and act as professionals. Students should extend to all guests both professional and common courtesy. The instructor reserves the right to assess penalty points toward the class, or toward individuals who have chosen to disregard these guidelines.

**Academic Honesty:**As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: “*We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.*” You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either required or implied: "*On my honor, I have neither given nor received unauthorized aid in doing this assignment.*"

It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: [http://www.dso.ufl.edu/sccr/process/student-conduct-honor-codeLinks to an external site.](http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code).

**Artificial Intelligence Use:** The use of AI software should only be used to improve clarity of the student's final work product. Be advised that many AI packages will provide invalid, and in some cases fictious results. Results that look authentic and even believable but should not be trusted.

**Evaluation Process:** Student assessment of instruction is an important part of efforts to improve teaching and learning. At the end of the semester, students are expected to provide feedback on the quality of instruction in this course using a standard set of university and college criteria. Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at: [https://gatorevals.aa.ufl.edu/students/Links to an external site.](https://gatorevals.aa.ufl.edu/students/). Students will be notified when the evaluation period opens and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via [https://ufl.bluera.com/ufl/Links to an external site.](https://ufl.bluera.com/ufl/). Summaries of course evaluation results are available to students at: [https://gatorevals.aa.ufl.edu/public-results/Links to an external site.](https://gatorevals.aa.ufl.edu/public-results/).

**Accommodation for Students with Disabilities:** The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation 0001 Reid Hall, 352-392-8565, [https://disability.ufl.eduLinks to an external site.](https://disability.ufl.edu/)

**UF Helping Resources:**Students experiencing crises or personal problems that interfere with their general wellbeing are encouraged to utilize the university’s counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

* University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575, [www.counseling.ufl.eduLinks to an external site.](http://www.counseling.ufl.edu/)
* Counseling Services
* Groups and Workshops
* Outreach and Consultation
* Self-Help Library
* Wellness Coaching
* U Matter We Care, [umatter.ufl.edu/Links to an external site.](http://www.umatter.ufl.edu/).
* Career Connections Center, First Floor JWRU, 392-1601, [https://career.ufl.edu/Links to an external site.](https://career.ufl.edu/).
* Student Success Initiative, [http://studentsuccess.ufl.eduLinks to an external site.](http://studentsuccess.ufl.edu/).

Student Complaints :

* Residential Course: [https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/Links to an external site.](https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/).
* Online Course: [https://pfs.tnt.aa.ufl.edu/state-authorization-status/#student-complaintLinks to an external site.](https://pfs.tnt.aa.ufl.edu/state-authorization-status/#student-complaint)

**Software Use:** All faculty, staff and student of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator.  Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate.