Diesel Equipment Technology (A.A.S.) & Diesel Technology (A.O.S.) Program Review

Self-Study Report
Spring 2017

School of Agriculture, Sustainability, Business, and Entrepreneurship
Department of Agricultural Engineering

Prepared by:
Robert Cross: Associate Professor & Agricultural Engineering Department Chair
March 11th, 2017

- **Diesel Equipment Technology (A.A.S.) & Diesel Technology (A.O.S.) Program Review Committee:**
  - **Ron Alexander:** Assistant Professor, Morrisville State College & Chair of the Diesel Technology Program Review committee
  - **Buster Fiacco:** Service Manager, Milton Caterpillar
  - **Andy Nethercott:** General Manager-Product Support-Eastern NY, Anderson Equipment
  - **Jeff Galley:** Dealer Group-Technical Manager, Utica General
  - **Douglas Pilbeam:** Instructor-Outdoor Power Equipment, Oneida-Herkimer-Madison BOCES

Thank for agreeing to serve on the Program Review Committee for the Diesel Equipment Technology (A.A.S.) & Diesel Technology (A.O.S.) Program Review. Your task will be to consider what the Diesel Equipment Technology and Diesel Technology’s programs are and suggest what they could be. Your time and effort are much appreciated.

At Morrisville State College, we strive to provide students with an education that gives them a competitive edge when entering the workforce. To do this, we monitor and assess our degree programs to ensure that we are teaching students the background necessary to understand their area of study, as well as introduce them to cutting edge technologies in their field. We accomplish this by utilizing our advisory board members expertise, as well as periodic program reviews involving the input of individuals outside of the Morrisville State College community.

You have been selected to be a member of the review team because the faculty members in the Agricultural Engineering department believe your input will be extremely beneficial as we improve and grow the program. Please take your time to examine the program as it currently is, and take into consideration the opinions the faculty members share. Your feedback, highlighting what is done correctly, what is done poorly, and what should be changed will be crucial in helping the department improve the educational experience here.

The requested task of your committee is straightforward. You are asked to review this packet which contains overviews of the current Diesel Equipment Technology and Diesel Technology’s programs, some suggestions for its future, and some questions for consideration. You are asked to attend an all-day visit on April 14, 2017 to meet with your Committee and discuss the Diesel Equipment Technology and Diesel Technology’s programs with faculty, students, and
administrators, as well as tour the educational facilities. Your day will start with coffee and introductions at 8:00am in the President’s Room in Charlton Hall on campus, and will follow the times and events listed in the following table:

**Schedule for Morrisville State College’s Agricultural Engineering (A.A.S.) & Agricultural Mechanics (A.O.S.) and the Diesel Technology (A.A.S. & A.O.S.) Program Review’s On-site Visit on April 14th, 2017**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
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<tbody>
<tr>
<td>8:00 am</td>
<td>Coffee &amp; Introductions</td>
<td>President’s Room: 117 Charlton Hall</td>
</tr>
<tr>
<td>8:30 am</td>
<td>Dean Nyberg Reviews Committees’ Task</td>
<td>President’s Room: 117 Charlton Hall</td>
</tr>
<tr>
<td>9:00 am</td>
<td>Committee Work Time</td>
<td>President’s Room: 117 Charlton Hall</td>
</tr>
<tr>
<td>9:30 am</td>
<td>Meet with Dean Nyberg</td>
<td>President’s Room: 117 Charlton Hall</td>
</tr>
<tr>
<td>10:00 am</td>
<td>Meet with Current Students</td>
<td>DTEC A.A.S. &amp; A.O.S. Group: 125 Charlton Hall</td>
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<tr>
<td></td>
<td></td>
<td>AGEN A.A.S. &amp; AGMECH A.O.S. Group: 102 Charlton Hall</td>
</tr>
<tr>
<td>11:00 am</td>
<td>Meet with Faculty Member: Chip Ax</td>
<td>President’s Room: 117 Charlton Hall</td>
</tr>
<tr>
<td>11:20 am</td>
<td>Meet with Faculty Member: Fred Bach</td>
<td>President’s Room: 117 Charlton Hall</td>
</tr>
<tr>
<td>11:40 am</td>
<td>Meet with Faculty Member: Jared Ford</td>
<td>President’s Room: 117 Charlton Hall</td>
</tr>
<tr>
<td>12:00 pm</td>
<td>Lunch</td>
<td>Copper Turret</td>
</tr>
<tr>
<td>1:00 pm</td>
<td>Meet with Faculty Member: Robert Cross</td>
<td>President’s Room: 117 Charlton Hall</td>
</tr>
<tr>
<td>1:30 pm</td>
<td>Tour of Facilities</td>
<td>Marshall &amp; Galbreath Halls</td>
</tr>
<tr>
<td>2:30 pm</td>
<td>Committee Work Time</td>
<td>AGEN A.A.S. &amp; AGMECH A.O.S. Committee: President’s Room: 117 Charlton Hall</td>
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<tr>
<td></td>
<td></td>
<td>DTEC A.A.S. &amp; A.O.S. Committee: President’s Room: 106 Charlton Hall</td>
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<tr>
<td>4:00 pm</td>
<td>Closing Discussion with Dean Nyberg &amp; Provost Spriggs</td>
<td>President’s Room: 117 Charlton Hall</td>
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</table>
The Agricultural Equipment Technology (A.A.S.) and Agricultural Mechanics (A.O.S.) program review committee will also be doing their on-site visit on April 19th and you will share many meetings throughout the day with them.

The makeup of the Agricultural Equipment Technology (A.A.S.) and Agricultural Mechanics (A.O.S.) program review committee is as follows:

- **Steve Mooney**: Associate Professor, Morrisville State College & Chair of the Agricultural Engineering Program Review committee
- **Wade Heineman**: Northeastern & Canadian Sales, OXBO International
- **Jeff White**: Sales Manager, White’s Farm Supply
- **Erik Haas**: Integrated Solutions Specialist, Cazenovia Equipment
- **Jon Clayson**: Agricultural Educator-Mechanics, Pioneer Central School District

After visiting, meeting and discussing, the committee is asked to return your evaluation report in two weeks of the visit to the Dean, Dr. Chris Nyberg. The report will summarize the team’s findings and Dean Nyberg will then meet with the faculty and staff to discuss the report. If you are unable to attend the April 14th meeting, your written comments may be delivered to Professor Ronald Alexander at alexanrf@morrisville.edu or Marshall Hall, PO Box 901, Morrisville, NY 13408.

The Agricultural Engineering department wishes to express its sincerest gratitude to the review team for agreeing to spend the time and effort involved in carrying out this evaluation.

Respectfully Submitted,

Robert Cross  
Agricultural Engineering Department Chair &  
Associate Professor
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Introduction:

To assist you in your review of the Diesel Equipment Technology (A.A.S.) & Diesel Technology (A.O.S.) programs, a background has been provided, as well as information pertaining to Morrisville State College and the available programs for students has been provided. This report has been compiled following the guidelines provided by the Provost. The objectives of this report are to:

- Present the institutional mission of the college as a whole and the mission, goals, and objectives of the Diesel Equipment Technology (A.A.S.) & Diesel Technology (A.O.S.) programs
- Describe curriculum design, identify student learning outcomes, and explain assessment procedures, methods, & criteria
- Provide profiles of faculty and staff responsible for fulfilling the goals of the program
- Provide a student profile that includes the number of majors, the number of graduates, and the needs of the students
- Describe existing support services, both general and specialized, that support the efforts of the faculty and promote student success
- Outline facilities, equipment, resources, and special projects
- Describe administrative support to the quality and effectiveness of the program
- Highlight unique or experimental instructional methods and facilities
- Identify faculty’s perceptions of the program’s strengths and weaknesses
- Explain new directions under consideration for the program
- Provide supporting documents

Program Review – Expectations:

The Visit:
The visit will last for one day and will include interviews with the faculty, students, and administrators related to the program. Reviews will have access to all pertinent materials related to enrollment, course syllabi, and assessment documents. Classrooms and laboratories may be visited. The Dean will begin the visit with a meeting to welcome the team and review their charge. The visit will conclude in the afternoon with the Dean, Faculty and the Vice President of Academic Affairs meeting with the team.

Review Team’s Report:
The evaluation report will be submitted within two weeks of the visit by a member of the review team to the Dean Nyberg. The report will summarize the team’s findings as they relate to the main sections of the self-study document.

Some questions that may be addressed are:
- Are the goals, objectives, and student learning objectives valid? Are they being met?
• Is the program design reflective of the needs and expectations in the discipline or profession? Do the courses relate to the program goals and objectives?
• What is the overall quality of instruction?
• What are the students’ perceptions? Are their goals being met? Do they have access to the faculty? Is the student advisement process effective? How do they appraise the faculty and administration responsible for the curriculum?
• Are campus academic and student services providing adequate support to the faculty and students (i.e. admissions, library, technology services, health & counseling, placement, etc.)?
• Are existing resources and facilities appropriately used and adequate?
• Do you concur with the faculty’s perceptions of the programs strengths and weaknesses?
• What new directions are suggested for this program?

Departmental Response to the Evaluation:
The Dean will convene the faculty to discuss the team's evaluation. A written response to the evaluation will be completed within two weeks. This response may express agreement or disagreement with the report recommendations. It should be a summary of the value of the experience, but should not attempt to provide further detailed documentation.

Disposition of the Program Assessment Documents:
The School Office shall retain copies of all documents developed as a result of the academic program review. A copy of the review team’s report, the faculty response, the Assessment of Student Learning Outcomes in the Major Summary Report and the Program Data Summary Table shall be forwarded via email to the Vice President for Academic Affairs.

Mission Statements & Learning Outcomes:
Follow are the mission statements and goals for various levels related to this Program Review.

For Morrisville State College:

 Vision: Morrisville State College aspires to be a recognized leader in innovative applied education.

 Mission: Morrisville State College works to offer diverse learning experiences so that graduates may pursue rewarding lives and careers, become engaged citizens, and contribute to our collective future.

 Goals:
 Inspire Learning through Experience
 • Goal 1: To offer career-focused, experiential learning
 • Goal 2: To promote inquiry and scholarship at all levels
 • Goal 3: To enhance cultural competency and promote equity and inclusion
Build Community
● Goal 4: To create a vibrant campus community for personal interaction and growth
● Goal 5: To engage the local community in civic and cultural affairs
● Goal 6: To promote regional, statewide and international partnerships

Achieve a Sustainable Future
● Goal 7: To develop campus resources and operations with minimum resource footprint
● Goal 8: To achieve effective and sustainable levels of required resources
● Goal 9: To assess and document success in achieving the College’s mission

Program Learning Outcomes for the Diesel Equipment Technology (A.A.S.) program

● Develop a comprehensive understanding of the mechanical function of the compression-ignition engines and modern agricultural equipment
● Develop a comprehensive understanding of electrical systems and electronic controls used for diesel-powered equipment and modern agricultural equipment
● Develop a comprehensive understanding of hydraulic systems, components and control systems used for transmitting hydraulic power in diesel powered equipment and modern agricultural equipment
● Develop the ability to accurately and efficiently diagnose and repair failures in mechanical, electrical and hydraulic systems in diesel-powered equipment and modern agriculture equipment.

Program Learning Outcomes for the Diesel Technology (A.O.S.) program

● Develop a comprehensive understanding of the mechanical function of the compression-ignition engines and modern agricultural equipment
● Develop a comprehensive understanding of electrical systems and electronic controls used for diesel-powered equipment and modern agricultural equipment
● Develop a comprehensive understanding of hydraulic systems, components and control systems used for transmitting hydraulic power in diesel powered equipment and modern agricultural equipment
● Develop the ability to accurately and efficiently diagnose and repair failures in mechanical, electrical and hydraulic systems in diesel-powered equipment and modern agriculture equipment.
COLLEGE CATALOG DESCRIPTION OF THE DIESEL EQUIPMENT TECHNOLOGY (A.A.S.) & THE DIESEL TECHNOLOGY (A.O.S.) PROGRAMS:

DIESEL EQUIPMENT TECHNOLOGY A.A.S. – CODE #2391

Diesel Equipment Technology is a ThinkPad University curriculum in which the use of laptop computers is integrated into courses.

The A.A.S. curriculum was patterned after an industrial training curriculum. This curriculum offers courses in agricultural, industrial and vehicular mechanics. The program provides the courses necessary to move from the technician level to management within a business. It is designed for students who may be considering additional course work after completing their two-year degree.

Career Opportunities: Diesel technician - truck, construction, electric power generation, agricultural, service writer, vocational teacher (with additional education), parts technician and factory representative.

Degree Requirements: Minimum 60 credits hours with a 2.0 minimum GPA and all required courses including 20 credits of Liberal Arts and Sciences

DIESEL TECHNOLOGY A.O.S.—CODE #1604

Diesel Technology is a ThinkPad University curriculum in which the use of laptop computers is integrated into courses.

This A.O.S. program consists of courses in vehicular and industrial mechanics. The curriculum is best suited for those students who wish to find immediate employment working on diesel and all aspects of industrial and agricultural equipment. The student is allowed to take a variety of courses to gain a broad background in state-of-the-art technology.

Career Opportunities: Truck repair, trailer repair, auto repair, sales and service of farm and industrial equipment, service manager, diesel fuel system technician.

Degree Requirements: Minimum 60 credits hours with a 2.0 minimum GPA and all required courses.
# TYPICAL CLASS SCHEDULES:

## Diesel Equipment Technology (A.A.S.)

### First Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>AGEN 100</td>
<td>Tractor Care &amp; Maintenance</td>
</tr>
<tr>
<td>AGEN 131</td>
<td>Fundamentals of Hydraulics</td>
</tr>
<tr>
<td>DTEC 125</td>
<td>Diesel Electrical Systems</td>
</tr>
<tr>
<td>MATH</td>
<td>Mathematics (as advised)</td>
</tr>
<tr>
<td>OFFT 110</td>
<td>Introduction to Spreadsheet Software</td>
</tr>
</tbody>
</table>

#### Spring Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGEN 161</td>
<td>Basic Hydraulics</td>
</tr>
<tr>
<td>DTEC 105</td>
<td>Diesel Powertrains I</td>
</tr>
<tr>
<td>DTEC 225</td>
<td>Diesel Electronics</td>
</tr>
<tr>
<td>AUTO 102</td>
<td>Metals</td>
</tr>
<tr>
<td>HIST, PHIL, POLI, PSYCH &amp;/or SOCI</td>
<td>Social Science Elective (as advised)</td>
</tr>
<tr>
<td>AUTO 260</td>
<td>Automotive Air Conditioning</td>
</tr>
</tbody>
</table>

### Second Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>AGEN 261</td>
<td>Advanced Hydraulics</td>
</tr>
<tr>
<td>DTEC 150</td>
<td>Diesel Systems</td>
</tr>
<tr>
<td>COMP 101</td>
<td>Composition &amp; Research</td>
</tr>
<tr>
<td>PHYS 107</td>
<td>Introduction to Physics I</td>
</tr>
</tbody>
</table>

#### Spring Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>AGEN 270</td>
<td>Tractor Overhaul &amp; Repair</td>
</tr>
<tr>
<td>DTEC 110</td>
<td>Diesel Powertrains II</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
</tr>
<tr>
<td>------------</td>
<td>------------------------------------</td>
</tr>
<tr>
<td>COMP 110</td>
<td>Technical Communications</td>
</tr>
<tr>
<td>HIST, PHIL, POLI, PSYCH &amp;/or SOCI</td>
<td>Social Science Elective (as advised)</td>
</tr>
</tbody>
</table>

**Diesel Technology (A.O.S)**

**First Year**

**Fall Semester**
- AGEN 100  Tractor Care & Maintenance
- AGEN 131  Fundamentals of Hydraulics
- DTEC 125  Diesel Electrical Systems
- RENG 102  Renewable Energy Resources
- OFFT 110  Introduction to Spreadsheet Software
- MATH     Mathematics (as advised)

**Spring Semester**
- AGEN 161  Basic Hydraulics
- DTEC 105  Diesel Powertrains I
- DTEC 225  Diesel Electronics
- AUTO 102  Metals

**Second Year**

**Fall Semester**
- AGEN 261  Advanced Hydraulics
- DTEC 150  Diesel Systems
- Major Electives
- AUTO 260  Automotive Air Conditioning

**Spring Semester**
- AGEN 270  Tractor Overhaul & Repair
<table>
<thead>
<tr>
<th>DTEC 110</th>
<th>Diesel Powertrains II</th>
</tr>
</thead>
<tbody>
<tr>
<td>DTEC 350</td>
<td>Advanced Diesel Fuel Systems (or elective)</td>
</tr>
<tr>
<td></td>
<td>Major Elective</td>
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**SUNY General Education Requirements (SUNY-GER)**

Students in the A.A.S. curriculum are required to complete 20 credits of general education courses. Students in the A.O.S. curriculum have no requirement for courses in liberal arts and general studies beyond what is viewed as a secondary school competence in English & mathematics. The A.O.S. curriculum is best suited to students who intend to find immediate employment in their field or return to the home farm. Students who intend to continue their education would be better prepared by following the A.A.S. degree program in Agricultural Engineering or Diesel Equipment Technology, which includes the liberal arts and sciences required to transfer to a bachelor degree program. A full list of SUNY General Education Requirements can be found in Appendix 7.

**Academic Advising:**

Academic advising is performed by faculty. Incoming freshmen are assigned to Chip Ax, Fred Bach or Robert Cross in order to balance the advising load. The use of the Degree Works from SUNY that both students and faculty can access helps to keep students on track to graduate. The major objectives of academic advising in the Agricultural Engineering Department are to:

- Assist students in identifying how the academic program can be suited to their interests and career goals
- Ensure that students are meeting the requirements of their degree program in a timely fashion, including prerequisites for both major and non-major courses
- Address issues that students may face while making the transition into the college environment. Faculty members, as advisors and mentors, counsel students and refer them to the appropriate resources on campus
- Encourage students to apply for summer internships that would provide them with additional experience and technical skills within their area of interest
- Advise students to apply for available scholarships and awards to allow them the ability to focus their time and energy on academics

Students meet with their academic advisors at a minimum of once per semester during their first year in order to ensure that their academic needs and credit requirements are being met, and also on an as needed basis for additional advisement. First semester students are instructed about the scheduling process during a Equipment Care & Maintenance (AGEN 100) lecture. Formal advisement of current students takes place during registration periods in the middle of each semester. Scheduled office hours for classes can also be used for advising on
other academic concerns. Students are also encouraged to seek advice and mentoring from persons they respect.

While faculty members strive to make the academic advisement as smooth for the students as possible, several factors exist that may challenge the process, including:

- Students who place in SKLS courses in Math and English before they can take the required courses in these subjects
- Students who come to college with credits earned while in high school
- Students who come to college with credits/degrees earned at another college or university
- Students who begin in the spring semester are out-of-sequence
- Students who fail required courses or earn a C- or below in a mathematics class
- Students who habitually drop required courses
- Many students in the program hold part- or full-time jobs, either at the family farm or on local operations to help offset the costs of college

Description of the Faculty:

The quality of the faculty is critical to the quality of an undergraduate academic program. The qualifications of the faculty constitute traditional measures, and they are useful to show the extent to which the faculty is prepared to fulfill the mission of the program. The quality of the program also depends on the availability of the faculty to the undergraduate, and the effectiveness of the interactions.

The Agricultural Engineering Department is part of the School of Agriculture, Business, Sustainability & Entrepreneurship (ASBE.) The seven members in the department are responsible for the following programs: Agricultural Engineering Technology (A.A.S.), Agricultural Mechanics (A.O.S.), Diesel Equipment Technology (A.A.S.), Diesel Technology (A.O.S), Renewable Energy Technology (A.A.S), Renewable Energy (B.T.) and a one year certificate in Agricultural Mechanics. The department also shares one faculty member with two other departments.

Three full-time faculty members are responsible for the majority of the Agricultural Engineering & Diesel Technology courses and advisement with the help from an Instructional Support Assistant (ISA). The majority of courses in the programs are taught by Chip Ax, Fred Bach & Robert Cross. Laboratory maintenance, compliance, set-up, creation of teaching aids, repair of school machinery and in many cases; instruction is performed by Jared Ford who is the department’s ISA. The department currently has one adjunct, Dick Smith who teaches a Seminar in Caterpillar Power Systems (DTEC 151.) Please find a description of each of the four full-time department members below:
Chip Ax:

Charles J. Ax, III

Assistant Professor

Faculty Description

Most people know me as Chip Ax and I normally teach courses in electricity, electronics, electrical power generation and small gasoline engines. However, I did not focus in pursuit of a career in academia, therefore, my education and experience background is unique but one that I consider beneficial to our students. Over the last 25 years, in addition to teaching I have had the opportunity to be an employee, be self-employed along with starting and closing a couple agricultural businesses. Some of these ventures included work in fruit crop production, juice processing and commercial ground maintenance equipment. All of these experiences have provided numerous opportunities where I can relate my personal experiences to lessons and ultimately help educate our students. During these various pursuits I have taken coursework at several institutions of higher education, attended numerous workshops and trainings as a technician and other times as an instructor.

Faculty Continuing Education & Participation

In order to provide a top quality program and training for our students I feel that we need to continue our own education in these continuously changing technologies. Therefore, to this date I strive to attend at least one equipment manufacturer sponsored or similar training opportunity annually. Additionally, I find reading about mechanics, electricity and other technology fascinating and some consider my choice of reading material to be very odd. In addition to various noted training opportunities I continually seek books, magazines, articles and other publications securing information to enhance lessons and other activities in the courses I teach. Some workshop and other training venues that I have participated include but are not limited to the following:
Fred Bach:

Fred Bach started teaching in Morrisville in 1981 and has won the Distinguished Faculty Award for his work inside and outside of the classroom. He has received both Bachelor’s & Master’s degrees in Agricultural Engineering from Cornell University, an Associate’s degree from Morrisville State College as well as an Associate’s degree in music from Onondaga Community College. Fred’s teaching currently includes courses in hydraulics, diesel engine systems, diesel fuel systems and in tractor overhaul and repair. Fred has received a multitude of training courses through industry/dealership partners throughout his career and has Cummins Engine Company trainer status. He was instrumental in the Diesel Technology program development and has created many courses for the department. When enrollment was down in our department, Fred and Andy Nethercott, formally of Syracuse Supply/Milton Caterpillar travelled to many BOCES centers throughout the state promoting our programs and scholarship opportunities. He is the advisor of the Agricultural Engineering Club which with students do a variety of activities on campus, off campus and maintains and improves the college owned Crane Lodge. Fred plays piano for many campus functions and is an active member and officer in his coin club.

Robert Cross:

Robert Cross began at Morrisville State College in 2002 after completing a M.A.T. in Education at Cornell University. Prior to that he received Bachelor’s degrees in English and Agriculture from SUNY Fredonia and SUNY Cobleskill respectively. Robert’s teaching includes a fundamental systems course, hydraulics, powertrains and agricultural machinery. He has been the department chair for the Agricultural Engineering department since 2007. In regards to professional development, Robert is an active member in the Technology & Maintenance Council (TMC), which is an offshoot of the American Trucking Association. TMC is a premiere trade group that focuses on maintenance issues of medium and heavy trucks with members from OEMs, suppliers, dealerships and fleets. Robert has received training from the construction equipment, agricultural equipment and heavy truck industries. On campus, beyond being department chair, he currently is on the campus judicial board & the applied learning committee. Outside of the department Robert has a small hay business and works on vegetable production during the growing season. He also has interests in photography and the history of agriculture and machinery.
Jared T. Ford:

Jared Ford’s background is rooted deep within agriculture with a vast amount of experience stemming from it. Experience from which he draws from to use in his position as an Instructional Support Assistant at Morrisville State College. His family has owned and operated a small dairy farm in central NY concentrating on milk production, growing, maintaining and harvesting 300 acres of diverse crops and sustaining the reproduction of 100 acres of woodland.

From his experience on the family farm Jared attended Morrisville State College and excelled in the Agricultural Engineering program paid for by a Presidential Scholarship he was awarded. After success at Morrisville he transferred to SUNY Cobleskill’s Agricultural Equipment Technology BT program. He was awarded another scholarship upon transferring and did very well in their program, including an internship he completed at Kuhn Farm Machinery. After graduation in 2009, Jared found employment at Empire Tractor, Inc. were he became the implement specialist in the service department over a 5 year period. His specialization came from set-up, service, repair and calibration of planters, tillage and hay/forage equipment and a number of service training schools. During his time at Empire tractor he begun to adjunct at Morrisville State College, starting with AGEN 270 Tractor Overhaul and Repair and later adding DTEC 150 Diesel Systems and DTEC 105 Powertrains I.

In August 2014 he became a full time employee at Morrisville State College as an Instructional Support Assistant. As an ISA his duties include setting up multiple lab activities throughout the program and maintaining equipment in the labs as needed. He aids in the progression of the program by keeping relationships with local dealerships, working with the development of interns at their locations and organizing agreements to bring in new equipment for training purposes. He works extensively with other departments of the college to use college equipment to incorporate into the program’s curriculum. He also has several lab sections in which he is the instructor and he works closely with the other faculty members to create labs, bring in new material and make regular advancements in those courses.
Demographics of Faculty in the Agricultural Engineering Department:

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<tr>
<th></th>
<th>Full-Time Faculty</th>
<th>I.S.A.</th>
<th>Adjunct</th>
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<tbody>
<tr>
<td><strong>Gender:</strong></td>
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<td></td>
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<tr>
<td>Male</td>
<td>6</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Female</td>
<td>0</td>
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<tr>
<td><strong>Credentials:</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Associate's Degree</td>
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<td>Bachelor's Degree</td>
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<td>Master's Degree</td>
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<tr>
<td>Doctorate</td>
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<td>15+ years</td>
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Hiring of Faculty & Staff:

The job description is initially formulated by the Department Chair with input from other department members. This description will be edited and approved by the Dean who will then forward it to the Provost. The Provost approves the job description and it is forwarded to Human Resources for publication. Resumes are sent to Human Resources and then forwarded to the School Office. The Dean appoints a search committee that will review at least three qualified candidates. The committee is comprised of all current faculty in the department with one additional non-department member. Candidates meet with the search committee and also make a lecture presentation to faculty and students. The committee recommends a candidate to the Provost. The Provost makes the final hiring decision.

Faculty Continuing Education & Participation:

In addition, faculty and professional staff are involved in a wide array of public service activities. The faculty and professional staff also share their knowledge and experience by giving lectures for a variety of organizations, serving on advisory councils and committees, and mentoring students. Faculty and professional staff serve on many campus committees, participate in
program reviews, in-service training, campus recruiting, and open houses, develop new courses and degree programs, and serve on search committees.

The faculty members contribute on an ongoing basis, to a wide range of scholarly and creative endeavors. These activities include, but are not limited to, extension activities, industry articles, participating in and attending conferences, entrepreneurial enterprises, and judging youth activities. The faculty members are active on hiring and tenure committees, Faculty Senate, and many other committees on campus as the need arises.

Admissions has recently required the faculty to spend a greater amount of time on duties related to increasing student numbers. Unlike any of our competitors, a faculty member or I.S.A. gives departmental tours to all students and families that visit campus. The faculty have duties at an ever-increasing number of admissions events including Open Houses & Accepted Student Days. This semester, faculty was requested to reach out to accepted students who have not yet paid their deposit. While student numbers are very important for the College to be successful and the staff does not mind these recruiting activities, there are challenges in what needs to be given up to provide time to assist the admissions department.

The faculty stay up-to-date on their knowledge of industry issues, products, and services through conferences, lecture series, print and electronic subscriptions to trade periodicals, visits to trade shows, and contact with practitioners in the field. Although limited, there are funding sources available for professional growth and development. These sources include the: Professional Development Fund, Faculty/Applied Research Program, Morrisville State College Alumni Association for Instructional Improvement, NYS/UUP Joint Labor/Management Committee, and Individual Development Awards Program.

**Description of Instruction:**

The varied educational and professional backgrounds of the faculty and professional staff represents a strong and effective mix of talents and skill. The diverse backgrounds of the faculty and staff provide a broad knowledge base to teach students. Additionally, the faculty are able to provide real world examples and situations for the students to experience, strengthening the hands-on approach that is an integral part of the education received at Morrisville State College. The faculty and professional staff highly value the differences in their backgrounds, and regards each other’s skills as valuable professional resources.

Instruction in our programs occurs in both lecture and laboratory. Virtually all of the required courses have a lecture component where the whole class meets for a traditional teaching component. Then, each course breaks down into several lab sections, where more individual, hands-on applied learning takes place.

The following table describes the teaching assignments for Agricultural Engineering, Diesel Technology & other relevant courses:
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<tr>
<th>Course #</th>
<th>Course Title</th>
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<td>Equipment Care &amp; Maintenance</td>
<td>Cross</td>
</tr>
<tr>
<td>AGEN 105</td>
<td>Principles of Farm Machinery</td>
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<td>AGEN 110</td>
<td>Small Power Equipment</td>
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<td>AGEN 115</td>
<td>Agricultural Engineering - Industry Overview</td>
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<td>Water Supply &amp; Sanitation</td>
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<td>AGEN 131</td>
<td>Fundamentals of Hydraulics</td>
<td>Bach/Ford</td>
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<td>Construction Surveying</td>
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<tr>
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<td>Applied Hydraulics for Hydropower Generation</td>
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<td>AGEN 161</td>
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<td>AGEN 210</td>
<td>Advanced Small Power Equipment</td>
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<tr>
<td>AGEN 220</td>
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<td>AGEN 261</td>
<td>Advanced Hydraulics</td>
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<td>AGEN 270</td>
<td>Tractor Overhaul &amp; Repair</td>
<td>Bach</td>
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<td>Introduction to Computer Applications in Precision Farming I</td>
<td>Shayya</td>
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<td>Diesel Powertrains I</td>
<td>Cross/Ford</td>
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Agricultural Engineering Advisory Board:

The Agricultural Engineering department has a very strong advisory board that has members from each of the three industries we serve. Members represent the construction machinery, heavy truck and agricultural machinery related firms. The members of our advisory board help shape the curricula and are the department’s best ties to industry in regards to internships and employment. The current membership is shown below:

**Andy Nethercott: Chairperson**  
Manager  
Anderson Equipment  
Email: anethercott@andersonequip.com  
Office: (315) 463-8673  
Address: 6317 Thompson Rd., Syracuse, NY 13206

**Dick Smith**  
Technical Communicator  
Milton Caterpillar  
Email: dick_smith2@miltoncat.com  
Office: (315) 476-9981  
Address: 336 Ainsley Drive, Syracuse, NY 13210

**Jerry Skiff**  
General Manager  
Anderson Equipment  
Email: JSkiff@andersonequip.com  
Office: (315) 463-8673  
Address: 6317 Thompson Rd., Syracuse, NY 13206

**Jim Strigle**  
Service Manager  
Vantage Equipment  
Email: Jim.Strigle@vanquip.com  
Mobile: (315) 437-8673  
Address: 5985 Old Court St., Syracuse, NY 13206

**David Powers**  
Manager  
Cummins Northeast  
Email: Dave.Powers@cummins.com  
Phone: (315) 410-7510  
Address: 6193 Eastern Ave., Syracuse, NY 13211
George Hand  
Service Manager  
Tracey Road Equipment  
Email: ghand@traceyroad.com  
Phone: (315) 437-1471  
Address: 6803 Manlius Center Rd., East Syracuse, NY 13057

Karl VonHahmann  
Manager  
Empire Tractor  
Email: karlvh@empiretractor.com  
Phone: (315) 539-7000  
Address: 1437 New York 318, Waterloo, NY 13165

Erik Haas  
Integrated Solutions Specialist  
Cazenovia Equipment  
Email: ehaas@cazequip.com  
Phone: (315) 655-8620  
Address: 2 Remington Park Dr, Cazenovia, NY 13035

Jeff Galley  
Service Manager  
Utica General Peterbilt  
  Email: jgalley@uticageneral.com  
Phone: (315) 732-4300  
5636 Horatio St, Rt. 12 N, Utica, NY 13502

Doug Pilbeam  
Teacher  
Oneida Herkimer Madison BOCES  
Email: dpilbeam@oneida-boces.org  
Phone: (315) 793-8685  
Address: Box 70, 4747 Middle Settlement Road, New Hartford, NY 13413

Buster Fiacco (Interim Member)  
Service Manager  
Milton Caterpillar  
Email: Buster_Fiacco@miltoncat.com  
Phone: (607) 251-6504  
Address: 55 Industrial Park Drive, Binghamton, NY 13904
Support Services for Students:

The academic and student services of the campus provide important support to the instructional efforts of the faculty. Furthermore, support services should contribute directly to the richness of students’ academic lives.

General Student Services:

The Morrisville State College (MSC) community recognizes that in order for students to succeed in the classroom and beyond, they need to make a smooth transition to college life and have positive experiences while attending. Professionals within Student Affairs and Academic Affairs at MSC share a vision of student development, a commitment to excellence in support of the overall academic mission of the college. Faculty and staff find the campus climate to be creative, conducive to innovation and dedicated to the development and maintenance of quality academic curriculums. The College Catalog, Student Handbook and Web Page detail the extensive palate student services bring to bear in support of the instructional efforts of our faculty on both the Morrisville and Norwich Campus.

The majority of students attending the main campus enjoy living in a residence hall where students begin experiencing life on their own. Students who feel safe in their living environment are more likely to have fun at college and achieve academic success. MSC students have the option of living in ten on-campus residence halls, all of which are very safe. Each residence hall has a professional, live-in Resident Director who oversees student staff to lend support, make referrals and serve as the primary resource to students who live in the building. Residence Halls are protected by 24-hour “swipe-card” security, surveillance cameras and access to a University Police force that ensures the safety of all students. Residence Hall living offers a managed living environment, educational, cultural and social programming, staff support and community development experiences. Housing by academic-affiliation and a wide range of accommodations including quiet buildings, single rooms, split-double rooms and suites, help students develop a strong peer network, live in comfortable surroundings and find varying levels of privacy.

The Student Government Organization (SGO) is an integral part of student activities at MSC, serving the entire student body through the allocation of the Student Activity Fee. SGO’s goals are to promote the general welfare of the student body, to stimulate interest in and support of activities contributing to cultural, social, educational and community development. SGO
supports dozens of programs and events on campus including the Music and Theatre Department, Arcadian student yearbook, Campus Activities Board (CAB), and open recreation in STUAC and Hamilton Hall. SGO oversees approximately 40 clubs and organizations, ranging from academic-interest clubs, such as IFSEA, to cultural organizations, music groups and honor societies and funds many activities during the year such as dances, intramurals and carnivals. The students of the Campus Activities Board (CAB) provide programming for the whole campus and remain dedicated to bringing a wide variety of educational and entertainment programs to the diverse student population. Through a combination of dedication and hard work they offer over 100 events per year including comedians, movies, mall trips, music, dances and lectures to campus.

Students can find virtually all they need right on campus. While building strong minds, students can build strong bodies. Seneca Dining Hall features balanced and delicious menus throughout the day. Students can choose freshly made deli sandwiches, hot entrees, soups, vegetables, an extensive salad bar, grill items, and hot specials. Students can exercise and recreate in two gymnasiums, an all-new fitness center, an IcePlex, a Recreation Center, an indoor and outdoor track and numerous outdoor athletic areas including softball, baseball, soccer fields and a state of the art football stadium. The Student Health Center allows students to receive basic medical care and medical advice without leaving campus. For students who need to travel, the “Rides for Residents” program helps them gain access to local medical providers.

While at college, students meet new people, experience new situations and explore new ideas. Students often have questions about themselves, about academic and career goals and choices. MSC counselors are available to talk with students about life's challenges and to help them to identify and understand their feelings, thoughts and behaviors. The counselors listen objectively and provide students with alternatives and choices to support their emotional, interpersonal, social, moral and ethical growth and help them experience academic success, provide the tools necessary to transition into another major, another college, a job or a career.

MSC is a ThinkPad University, where students learn to utilize technology in an integrated environment. Students enjoy access to an exceptional computer network, where specialized computer labs are maintained to support academic programs, data ports can be found in every classroom and wireless access permeates the campus. Staff at the Laptop Help Desk support student and faculty laptop computers, conduct laptop orientation classes, offer software/hardware maintenance and upgrades - all on a walk-in basis, over the phone, by e-mail, or by instant messenger.

The College Library maintains a high quality physical and electronic collection, the scope and content of which is determined through close cooperation between the Library and academic departments. Library staff train students in various information resources and collaborates with other libraries to share materials so students can access the very best resources available.

Nontraditional students have special needs. Many commute to campus and juggle multiple responsibilities associated with family, work and their studies. Some require access to childcare
services at the Children’s Center, others find contact with peers in the Commuter Student Organization and they all find a place just for them in the dedicated Commuter Lounge. International students benefit from a closely coordinated admissions and support process. They participate in large numbers with several clubs and organizations in the Student Government Organization and can utilize vacation-housing services during extended breaks when traveling home is impractical. Students with a documented disability can utilize services and academic accommodations by working with the Disability Specialist, who assists persons with mobility, hearing or visual impairments. Students with learning disabilities benefit from accommodations such as extended time for exams and special locations for exam taking. Students in need of tutorial services can seek assistance at the Academic Support Center and find free academic support services on a walk-in or appointment basis. The Center is staffed by full-time professionals and student tutors selected by faculty, who teach general education and basic skills courses such as mathematics, reading, writing, English as a Second Language, study skills, learning strategies and offer students a variety of individual improvement programs, workshops, videotapes and self-help materials.

MSC places a strong emphasis on meeting student needs for success in career preparation. Students utilize “Choices,” a self-directed, web-based software program that helps them investigate career options, while the Office of Placement and Transfer provides individual academic and transfer counseling, resume writing and interviewing skills assistance, helps students identify employment opportunities and hosts on-campus recruitment and Career Days events. The office places students in work-study positions during the school year and maintains a library of college catalogues and applications from across the U.S. for student and alumni use. Additionally, faculty within the Department of Agricultural Science, Dairy Management, and Agricultural Business are available and willing to meet with students on an individual basis to discuss career opportunities and assist them with cover letter/resume writing.

All students are encouraged to access the full range of service in order to enhance the richness of their academic experience. Starting with admission events and orientation programs, MSC forges a partnership with students and their families and begins delivering messages and services designed to ease the transition to the campus and chart the course for student’s personal, social and academic growth to come.

**Administrative Support:**

**Placement and Transfer Office (Whipple Administration Building)**

*Morrisville State College is a ‘transfer in not out’ institution.*

The Career Service center is available to help students and alumni of all class years, areas of study, and career ambitions on:

- Identifying and exploring career options
- Creating or editing your resume, cover letter, portfolio or personal statement
• Connecting with employers and alumni for career exploration, networking, and internship and job opportunities
• Preparing for an interview, including mock interviewing
• Doing an internship or job search
• Negotiating and evaluating job offers
• Preparing for and applying to transfer and graduate programs

However, most internships and full-time employment opportunities are a result of faculty connections within industry. Faculty members spend countless hours networking, assisting students with resumes, cover letters and future contacts.

Assessment:

Since our last program reviews in 2007, the department with help of the administration and the advisory department worked diligently to achieve an accreditation for the diesel program through the Association of Equipment Distributors (AED.) It proved to be too difficult to align an Associate’s program that stresses learning outcomes with AED’s standards that focus merely on time on task. Nonetheless, the process was very beneficial in several aspects. We changed our curricula, removing a fuels course (DTEC 250) and adding a fundamental hydraulics course. Labs were cleaned up, painted, and better arranged. In the end, for a variety of reasons, the accreditation was not received though we are a better program.

Strengths, Weaknesses, Opportunities & Threats:

Strengths of the Program

• The faculty has a wide variety of knowledge in the industries our graduates enter
• The faculty has strong industry ties with dealerships, manufacturers and trade groups in the construction machinery, heavy truck and agricultural machinery fields
• The department has a strong advisory board that provides instructional support, machinery and training opportunities as well as assisting in the advancement of the curricula
• The department is focused on providing worthwhile educational activities that occur both in and out of the classroom
• Graduates receive an Associate’s degree from an accredited university over a certificate that is earned at a for-profit institution
• Compared to our local competition, the department is known as the hands-on program that effectively use applied learning throughout the curricula
• Successful students have the opportunity to perform an internship between their first and second years which frequently leads to a job offer
• Interdepartmental relationships are currently very cohesive allowing several departments in the ASBE school to work together to share machinery, repairs, maintenance and other resources
Weaknesses of the Program

- The greatest weakness is the facility. The facility does not have the ability to fit modern equipment and does not provide enough space to effectively or safely instruct labs.
- The faculty has a large number of contact hours and other duties as compared to other technical programs on this campus and to our closest competitor.
- The teaching load allows the faculty to maintain the status quo, but doesn’t easily allow growth in our course work to incorporate the latest technologies.
- The operational budget of the program is not sufficient. To make things more difficult, maintenance of equipment and all expendable supply items such as floor soap and rags have to be purchased through these funds which takes away money from buying instructional tools and equipment.
- With the current teaching load, professional development such as industry training is difficult to attend.
- Industry training opportunities can be difficult to find.
- An additional faculty member would allow growth throughout the program.

Opportunities for the Program

- With the completion of the new agricultural engineering building, Morrisville State College could have the premiere programs in the state which would bring more students into the Morrisville community.
- The creation of a Bachelor’s of Technology (B.T.) that focuses on the technical side of the industry to complement the current B.T. in Technical Management that is currently offered through the business program.
- With the completion of the new agricultural engineering building, there will be an opportunity to work closer with industry to provide training.

Threats to the Program

- The limited number of faculty, each with a large course load provides challenges to keep up to date with technology and to grow the program.
- With our-state-of-the-art 1967 facility, many perspective students look elsewhere for their education and choose not to attend Morrisville State College.
- A lack of funding does not allow the department to purchase necessary tooling and equipment to provide quality instruction to our students.
- The size of our facility and number of laboratories does not sufficiently provide lab space for all the courses offered.
- The size of the facility and the number of faculty does not allow the addition of classes or begin work on offering a technical Bachelor’s of Technology.
Questions for the Reviewers:

- Overall, are the Diesel Equipment Technology (A.A.S.) & Diesel Mechanics (A.O.S.) programs serving the mission to educate and develop students?

- How should the Program Learning Outcomes be differentiated between the:
  - Diesel Equipment Technology (A.A.S.) program
  - Diesel Technology (A.O.S.) program

- What are the strengths of the Diesel Equipment Technology (A.A.S.) & Diesel Mechanics (A.O.S.) programs?

- What are the weaknesses of the Diesel Equipment Technology (A.A.S.) & Diesel Mechanics (A.O.S.) programs?

- What items should be changed, added or removed from the Diesel Equipment Technology (A.A.S.) & Diesel Mechanics (A.O.S.) programs?

- What items should be changed, added or removed from the Diesel Equipment Technology (A.A.S.) & Diesel Mechanics (A.O.S.) programs?

- What skill sets should a graduate from the:
  - Diesel Equipment Technology (A.A.S.) program have
  - Diesel Technology (A.O.S.) program have

- Ideally, what management and/or leadership skills should a graduate from the:
  - Diesel Equipment Technology (A.A.S.) program have
  - Diesel Technology (A.O.S.) program have

- What is the importance of having students perform an internship between their first and second years?

- How much larger in regards to student numbers could the Agricultural Engineering & Diesel Technology programs be if a state of the art agricultural engineering facility was built?

- Is there a need for graduates with a bachelor’s degree in the Agricultural Engineering and/or Diesel Technology industry?
• If there is a need for a bachelor’s degree in Agricultural Engineering and/or Diesel Technology, should the degree focused on management or technology be preferred?

• Should students in the Diesel Equipment Technology (A.A.S.) & Diesel Mechanics (A.O.S.) programs be able to substitute an internship for the Tractor Overhaul & Repair (AGEN 270) class like their peers in Agricultural Equipment Technology (A.A.S) and Agricultural Mechanics (A.O.S) can?

• Should the Powertrains I (DTEC 105) have separate labs with one focusing on medium and heavy trucks and one focusing on construction machinery and agricultural equipment?

• How should multiplexing concepts such as ISO BUS and CAN be better introduced into the curricula?
Appendix 1: Institutional Research Data Tables
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<td><strong>60</strong></td>
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## Morrisville State College
### School of Agriculture, Sustainability, Business and Entrepreneurship
#### Graduates with Average and Median Final GPA
##### 2011-12 TO 2015-16

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### Morrisville State College
School of Agriculture, Sustainability, Business and Entrepreneurship
Credits Attempted and Earned
Fall 2011-Fall 2015

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### Morrisville State College

**School of Agriculture, Sustainability, Business and Entrepreneurship**

First-time, Full-time Fall to Fall Retention

**Fall 2011-Fall 2015**

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Morrisville State College  
School of Agriculture, Sustainability, Business and Entrepreneurship  
Headcount by Gender  
Fall 2012-Fall 2016

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### Morrisville State College

#### School of Agriculture, Sustainability, Business and Entrepreneurship

**Headcount by Age Range**

**Fall 2012-Fall 2016**

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Appendix 2: Program Learning Outcomes:

Agricultural Engineering Technology A.A.S.

- Develop a comprehensive understanding of the mechanical function of the compression-ignition engines and modern agricultural equipment
- Develop a comprehensive understanding of electrical systems and electronic controls used for diesel-powered equipment and modern agricultural equipment
- Develop a comprehensive understanding of hydraulic systems, components and control systems used for transmitting hydraulic power in diesel-powered equipment and modern agricultural equipment
- Develop the ability to accurately and efficiently diagnose and repair failures in mechanical, electrical and hydraulic systems in diesel-powered equipment and modern agriculture equipment.

Agricultural Mechanics A.O.S.

- Develop a comprehensive understanding of the mechanical function of the compression-ignition engines and modern agricultural equipment
- Develop a comprehensive understanding of electrical systems and electronic controls used for diesel-powered equipment and modern agricultural equipment
- Develop a comprehensive understanding of hydraulic systems, components and control systems used for transmitting hydraulic power in diesel-powered equipment and modern agricultural equipment
- Develop the ability to accurately and efficiently diagnose and repair failures in mechanical, electrical and hydraulic systems in diesel-powered equipment and modern agriculture equipment.

Diesel Equipment Technology A.A.S.

- Develop a comprehensive understanding of the mechanical function of the compression-ignition engines.
- Develop a comprehensive understanding of electrical systems and electronic controls used for diesel-powered equipment.
• Develop a comprehensive understanding of hydraulic systems, components and control systems used for transmitting hydraulic power in diesel-powered equipment.

• Develop the ability to accurately and efficiently diagnose and repair failures in mechanical, electrical and hydraulic systems in diesel-powered equipment.

Diesel Technology A.O.S.

• Develop a comprehensive understanding of the mechanical function of the compression-ignition engines.

• Develop a comprehensive understanding of electrical systems and electronic controls used for diesel-powered equipment.

• Develop a comprehensive understanding of hydraulic systems, components and control systems used for transmitting hydraulic power in diesel-powered equipment.

• Develop the ability to accurately and efficiently diagnose and repair failures in mechanical, electrical and hydraulic systems in diesel-powered equipment.
Appendix 3: Assessment of Program Learning Outcomes for the Agricultural Engineering (A.A.S.), Agricultural Mechanics (A.O.S.) & Diesel Equipment Technology (A.O.S.)
### School of Agriculture, Sustainability, Business and Entrepreneurship

#### Agricultural Engineering Technology, A.A.S.

#### Program Learning Outcomes

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Office of Institutional Research & Effectiveness
Source: Banner Student Information System

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### School of Agriculture, Sustainability, Business and Entrepreneurship

**Agricultural Mechanics, A.O.S.**

**Program Learning Outcomes**

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<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>0527-03</td>
<td>Develop comprehensive understanding of hydraulic systems, components &amp; control systems used for transmitting hydraulic power in diesel-powered equipment &amp; modern agricultural equipment.</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>0527-04</td>
<td>Develop ability to accurately &amp; efficiently diagnose &amp; repair failures in mechanical, electrical, &amp; hydraulic systems in diesel-powered equipment &amp; modern agricultural equipment.</td>
<td>0%</td>
<td>8%</td>
<td>58%</td>
<td>0%</td>
<td>33%</td>
</tr>
</tbody>
</table>

#### Fall 2014

<table>
<thead>
<tr>
<th>PLO</th>
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<th>Not met</th>
<th>Approach</th>
<th>Meet</th>
<th>Exceed</th>
<th>Not Reported</th>
</tr>
</thead>
<tbody>
<tr>
<td>0527-01</td>
<td>Develop a comprehensive understanding of the mechanical function of the compression-ignition engines and modern agricultural equipment.</td>
<td>0%</td>
<td>50%</td>
<td>50%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>0527-03</td>
<td>Develop a comprehensive understanding of electrical systems and electronic controls used for diesel-powered equipment and modern agricultural equipment.</td>
<td>0%</td>
<td>40%</td>
<td>60%</td>
<td>0%</td>
<td>0%</td>
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<tr>
<td>0527-04</td>
<td>Develop the ability to accurately and efficiently diagnose and repair failures in mechanical, electrical and hydraulic systems in diesel-powered equipment and modern agricultural equipment.</td>
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<td>33%</td>
<td>67%</td>
<td>0%</td>
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#### Spring 2014

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<th>Meet</th>
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<tbody>
<tr>
<td>0527-04</td>
<td>Develop the ability to accurately and efficiently diagnose and repair failures in mechanical, electrical and hydraulic systems in diesel-powered equipment and modern agricultural equipment.</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
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<tr>
<td>PLO</td>
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<td>Not met</td>
<td>Approach</td>
<td>Meet</td>
<td>Exceed</td>
<td>Not Reported</td>
</tr>
<tr>
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<tr>
<td>0527-01</td>
<td>Develop a comprehensive understanding of the mechanical function of the compression-ignition engines and modern agricultural equipment.</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>0527-03</td>
<td>Develop a comprehensive understanding of hydraulic systems, components and control systems used for transmitting hydraulic power in diesel-powered equipment and modern agricultural equipment.</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>0527-04</td>
<td>Develop the ability to accurately and efficiently diagnose and repair failures in mechanical, electrical and hydraulic systems in diesel-powered equipment and modern agricultural equipment.</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
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</table>

Office of Institutional Research & Effectiveness
Source: Banner Student Information System
## School of Agriculture, Sustainability, Business and Entrepreneurship

### Diesel Technology, A.O.S.

### Program Learning Outcomes

<table>
<thead>
<tr>
<th>PLO</th>
<th>Program Learning Outcome</th>
<th>Spring 2016</th>
<th>Fall 2015</th>
<th>Spring 2015</th>
<th>Fall 2014</th>
<th>Spring 2014</th>
<th>Fall 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Develop comprehensive understanding of mechanical function of compression-ignition engines.</td>
<td>0%</td>
<td>18%</td>
<td>0%</td>
<td>13%</td>
<td>0%</td>
<td>28%</td>
</tr>
<tr>
<td>2</td>
<td>Develop comprehensive understanding of electrical systems &amp; electronic controls used for diesel-powered equipment &amp; modern agricultural equipment.</td>
<td>0%</td>
<td>29%</td>
<td>0%</td>
<td>13%</td>
<td>0%</td>
<td>39%</td>
</tr>
<tr>
<td>3</td>
<td>Develop comprehensive understanding of hydraulic systems, components &amp; control systems used for transmitting hydraulic power in diesel-powered equipment &amp; modern agricultural equipment.</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>4</td>
<td>Develop ability to accurately &amp; efficiently diagnose &amp; repair failures in mechanical, electrical, &amp; hydraulic systems in diesel-powered equipment &amp; modern agricultural equipment.</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
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### Fall 2015

<table>
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<th>Approach</th>
<th>Meet</th>
<th>Exceed</th>
<th>Not R</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Develop comprehensive understanding of mechanical function of compression-ignition engines.</td>
<td>18%</td>
<td>29%</td>
<td>53%</td>
<td>0%</td>
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</tr>
<tr>
<td>2</td>
<td>Develop comprehensive understanding of electrical systems &amp; electronic controls used for diesel-powered equipment &amp; modern agricultural equipment.</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Develop comprehensive understanding of hydraulic systems, components &amp; control systems used for transmitting hydraulic power in diesel-powered equipment &amp; modern agricultural equipment.</td>
<td>9%</td>
<td>20%</td>
<td>37%</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Develop ability to accurately &amp; efficiently diagnose &amp; repair failures in mechanical, electrical, &amp; hydraulic systems in diesel-powered equipment &amp; modern agricultural equipment.</td>
<td>6%</td>
<td>4%</td>
<td>11%</td>
<td>2%</td>
<td></td>
</tr>
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</table>

### Fall 2014

<table>
<thead>
<tr>
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<th>Not met</th>
<th>Approach</th>
<th>Meet</th>
<th>Exceed</th>
<th>Not R</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Develop a comprehensive understanding of the mechanical function of the compression-ignition engines.</td>
<td>13%</td>
<td>7%</td>
<td>73%</td>
<td>7%</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Develop a comprehensive understanding of electrical systems &amp; electronic controls used for diesel-powered equipment &amp; modern agricultural equipment.</td>
<td>13%</td>
<td>20%</td>
<td>57%</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Develop a comprehensive understanding of hydraulic systems, components &amp; control systems used for transmitting hydraulic power in diesel-powered equipment &amp; modern agricultural equipment.</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Develop the ability to accurately &amp; efficiently diagnose &amp; repair failures in mechanical, electrical and hydraulic systems in diesel-powered equipment.</td>
<td>0%</td>
<td>50%</td>
<td>50%</td>
<td>0%</td>
<td></td>
</tr>
</tbody>
</table>

### Spring 2014

<table>
<thead>
<tr>
<th>PLO</th>
<th>Program Learning Outcome</th>
<th>Not met</th>
<th>Approach</th>
<th>Meet</th>
<th>Exceed</th>
<th>Not R</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Develop comprehensive understanding of mechanical function of compression-ignition engines.</td>
<td>0%</td>
<td>10%</td>
<td>80%</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Develop comprehensive understanding of electrical systems &amp; electronic controls used for diesel-powered equipment &amp; modern agricultural equipment.</td>
<td>0%</td>
<td>60%</td>
<td>40%</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Develop comprehensive understanding of hydraulic systems, components &amp; control systems used for transmitting hydraulic power in diesel-powered equipment &amp; modern agricultural equipment.</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Develop the ability to accurately &amp; efficiently diagnose &amp; repair failures in mechanical, electrical and hydraulic systems in diesel-powered equipment.</td>
<td>7%</td>
<td>20%</td>
<td>61%</td>
<td>11%</td>
<td></td>
</tr>
</tbody>
</table>

### Fall 2013

<table>
<thead>
<tr>
<th>PLO</th>
<th>Program Learning Outcome</th>
<th>Not met</th>
<th>Approach</th>
<th>Meet</th>
<th>Exceed</th>
<th>Not R</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Develop a comprehensive understanding of the mechanical function of the compression-ignition engines.</td>
<td>28%</td>
<td>39%</td>
<td>28%</td>
<td>6%</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Develop a comprehensive understanding of electrical systems and electronic controls used for diesel-powered equipment.</td>
<td>33%</td>
<td>44%</td>
<td>11%</td>
<td>11%</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Develop a comprehensive understanding of hydraulic systems, components &amp; control systems used for transmitting hydraulic power in diesel-powered equipment.</td>
<td>25%</td>
<td>38%</td>
<td>38%</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Develop the ability to accurately &amp; efficiently diagnose &amp; repair failures in mechanical, electrical and hydraulic systems in diesel-powered equipment.</td>
<td>34%</td>
<td>34%</td>
<td>26%</td>
<td>6%</td>
<td></td>
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</tbody>
</table>

Office of Institutional Research & Effectiveness

Source: Banner Student Information System
Appendix 4: Alumni Survey Questions & Data:

The survey on the following pages was sent out to over 50 graduates of our programs that received degrees over the last five years. We were pleased that we received 28 responses from alumni and their responses should give the reviewers a good sense of how our alumni feel about the education received at Morrisville State College.

All of the questions were multiple choice except for question 28 which stated: “Please enter any comments that would be beneficial for the program reviewers to help make the programs stronger.” Eighteen of the twenty eight alumni responded to that question and their unedited responses are at the end of this section.
Q1 Your Agricultural Engineering department major is:

Answered: 28  Skipped: 0

Answer Choices

<table>
<thead>
<tr>
<th>Major</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural Engineering Technology</td>
<td>21.43%</td>
</tr>
<tr>
<td>Agricultural Mechanics</td>
<td>10.71%</td>
</tr>
<tr>
<td>Diesel Equipment Technology</td>
<td>32.14%</td>
</tr>
<tr>
<td>Diesel Technology</td>
<td>35.71%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
</tr>
</tbody>
</table>
Q2 Graduation class:
Answered: 27  Skipped: 1

<table>
<thead>
<tr>
<th>Year</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>18.52%</td>
</tr>
<tr>
<td>2015</td>
<td>29.63%</td>
</tr>
<tr>
<td>2014</td>
<td>22.22%</td>
</tr>
<tr>
<td>2013</td>
<td>18.52%</td>
</tr>
<tr>
<td>2012</td>
<td>11.11%</td>
</tr>
</tbody>
</table>
Q3 The source of information that gave you the idea of majoring in the Morrisville program was:

Answered: 28  Skipped: 0

<table>
<thead>
<tr>
<th>Answer Choices</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>High school counselor</td>
<td>28.57%</td>
</tr>
<tr>
<td>Friend</td>
<td>25.00%</td>
</tr>
<tr>
<td>Parent/relative</td>
<td>10.71%</td>
</tr>
<tr>
<td>Morrisville admissions counselor</td>
<td>3.57%</td>
</tr>
<tr>
<td>Other</td>
<td>32.14%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100%</td>
</tr>
</tbody>
</table>
Q4 Was the program at Morrisville your first choice of study in college:

Answered: 28  Skipped: 0

<table>
<thead>
<tr>
<th>Answer Choices</th>
<th>Responses</th>
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</thead>
<tbody>
<tr>
<td>Yes</td>
<td>82.14%</td>
</tr>
<tr>
<td>No</td>
<td>17.86%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
</tr>
</tbody>
</table>
Q5 During the school year, how many hours did you study during a typical week:

Answered: 27  Skipped: 1

<table>
<thead>
<tr>
<th>Answer Choices</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5</td>
<td>7.41%</td>
</tr>
<tr>
<td>6-10</td>
<td>48.15%</td>
</tr>
<tr>
<td>11-15</td>
<td>33.33%</td>
</tr>
<tr>
<td>16-20</td>
<td>0.00%</td>
</tr>
<tr>
<td>20 plus</td>
<td>11.11%</td>
</tr>
</tbody>
</table>

Total 27
Q6 What was your cumulative grade point average for the first two semesters in the program:

Answered: 28  Skipped: 0

<table>
<thead>
<tr>
<th>Answer Choices</th>
<th>Responses</th>
</tr>
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<tbody>
<tr>
<td>Below 2.0</td>
<td>3.57%</td>
</tr>
<tr>
<td>2.0-2.49</td>
<td>7.14%</td>
</tr>
<tr>
<td>2.5-2.99</td>
<td>42.86%</td>
</tr>
<tr>
<td>3.0-3.49</td>
<td>32.14%</td>
</tr>
<tr>
<td>Above 3.5</td>
<td>14.29%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
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</table>
Q7 How do you envision your future goals in relation to your program training:

Answered: 28  Skipped: 0

Answer Choices

<table>
<thead>
<tr>
<th>Response</th>
<th>Responses</th>
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</thead>
<tbody>
<tr>
<td>Will seek immediate employment in the field</td>
<td>64.29%</td>
</tr>
<tr>
<td>Will seek further professional training in the field</td>
<td>21.43%</td>
</tr>
<tr>
<td>Will seek further training in a different field</td>
<td>7.14%</td>
</tr>
<tr>
<td>Will seek immediate employment in a field other than Agricultural Engineering Technology</td>
<td>3.57%</td>
</tr>
<tr>
<td>Not sure at this time</td>
<td>3.57%</td>
</tr>
</tbody>
</table>

Total: 28
**Q8** How would you rate the overall instruction provided in the Agricultural Engineering department programs:

- **Answered:** 28  **Skipped:** 0

<table>
<thead>
<tr>
<th>Answer Choices</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very poor</td>
<td>3.57%</td>
</tr>
<tr>
<td>Poor</td>
<td>0.00%</td>
</tr>
<tr>
<td>Good</td>
<td>17.86%</td>
</tr>
<tr>
<td>Very good</td>
<td>53.57%</td>
</tr>
<tr>
<td>Excellent</td>
<td>25.00%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
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</table>
Q9 Rate the instructors' use of a variety of teaching techniques:

Answered: 28  Skipped: 0

<table>
<thead>
<tr>
<th>Answer Choices</th>
<th>Responses</th>
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<tbody>
<tr>
<td>Hardly ever</td>
<td>3.57%</td>
</tr>
<tr>
<td>Sometimes</td>
<td>25.00%</td>
</tr>
<tr>
<td>Frequently</td>
<td>57.14%</td>
</tr>
<tr>
<td>Almost always</td>
<td>14.29%</td>
</tr>
</tbody>
</table>

Total 28
Q10 Are the lectures well organized?

Answered: 28  Skipped: 0

<table>
<thead>
<tr>
<th>Answer Choices</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardly ever</td>
<td>0.00%</td>
</tr>
<tr>
<td>Sometimes</td>
<td>28.57%</td>
</tr>
<tr>
<td>Frequently</td>
<td>42.86%</td>
</tr>
<tr>
<td>Almost always</td>
<td>28.57%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
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</table>
Q11 Are the course objectives clearly stated?
Answered: 28 Skipped: 0

Answer Choices

<table>
<thead>
<tr>
<th>Answer Choices</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardly ever</td>
<td>0.00%</td>
</tr>
<tr>
<td>Sometime</td>
<td>17.86%</td>
</tr>
<tr>
<td>Frequently</td>
<td>46.43%</td>
</tr>
<tr>
<td>Almost always</td>
<td>35.71%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
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</table>
Q12 Does the program provide for student input in course content?

Answered: 28  Skipped: 0

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<th>Answer Choices</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardly ever</td>
<td>10.71%</td>
</tr>
<tr>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Sometime</td>
<td>25.00%</td>
</tr>
<tr>
<td></td>
<td>7</td>
</tr>
<tr>
<td>Frequently</td>
<td>32.14%</td>
</tr>
<tr>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Almost always</td>
<td>32.14%</td>
</tr>
<tr>
<td></td>
<td>9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>28</strong></td>
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</table>
Q13 Does the program encourage students to participate in class/lab?

Answered: 28  Skipped: 0

<table>
<thead>
<tr>
<th>Answer Choices</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardly ever</td>
<td>0.00%</td>
</tr>
<tr>
<td>Sometime</td>
<td>3.57%</td>
</tr>
<tr>
<td>Frequently</td>
<td>7.14%</td>
</tr>
<tr>
<td>Almost always</td>
<td>89.29%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
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</table>
Q14 How do you rate the amount of out of class assignments given within the program?

Answered: 28  Skipped: 0

<table>
<thead>
<tr>
<th>Answer Choices</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Too much</td>
<td>7.14%</td>
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<tr>
<td>Too little</td>
<td>0.00%</td>
</tr>
<tr>
<td>About right</td>
<td>92.86%</td>
</tr>
</tbody>
</table>

Total: 28
Q15 Do you feel that each instructor should provide a course evaluation so that students can describe the instructor's teaching effort?

Answered: 28  Skipped: 0

<table>
<thead>
<tr>
<th>Answer Choices</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>100.00%</td>
</tr>
<tr>
<td>No</td>
<td>0.00%</td>
</tr>
</tbody>
</table>

Total 28
Q16 How would you rate the quality of training provided in the Agricultural Engineering Technology programs

Answered: 28  Skipped: 0

<table>
<thead>
<tr>
<th>Answer Choices</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very poor</td>
<td>0.00%</td>
</tr>
<tr>
<td>Poor</td>
<td>7.14%</td>
</tr>
<tr>
<td>Good</td>
<td>25.00%</td>
</tr>
<tr>
<td>Very good</td>
<td>42.86%</td>
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<tr>
<td>Excellent</td>
<td>25.00%</td>
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Q17 How would you rate the quality of counseling provided in the Agricultural Engineering Technology programs?

Answered: 28  Skipped: 0

<table>
<thead>
<tr>
<th>Answer Choices</th>
<th>Responses</th>
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<tbody>
<tr>
<td>Very poor</td>
<td>0.00%</td>
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<tr>
<td>Poor</td>
<td>7.14%</td>
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<tr>
<td>Good</td>
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<td>Very good</td>
<td>50.00%</td>
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<tr>
<td>Excellent</td>
<td>21.43%</td>
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Q18 Do you think the Agricultural Engineering Technology programs need more outside group activities (field trips etc)?

Answered: 28 Skipped: 0

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<td>Yes</td>
<td>64.29%</td>
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<td>No</td>
<td>28.57%</td>
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Q19 Do you think the Agricultural Engineering Technology programs need more seminars utilizing outside personnel?

Answered: 28  Skipped: 0

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<td>20</td>
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<td>No</td>
<td>7.14%</td>
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<td>Not sure</td>
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Q20 Do you think the Agricultural Engineering Technology programs need more hands-on type of learning experiences in your training efforts?

Answered: 28  Skipped: 0

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<td>Not sure</td>
<td>7.14%</td>
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Total 28
Q21 Do you think the Agricultural Engineering Technology programs need additional faculty?

Answered: 28  Skipped: 0

Answer Choices

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<td>32.14%</td>
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Total 28
Q22 If you had to do it over again, would you go through the program?

Answered: 28  Skipped: 0

Yes: 92.86%  26
No: 7.14%  2

Total: 28
Q23 Which of the following best describes your vocational aspiration as a result of your training:

Answered: 28  Skipped: 0

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<td>Unchanged</td>
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<tr>
<td>Somewhat changed</td>
<td>28.57%</td>
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<td>Greatly changed</td>
<td>42.86%</td>
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<tr>
<td>Completely changed</td>
<td>17.86%</td>
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Q24 Do you feel the Agricultural Engineering Technology programs have the necessary equipment to support students in proper training programs?

Answered: 28  Skipped: 0

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<th>Answer Choices</th>
<th>Responses</th>
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<td>14.29%</td>
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<td>No</td>
<td>71.43%</td>
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<tr>
<td>Not sure</td>
<td>14.29%</td>
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<td>Total</td>
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</table>
Q25 Which areas should there be more instruction in? (Check all that apply.)

Answered: 28  Skipped: 0

Answer Choices Responses

Power generation/Electronics 35.71% 10

Hydraulics 21.43% 6

Engine systems 50.00% 14

Power trains 39.29% 11

All of the above 50.00% 14

Total Respondents: 28
Q26 If you graduated with a Diesel Technology degree (either A.O.S. or A.A.S), do you feel that you should have had the option to do a summer internship in place of Tractor Overhaul?

Answered: 26  Skipped: 2

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<tr>
<th>Answer Choices</th>
<th>Responses</th>
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<tbody>
<tr>
<td>Yes</td>
<td>38.46%</td>
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<tr>
<td>No</td>
<td>30.77%</td>
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<tr>
<td>No opinion on the question</td>
<td>30.77%</td>
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<tr>
<td>Total</td>
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</table>
Q27 If you graduated with an Agricultural Engineering Degree (A.A.S.) or an Agricultural Mechanics (A.O.S.) degree, what should the focus be for the second small engines course be?

Answered: 26  Skipped: 2

<table>
<thead>
<tr>
<th>Answer Choices</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>The course should continue to focus on performance vehicles (ex. snowmobiles &amp; four wheelers.)</td>
<td>11.54%</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>The course should focus on utility vehicles (ex. Gators, Mules &amp; RTVs.)</td>
<td>15.38%</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>The course should focus on both utility vehicles and performance vehicles.</td>
<td>34.62%</td>
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<td></td>
</tr>
<tr>
<td>The course should be an elective.</td>
<td>38.46%</td>
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<tr>
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<tr>
<td>Total</td>
<td>26</td>
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</table>
Q28: Please enter any comments that would be beneficial for the program reviewers to help make the programs stronger.

Response 1: For the first semester in overhaul they need more complete engines.

Response 2: There should be more hands on and tool usage in labs. (I took my tools home the first semester because they were just collecting dust) There should be more information on modern trucks and equipment and less on things that are becoming outdated and obsolete. There should be more electrical diagnostics and troubleshooting on real applications.

Response 3: I would highly recommend anyone that wants to go into the field of diesel technology to go through this program. The instructors go above & beyond to ensure students success even beyond Morrisville. I feel the program should focus less on old school injection pump rebuilds & things of that nature considering that is more specialized & average technicians rarely take pumps apart anymore, however it is still knowledge to know. More time should be spend on diesel emissions systems, they are much more prominent & technicians deal with problems with them on a daily basis. Either way it is a great program & I would not be where I am today if it was not for the dedicated instructors in that Program.

Response 4: The training equipment is in a sorry state, most of the hands on training is on equipment that is 20 years old, beginning to become dated and irrelevant to today's industry. Some of the courses were also in need of updating (fuel systems). The program should contain more courses on objectives that meet today's industry (power generation, today's fuel systems, ect.) The two courses that were most engaging and relevant were power generations and hydraulics 1&2. Power generation is an expanding field especially with alternative energy systems. Students need to be shown there is more to the field than equipment and truck repair. Professors were always around to help and abundant with information from both personal experience and gained knowledge through schooling. Overall a great program, even though I am not in the industry, I have used a lot of what I was taught.

Response 5: Some parts of the program are very outdated such as studying two cycle detroits and the ford 3 point hitch. The program really needs to focus hard on tier four emissions and common rail fuel systems. I work in the field full time and that is probably 80 percent of machine work is now emissions related. But the program truly was the hard core way of learnings diesel technology and hydraulics. I would recommend it to anybody.

Response 6: There should be more on how to actually work on the equipment rather than just learn every component of whole pieces that have to be replaced.
Response 7: I chose to transfer into tech. Management btech degree. Although this is a different program, there should be a path that is easier to follow, transitioning from ag eng to tech management. I was able to choose electives that suited my concentration and interest, though internship support and advisement in my desired field was severely lacking. The ag eng program is great being that it is versatile, though the fuels series of classes is extremely lacking in modern, up to date equipment and information. For example I have little experience with common rail systems, if any at all from college courses. At that, a majority of equipment that I work with has a common rail fuel system. On the contrary, the hydraulics courses are very good, maybe the method of instruction is foggy, but the necessary content is there. Electronics is also very strong, though with advancements in technology, there is a need for CAN network understandings, in more advanced applications. Overall I am pleased with my experience, and it gave me a great foundation to work from and build on from outside resources provided within my chosen career.

Response 8: Great staff memebers. The department needs more support from outside sources like cummins,detroit and other various large companies. They also need support on receiving hands on things like more up todate equipment to better student knowledge when they enter the worl force like newer engine, scr systems to see and after treatment systems. But all in all it is a very great course and degree with very knowledgeable staff memebers. I recommend this college and course/degree to everyone I know who mentions persueing a college degree in diesel and aig technology.

Response 9: having a basic knowledge of how and why systems work the way they do whether its electronics, engines, or hydraulics should be the foundation of these programs. with more companies investing in on the job training for specific brands(i.e. caterpillar, komatsu) I think its unnecessary to spend too much time teaching about brand specific systems.

Response 10: Tractor overhaul was a privilege to be a part of , it would maybe be helpful to somehow find tractors from outside people, an updated facility would be helpful but the curriculum was very thorough and I learned a great deal

Response 11: I believe this program has very good instruction for the theory of the systems found in heavy equipment and over road trucks but i feel certain parts are dated. The lack of training with tier 3, tier 4I and tier 4 final engines definitely impedes one”s success in the technician world. All training i currently have is what I have been able to teach myself at my current place of employment.
Response 12: Overall it was a great program to learn in. I do believe there should be a new updated facility and that some of the courses should focus on the more modern age engines and components as opposed to the more "old school engines"

Response 13: I feel the program was excellent in teaching key concepts and touched on many subjects to cover a broad spectrum. I believe it is time to update the systems in which they teach in order to keep up with the changing industries. I believe for education sake that students should be required to do an internship as well as tractor overhaul. Being able to experience a real working shop, then bringing your skills and abilities back to overhaul something is an experience that I think everyone should have. It boosts confidence in workmanship and is something to have on your resume. I also believe that common rail fuel injection systems should be covered more and possibly a diesel systems diagnostic class. It could utilize electronics, powertrains and engines all into one and look at new ways to see at how to find and correct faults that happen. One last idea for the new facility (if it happens) would be to have a fully operating shop similar to the auto facility. Having local people bring in real life failures and having students assess the damage and repair it. The auto program has made a name for its self being fully operational and self sustainable. As they don't not cover the in-depth teachings that we do, it would be awesome to see a fully operational diesel education and repair facility. It is time for this program to join the club in the 21st century and by having this fully operation facility could have more students going on to do a 4 year program in the diesel facility, rather than filling it with auto classes.

Response 14: Other schools (Alfred, Cobleskill, Ohio), do not remotely teach hydraulics as well as Morrisville. I have had a tremendous edge in my career due to this.

Response 15: be sure include teachings based on very common repairs needed in the field such as learning to rebuild hydraulic cylinders and know how to inspect a heavy duty vehicle.

Response 16: The labs should be more hands-on based and less lecture based. During the first year, labs should be more focused on the basics and learning fundamentals, while the second year should be based on trouble shooting. In learning fundamentals it would be beneficial to go over truck chassis in more depth as well as equipment undercarriage repairs. The course materials were picked well and most courses are very focused, however a few of the courses do get off topic regularly. A new building will greatly benefit this major as the labs will be able to be more course specific as well as having more room for labs. With a new building, it will also be beneficial to have a service department and parts department similar to the automotive department.

Response 17: I believe that the equipment that students need to be able to learn on need to be update big time. I am in the heavy truck field, road tractors. A couple of the biggest things that I
wish I had more training on was engines repair and engine diagnosis as well as emissions systems. Regardless of what the engines are in, almost all of them have tear four final emissions meaning they have to have a diesel particulate filter, decamp tube which holds the injector for your diesel exhaust fluid doser and your selective catylist reduction unit. We did not have one engine there with this system on it, we did how ever have one engine that had tear four interim which had only the diesel particulate filter on it which that system is not even being produced anymore. The one engine that was fitted for that was not even finished to be used for learning and also little to no class room information or teaching about these systems, I can tell you every new truck in America has this system on it, has to or the truck can’t be sold. Emmisions is a huge part of the Diesel engine today not only found in over the road trucks but farm tractors, construction equipment, and even cars and trucks. The equipment up dating is a must, common rail injection systems is found in almost every Diesel engine out there due to efficiency and creating cleaner combustion again only one engine has common rail and we never did anything with it. All the engines we have there are out of date and won’t see them in the field that often. We need up to date engines to do proper engine training and diagnosis it's incredibly crucial that this changes so students have a head start and not a behind start, the world has advanced and I thinks it's time the program does to. I recommend the school get in contact with peterbilt, freightliner, international, paccarmx, cummins, Detroit diesel, but only lightly touch base with caterpillar for engine informations only because it's a dying breed, they don't make engines. Also tractor overhaul was a great class but for the 70's and 80's maybe even 90's but farming has decreased and equipment has became out of control exoensive and unlimited in size, and working on old tractors is not really teaching much especially since the variations in age of the tractors are so much because people are scrounging to find machenery for the class. The class had a great meaning but is now something of the last that won't really work anymore and getting scarce in available machenery and parts availability. This class being eliminated and having something else brought into place would benefit the school as well as the students. Also I've found that the transmissions coarse was a decent coarse but watched it move from manual transmissions more to hydraulic transmissions and I understand a lot of farm tractors and contruction equipment have handrail if transmissions but don't forget about the guys that come to this program for trucks too. If your on a farm your most likely going to have a rig same goes for conruction and almost all trucks are using the twin countershaft transmissions even the automatic trucks are still twin countershaft transmissions . I just feel the power trains class is steering away from trucks and shouldn't be trucks run America and provide millions of jobs in the repair industry and should not be forgotten and that's why equipment updating and ciriculum updating should be in place for students to be successful thank you.

Response 18: I believe a look into automatic transmissions needs to be addressed. They are becoming more and more popular in the field. Also we did not get a good look into final drives on off-road machinery. Not much hands on instruction was given on common rail systems. Also function of aftertreatment and emissions programs should be stressed as well as diagnostics of them both physically and electronically.
AGRICULTURAL ENGINEERING TECHNOLOGY A.A.S. – CODE #0512

Agricultural Engineering is a ThinkPad University curriculum in which the use of laptop computers is integrated into courses.

Mechanization and automation in agriculture have created demand for technicians in agricultural engineering and mechanics by the farm equipment industry and by operators of large commercial farms.

If a student is interested in mechanical applications and in agriculture, this curriculum can provide many challenging opportunities.

The farm equipment industry today serves not only the commercial farmer but also is one of the major suppliers of such equipment as lawn, garden, and small recreational equipment, as well as construction equipment such as backhoes and small bulldozers for industrial uses.

Accreditation: The program is accredited by the Equipment and Engine Training Council.

Career Opportunities: Sales, service and distribution of farm equipment and supplies, petroleum products, small power equipment. Farm service representative, industrial plant maintenance.

Transfer Opportunities: Students who wish to prepare for transfer to a bachelor degree program can do so by taking six credit hours of biology and/or botany as well as eight credits of chemistry and six credits of mathematics in consultation with the student’s advisor. If a student intends to transfer to another SUNY institution, he/she must choose electives carefully taking courses covering seven of the 10 general education categories. See your advisor and select your courses carefully.

Graduation Requirements:

Students in the Agricultural Engineering program must complete 64 credit hours of course work including all requirements listed below with a minimum GPA of 2.0.

20 semester hours of Liberal Arts and Sciences

Math Proficiency: Demonstrated proficiency through MATH 102 – Intermediate Algebra with Trigonometry is required for graduation from this program.

Program Learning Outcomes:

Develop a comprehensive understanding of the mechanical function of the compression-ignition engines and modern agricultural equipment

Develop a comprehensive understanding of electrical systems and electronic controls used for diesel-powered equipment and modern agricultural equipment

Develop a comprehensive understanding of hydraulic systems, components and control systems used for transmitting hydraulic power in diesel-powered equipment and modern agricultural equipment

Develop the ability to accurately and efficiently diagnose and repair failures in mechanical, electrical and hydraulic systems in diesel-powered equipment and modern agriculture equipment.

Required Courses  Credits
OFFT 110 Introduction to Spreadsheet Software 1
AGEN 100 Tractor Care and Maintenance 3
AGEN 105 Principles of Farm Machinery 2
DTEC 125 Diesel Electrical Systems 4
DTEC 225 Diesel Electronics 4
AGEN 161 Basic Hydraulics 3
AUTO 102 Metals 3
AGSC 132 Intro to Computer Applications in Precision Farming 2
AGEN 115 Agricultural Engineering Industry Overview 1
AGEN 210 Small Power Equipment II 3
AGEN 220 Maintenance, Repair, and Performance Tuning of Arctic Cat equipment 4
AGEN 261 Advanced Hydraulics 4
AGEN 131 Fundamentals of Hydraulics 3
AGEN 270 Tractor Overhaul and Repair -or- 5
AGEN 300 Internship in Agricultural Engineering 4
AGBS 100 Agricultural Economics 3
-or-
AGBS 210 Farm Management 3
-or-
ACCT 100 Accounting Information and Management Decisions 3
DTEC 150 Diesel Systems 3

47-48

Liberal Arts and Sciences Requirements

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<tr>
<td>COMP 110 Technical Communications</td>
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<tr>
<td>MATH</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 101 Introduction to Biology</td>
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<tr>
<td>PHYS 107 Introductory Physics I</td>
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AGRICULTURAL MECHANICS A.O.S. – CODE #0527

Agricultural Mechanics is a ThinkPad University curriculum in which the use of laptop computers is integrated into courses.

The A.O.S. program is a two-year program consisting almost entirely of courses in mechanics and agriculture. There is no requirement for courses in liberal arts and general studies. The curriculum is best suited to students who intend to find immediate employment in their field or return to the home farm. The student may choose options (15 credits) in agricultural business, dairy equipment technology, small power equipment, auto mechanics, animal science, agronomy, or horticulture. Students who intend to continue their education would be better prepared by following the A.A.S. degree program in agricultural engineering, which includes the liberal arts and sciences required to transfer to a bachelor degree program.

Career Opportunities: Mechanics in farm machinery dealerships, sales and service of farm equipment, self-employment in farm machinery business, facilities maintenance in agricultural operations.

Graduation Requirements: Student must complete 61 credit hours our course work including all requirements listed below with a minimum GPA of 2.0. Demonstrated proficiency through SKLS 088 and MAGN 101 is required.

Program Learning Outcomes

- Develop a comprehensive understanding of the mechanical function of the compression-ignition engines and modern agricultural equipment
- Develop a comprehensive understanding of electrical systems and electronic controls used for diesel-powered equipment and modern agricultural equipment
- Develop a comprehensive understanding of hydraulic systems, components and control systems used for transmitting hydraulic power in diesel-powered equipment and modern agricultural equipment
- Develop the ability to accurately and efficiently diagnose and repair failures in mechanical, electrical and hydraulic systems in diesel-powered equipment and modern agriculture equipment.

Required Courses

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<td>AGEN 100</td>
<td>Tractor Care and Maintenance</td>
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<tr>
<td>AGEN 105</td>
<td>Principles of Farm Machinery</td>
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<tr>
<td>DTEC 125</td>
<td>Diesel Electrical Systems</td>
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<tr>
<td>DTEC 225</td>
<td>Diesel Electronics</td>
</tr>
<tr>
<td>AUTO 102</td>
<td>Metals</td>
</tr>
<tr>
<td>AGEN 115</td>
<td>Agricultural Engineering Industry Overview</td>
</tr>
<tr>
<td>AGEN 210</td>
<td>Small Power Equipment II</td>
</tr>
<tr>
<td>AGEN 220</td>
<td>Maintenance, Repair, and Performance Tuning of Arctic Cat Equipment</td>
</tr>
<tr>
<td>AGEN 161</td>
<td>Basic Hydraulics</td>
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<td>AGEN 261</td>
<td>Advanced Hydraulics</td>
</tr>
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<td>AGEN 270</td>
<td>Tractor Overhaul and Repair</td>
</tr>
<tr>
<td>AGEN 300</td>
<td>Internship in Agricultural Engineering</td>
</tr>
<tr>
<td>AUOS 260</td>
<td>Automotive Air Conditioning and Heating</td>
</tr>
</tbody>
</table>

-or-

75
AUTO 260 Automotive Air Conditioning 1
AGSC 132 Intro to Computer Applications in Precision Farming 2
OFFT 110 Introduction toSpreadsheet Software 1
RENG 102 Renewable Energy Resources 3
AGEN 131 Fundamentals of Hydraulics 3
DTEC 150 Diesel Systems 3
-or-
AUTO 103 Internal Combustion Engines I - Theory 3

Major Electives
Students must select a minimum of 3 credits from the following list of courses:
AGEN 135 Construction Surveying 3
-or-
NATR 142 Plane Surveying 3
RESC 130 Light Framing 3
AGEN 120 Water Supply and Sanitation 2
DTEC 350 Advanced Diesel Fuel Systems 3
ACCT 100 Accounting Info. Management and Decisions 3
AUTO 109 Chassis Analysis I 4
DTEC 105 Diesel PowerTrains I 4
DTEC 325 Electrical Power Generation 3

Option Field of Study Electives
Students must choose a minimum of 10 credits within one of the following option categories, if pursuing an option. 10 credits from the classes listed below must be taken if student is not pursuing an option.

Agricultural Business
ACCT 100 Accounting Info. and Management Decisions 3
AGBS 100 Agricultural Economics 3
AGBS 210 Farm Management 3
AGBS 200 Marketing Agricultural Products 3
AGBS 220 Agricultural Finance 3
AGBS 230 Agricultural Business Management 2

Agricultural Science (Agronomy)
AGRO 110 Soil Science 3
AGRO 210 Field Crops 3
AGRO 215 Soil Fertility and Fertilizers 3
AGRO 110 Soil Science 3
AGRO 310 Pasture Management and Forages Production 3
AGRO 105 Soil and Water Conservation 2

Animal Science
ANSC 100 Animal Science and Industry 3
DANS 100 Dairy Nutrition 3
DANS 160 Introduction to Dairy Science 3
DANS 210 Dairy Health 3
DANS 220 Dairy Herd Management 3
DANS 110 Dairy Breeding 3
DANS 225 Dairy Production and Management 3

Automotive Mechanics
AUTO 104 Automotive Electronics I 3
AUTO 109 Chassis Analysis I 4
AUTO 177 Business and Personnel Management 3
AUTO 202 Automotive Body Fundamentals 3
AUOS 127 Internal Combustion Engines 5
-or-
### Auto 103 Internal Combustion Engines I - Theory 3
### Auto 171 Automotive Drivetrains 3

### Dairy Equipment Technology
- **AGBS 230** Agricultural Business Management 2
- **DANS 160** Introduction to Dairy Science 3
- **ELEC 235** Computer Machine Control 1
- **ELEC 236** Industrial Instrumentation 1
- **BSAD 209** Salesmanship 3
- **DANS 225** Dairy Production and Management 3
- **ELEC 290** Digital Circuits and Microprocessors 3

### Horticulture
- **HORT 100** Introduction to Horticulture 3
- **HORT 101** Plant Materials 3
- **HORT 105** Landscape Planning II 3
- **HORT 109** Landscape and Turf Management 3
- **HORT 210** Horticulture Practices III 1
- **HORT 103** Landscape and Design I 3
- **HORT 107** Nursery and Garden Management 3

### Small Power Equipment
- **AUTO 104** Automotive Electronics I 3
- **AUTO 260** Automotive Air Conditioning 1
- **AGEN 110** Small Power Equipment 2
- **AUTO 177** Business and Personnel Management 3
- **ACCT 100** Accounting Info and Management Decisions 3

### DIESEL EQUIPMENT TECHNOLOGY A.A.S. – CODE #2391

*Diesel Equipment Technology is a ThinkPad University curriculum in which the use of laptop computers is integrated into courses.*

The A.A.S. curriculum was patterned after an industrial training curriculum. This curriculum offers courses in agricultural, industrial and vehicular mechanics. The program provides the courses necessary to move from the technician level to management within a business. It is designed for students who may be considering additional course work after completing their two-year degree.

**Career Opportunities:** Diesel technician - truck, construction, electric power generation, agricultural, service writer, vocational teacher (with additional education), parts technician and factory representative.

**Degree Requirements:** Minimum 60 credits hours with a 2.0 minimum GPA and all required courses including 20 credits of Liberal Arts and Sciences

**Program Learning Outcomes:**
- Develop a comprehensive understanding of the mechanical function of the compression-ignition engines.
- Develop a comprehensive understanding of electrical systems and electronic controls used for diesel-powered equipment.
- Develop a comprehensive understanding of hydraulic systems, components and control systems used for transmitting hydraulic power in diesel-powered equipment.
- Develop the ability to accurately and efficiently diagnose and repair failures in mechanical, electrical and hydraulic systems in diesel-powered equipment.

**Required Courses**

<table>
<thead>
<tr>
<th>Course</th>
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<tr>
<td>AGEN 161</td>
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<tr>
<td>DTEC 105</td>
<td>Diesel Powertrains I 4</td>
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<td>DTEC 110</td>
<td>Diesel Powertrains II 4</td>
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<td>DTEC 125</td>
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<td>AGEN 131</td>
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<td>DTEC 350</td>
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Diesel Technology is a ThinkPad University curriculum in which the use of laptop computers is integrated into courses.

This A.O.S. program consists of courses in vehicular and industrial mechanics. The curriculum is best suited for those students who wish to find immediate employment working on diesel and all aspects of industrial and agricultural equipment. The student is allowed to take a variety of courses to gain a broad background in state-of-the-art technology.

Career Opportunities: Truck repair, trailer repair, auto repair, sales and service of farm and industrial equipment, service manager, diesel fuel system technician.

Degree Requirements: Minimum 60 credits hours with a 2.0 minimum GPA and all required courses.

Program Learning Outcomes:
1. Develop a comprehensive understanding of the mechanical function of the compression-ignition engines.
2. Develop a comprehensive understanding of electrical systems and electronic controls used for diesel-powered equipment.
3. Develop a comprehensive understanding of hydraulic systems, components and control systems used for transmitting hydraulic power in diesel-powered equipment.
4. Develop the ability to accurately and efficiently diagnose and repair failures in mechanical, electrical and hydraulic systems in diesel-powered equipment.

Required Courses
- DTEC 105 Diesel Powertrains I 4
- DTEC 110 Diesel Powertrains II 4
- DTEC 125 Diesel Electrical Systems 4
- DTEC 150 Diesel Systems 3
- DTEC 225 Diesel Electronics 4
- AGEN 131 Fundamentals of Hydraulics 3
- DTEC 350 Advanced Diesel Fuel Systems 3
- AGEN 161 Basic Hydraulics 3
- AUTO 102 Metals 3
- AGEN 261 Advanced Hydraulics 4
- AGEN 270 Tractor Overhaul and Repair 5
- AUTO 260 Automotive Air Conditioning 1
- OFFT 110 Introduction to Spreadsheet Software 1
- ENSC 101 Agricultural Science 3
- RENG 102 Renewable Energy Resources 3
- AGEN 100 Tractor Care and Maintenance 3
Electives  8
Major Elective (a minimum of 4)  4
60

**Major Electives**

Students are required to take a minimum of 4 credits from the following list of courses:

- DTEC 151 Seminar in Caterpillar Power Systems 2
- DTEC Internships
- DTEC 300 Diesel Equipment Technology Internship II 4
- AGEN 103 Natural Resources Equipment Operation 2
- AGEN 120 Water Supply and Sanitation 3
- AGEN 210 Small Power Equipment II 3
- AGBS 230 Agricultural Business Management 2
- AUTO 109 Chassis Analysis I 4
- AUTO 202 Auto Body Fundamentals 3
- AUTO 203 Internal Combustion Engines II 3
- AUTO 209 Chassis Analysis II 3
- AUTO 259 Auto Body Non-structural Repair and Refinishing 3
- DTEC 325 Electrical Power Generation 3

Demonstrated proficiency through MAGN 101 Elementary Algebra with Trigonometry is required for this program. English proficiency through SKLS 088 Writing Essentials is required. Elective credits must be used to fulfill these requirements.
Course descriptions for the Agricultural Engineering Technology A.A.S. & the Agricultural Mechanics Technology A.O.S. programs

ACCOUNTING

ACCT 100 - ACCOUNTING INFORMATION AND MANAGEMENT DECISIONS
This course, recommended for non-business majors, is an accounting approach to measuring and reporting upon the economic activity, resources, and obligations of a business. Also discussed is the accounting approach to the application of accounting information to performance evaluation and the decision making process. Basic accounting processes, evaluation of financial position earnings, measurement in retailing and manufacturing, basic cost accounting and budgeting are discussed. This course is not available to accounting, business administration or computer information systems majors.

3 credits (3 lecture hours), fall or spring semester

AGRICULTURAL BUSINESS

AGBS 100 – AGRICULTURAL ECONOMICS
In this course, fundamental economic principles keyed to agriculture are discussed. Emphasis is placed on specialization and exchange, the commercial banking system, monetary and fiscal policy, and supply and demand. Units on gross national product and the consumer price index, Global international trade, United States and New York state economics are also discussed.

3 credits (3 lecture hours), fall and spring semester

AGBS 200 – MARKETING AGRICULTURAL PRODUCTS
Supply and demand analysis, elasticity of demand, commodity futures exchange with emphasis on individual projects in futures trading are included in this course. Market structure, marketing orders, pricing, advertising, and approaches to studying marketing problems are also covered as well as units on cooperatives and marketing alternatives.

3 credits (3 lecture hours), spring semester

AGBS 225 - ENVIRONMENTAL ECONOMICS
This course covers application of basic economic principles to environmental problems, pareto optimality, efficiency, price theory, perfect competition, market intervention and failure, and how the neoclassical theory affects policy decisions regarding the environment. Economic concepts are presented in an environmental context.

3 credits (3 lecture hours), spring semester

This course satisfies the Liberal Arts and Sciences requirement and the SUNY General Education Requirement for Social Science.

AGBS 230 – AGRICULTURAL BUSINESS MANAGEMENT
Fundamentals of small agricultural business operation. Forms of business organization. Sources and uses of long and short term credit and extending credit. Capital budgeting and investment analysis.

2 credits (2 lecture hours)

AGBS 240- FARM MANAGEMENT AND FINANCE
This course is designed to give students a broad understanding of the management skills required to be successful in 21st century agriculture. Students will study organizational behavior, human resource management and financial decision making as they relate to agricultural businesses with a particular emphasis on: dairy, equine, vegetable and fruit production. Major emphasis is on the fundamental principles underlying sound farm organizational and operational decision making. The principles and techniques developed are general enough to have validity through time, in any geographic area under any conditions. On the other hand, they are specific enough to be applied to an individual farm at a given time. This course requires a 15 page research paper (APA format) applying sound theoretical and practical research to an agricultural business of choice.

Prerequisite: ABGS 100 or permission of the instructor

4 credits: fall and spring
AGRICULTURAL ENGINEERING

AGEN 100 - EQUIPMENT CARE AND MAINTENANCE
Care, adjustments and overall maintenance of gasoline and diesel power applications. Servicing, fuel systems, lubrication, cooling, exhaust systems, clutch and brake adjustments and hydraulic systems will be covered. Principles of safety as applied to mobile machinery are emphasized. The course is designed for basic competency skills in care and maintenance.
3 credits (2 lecture hours, 2 laboratory hours)

AGEN 102 - AGRICULTURAL EQUIPMENT OPERATION
Familiarize students with the safe and proper methods of operating, performing maintenance, managing and selecting equipment in an economically viable way. Equipment that will be covered includes stationary and mobile machines such as feed mixers, equipment normally found on dairy farm, and forestry and construction industries. Lectures highlight management considerations whereas laboratories emphasize proper machine operation.
2 credits (1 lecture hour, 3 laboratory hours), fall semester

AGEN 103 - NATURAL RESOURCE EQUIPMENT OPERATION
Operation, safety and preventative maintenance of natural resource equipment including chain saws, log skidder, log loader, dump truck, bulldozer, fork lift, skid steer loader, backhoe, and flatbed trailer is practiced. Included in this course is the instruction and hands-on operation of chain saws, which with additional training in adult first aid/CPR and environmental concerns will qualify students for New York State Logger certification.
2 credits (1 lecture hour, 2 laboratory hours), fall or spring semester

AGEN 104 - ESTATE AND SMALL FARM EQUIPMENT OPERATION
This course will familiarize the student with safe and proper methods of operating, performing maintenance, managing and selecting equipment in an economically viable way. Equipment covered will include stationary and mobile machines such as auxiliary power units and equipment found on small farms and horticultural applications. It does not include the in-depth study into any specific machine, but covers the basics.
2 credits (1 lecture hour, 3 laboratory hours), fall semester

AGEN 105 - PRINCIPLES OF FARM MACHINERY
Care, adjustment, operation and repair of tillage, planting and harvesting field machinery common to New York state farms with special attention to adjustment and maintenance in the laboratory are covered in this course. Efficient machinery selection and use is also investigated.
2 credits (1 lecture hour, 2 laboratory hours), fall semester

AGEN 110 - SMALL POWER EQUIPMENT
Principles of operation, service and repair of 2 and 4 cycle small engines and the equipment which they operate such as lawn and garden equipment, chain saws, small power generators and outboard motors. Laboratory practice in testing, servicing and rebuilding the equipment.
2 credits (1 lecture hour, 2 laboratory hours), fall semester

AGEN 115 - AGRICULTURAL ENGINEERING—INDUSTRY OVERVIEW
This course will expose the student to the many and varied opportunities that exist for graduates in Agricultural Engineering Technology and Agricultural Mechanics. The course will present a broad spectrum of speakers to describe their careers and the linkages that exist to their educational background.
1 credit (1.5 lecture hours), first 10 weeks of fall semester

AGEN 120 - WATER SUPPLY AND SANITATION
Development of sources of water. Selection, servicing, installation of pumping equipment, and treatment of water. Designing and installing supply plumbing and sanitary disposal systems.
2 credits (1 lecture hour, 2 laboratory hours), spring semester

This course satisfies the Liberal Arts and Sciences requirement.
AGEN 125 - RESIDENTIAL ELECTRIFICATION
Design, installation, and troubleshooting of alternating current circuits used in residential construction. Circuit planning and layout as per national electrical code is emphasized. A set of hand tools is required for this course.

3 CREDITS (2 LECTURE HOURS, 2 LABORATORY HOURS), SPRING SEMESTER

AGEN 131 – FUNDAMENTALS OF HYDRAULICS
Students will develop a foundation of hydraulic principles and system operation as found on mobile hydraulic systems. Topics studied will include the principles of flow and pressure and how force can be multiplied within a mobile hydraulic system. The student will be introduced to components used in hydraulic systems: pumps (gear, vane and piston), valves, cylinders and accumulators. Students will also develop an understanding of how an open center hydraulic system functions.

3 credits (2 lecture hours, 2 laboratory hours), fall semester

AGEN 135 - CONSTRUCTION SURVEYING
Basic concepts of construction surveying as it specifically relates to agriculture and conservation applications, including field work in land drainage, pipeline stakeout, building stakeout and road construction. Survey planning and associated survey computations. Emphasis is on the operation of modern land measurement equipment including dumpy, laser and automatic levels, theodolite and EDM.

3 credits (2 lecture hours, 3 laboratory hours), fall semester

AGEN 140 - WELDING
Operation of oxyacetylene and electric welders. Laboratory practice in welding and cutting of ferrous metals by processes common and current to the industry.

3 credits (1 lecture hour, 1 recitation, 2 laboratory hours), spring semester

AGEN 145 - AGRICULTURAL BUILDING SYSTEMS
The design of agricultural production facilities as an integration of unique structural, environmental, and waste management systems is studied along with the principles of design and construction of the structure and associated environmental systems with emphasis on coordination of various systems. Laboratory exercises include construction of an exemplary structure on site.

3 credits (2 lecture hours, 3 laboratory hours), spring semester

AGEN 151 – APPLIED HYDRAULICS FOR HYDROPOWER GENERATION
This course covers the basic concepts of water hydraulics as applied to hydropower generation. The course is introductory in nature and is intended to provide basic review of fluid static and hydrodynamic conditions as applied to micro- and mini-hydro power generation systems. Focus will be on the utilization of the conservation of energy principle to establishing the conditions that will impact the selection of a hydropower generation system along with the assessment of how to harness energy from flowing fluids (water).

Prerequisites: MATH 102

3 credit (2 lecture hour, 2 laboratory hours), spring semester

AGEN 161 - BASIC HYDRAULICS
This course will present the fundamental principles of hydraulic and pneumatic systems as used on mobile agricultural, construction and on-highway machinery. Disassembly and inspection of the various components in hydraulic systems will be completed throughout the course. Introduction to ISO graphic symbols and how they are represented in actual systems will be stressed. Additionally, diagnostics and testing of equipment will be discussed.

Prerequisite: AGEN 131 or permission of instructor
Pre- or Co-requisite MAGN 101 or permission of instructor

3 credits (2 lecture hours, 2 laboratory hours), spring semester

This course satisfies the Liberal Arts and Sciences requirement and the SUNY General Education Requirement for Natural Science.
AGEN 210 - ADVANCED SMALL POWER EQUIPMENT
Students will learn technical and business aspects of operating a small engine repair business and technical theory covering design characteristics of different types of compact power units for lawn and garden, recreational vehicle, and commercial and industrial applications. Laboratory classes simulate repair shop conditions. Students are responsible for scheduling, servicing, performing repairs of equipment for the college community. A basic set of tools is required.
Prerequisite: AGEN 100 or AGEN 110
3 credits (2 lecture hours, 3 laboratory hours), spring semester

AGEN 220 - MAINTENANCE, REPAIR, AND PERFORMANCE TUNING OF ARCTIC CAT RECREATIONAL EQUIPMENT
This course will cover the maintenance, repair, and performance tuning of Arctic Cat Snowmobiles and All-Terrain Vehicles. The concepts taught will be common to many other sport equipment manufacturers' products. The systems studied will include; Suspension, EFI, Drivetrain, Electrical, Fuel, and 2 and 4 stroke engines. The course will include mandatory testing that will allow the student to be certified at the basic level of Arctic Cat CatMaster Technician Certification.
Prerequisite: AGEN 210 and successful completion of EETC 4-Stroke Cycle Test
4 credits (2 lecture hours, 4 laboratory hours), spring semester

AGEN 240 - ADVANCED WELDING
Bonding and fusion of metals including alloy steels and nonferrous metals. Metallurgical changes which accompany welding and the fabrication of metals, TIG, MIG, Flux-cored and plasma-arc processes are stressed.
Prerequisite: AGEN 140 or AUTO 102
2 credits (1 recitation, 2 laboratory hours), fall semester

AGEN 261 - ADVANCED HYDRAULICS
This course will be an application of previously mastered principles of hydraulic systems to both farm and light industrial equipment. Inspection, testing and servicing hydraulic circuits, systems and components, such as pumps, lift systems, hydraulic transmissions and motors will be emphasized. Appropriate testing procedures and equipment will be used. System difficulties and common service problems will be diagnosed.
Prerequisite: AGEN 131, AGEN 161, MAGN 101 or permission of instructor.
4 credits (2 lecture hours, 1 recitation hour, 2 laboratory hours), fall semester

AGEN 270 - TRACTOR OVERHAUL AND REPAIR
In this course, students study principles, overhaul and repair of multi-cylinder internal combustion engines and various types of engines used in farm and light industrial power applications. Design and construction of engine components and systems and fundamentals and principles of systems of power transmission are covered. There is a laboratory practice in which students may use their own machines.
Prerequisites: AGEN 100, AGEN 261, DTEC 250, or permission of instructor, agricultural engineering majors only
5 credits (2 lecture hours, 4 laboratory hours), spring semester

AGEN 300 - INTERNSHIP IN AGRICULTURAL ENGINEERING
Students work in an approved job in the agricultural engineering industry. Comprehensive written report required at the end of the work period. Employer and staff evaluation are due upon completion of internship.
Prerequisite: Completion of one semester in Agricultural Engineering and permission of staff, overall GPA of 2.0.
4 credits (12-Week, 480-hour minimum), fall or spring semester

AGRICULTURE AND NATURAL RESOURCES
AGNR 400 – INSTRUCTIONAL ASSISTANCE EXPERIENCE
Designed to concentrate students’ knowledge in an Agriculture Science or Natural Resource discipline to the extent that they can convey that knowledge to associate degree level students. As part of their course work they will research class topics, lead discussions for 100 or 200 level course work, demonstrate practical applications during laboratory sessions, and assist the professor with class and lab preparation. Student is expected to meet regularly with a discussion or laboratory section, to gain instructional experience, and to regularly discuss course objectives, techniques, and subject matter with the Lead Faculty member.
Prerequisite: “B” or better in the required course or by permission of the Instructor.
1-4 credits (as arranged with the Professor)
Fall or Spring Semester
AGRONOMY (CROPS AND SOILS)

AGRO 105 - SOIL AND WATER CONSERVATION
Principles of soil and water conservation are covered in this course as well as practical application through land use, runoff and erosion control and soil management practices.

2 credits (3 lecture hours, 2 laboratory hours), spring semester (8 weeks)

This course satisfies the Liberal Arts and Sciences requirement and the SUNY General Education Requirement for Natural Science.

AGRO 110 - SOIL SCIENCE
This course covers the fundamentals of soil science, origin, nature and formation of soils, physical and chemical properties and soil management practices.

3 credits (2 lecture hours, 2 laboratory hours), fall and spring semester

This course satisfies the Liberal Arts and Sciences requirement and the SUNY General Education Requirement for Natural Science.

AGRO 210 - FIELD CROPS
Production of field crops, their importance, adaptation, varieties and cultural practices are covered in this course.

Prerequisite: AGRO 110 or permission of instructor

3 credits (2 lecture hours, 2 laboratory hours), spring semester

AGRO 215 - SOIL FERTILITY AND FERTILIZERS
Principles involved in supplying essential elements for growing plants. Soil and tissue analysis, nutrient deficiency symptoms. Factors in manufacture, applications and economics of fertilizers, amendments and organic materials.

Prerequisite: AGRO 110

3 credits (2 lecture hours, 2 laboratory hours), spring semester

This course satisfies the Liberal Arts and Sciences requirement and the SUNY General Education Requirement for Natural Science.

AGRO 310 - PASTURE MANAGEMENT AND FORAGES PRODUCTION
Fundamentals of pasture management and forages production for maximum yield, quality, and longevity.

Prerequisite: AGRO 110

3 credits (2 lecture hours, 2 laboratory hours), fall semester

AGRICULTURAL SCIENCE

AGSC 132 - INTRODUCTION TO COMPUTER APPLICATIONS IN PRECISION FARMING I
Application of computer software in agricultural business, crop production, and dairy management as it relates to precision farming including: GPS, GIS, fertilizer recommendation, dairy ration software, dairy genetic software, and farm management software.

2 credits, fall semester

This course satisfies the Liberal Arts and Sciences requirement and the SUNY General Education Requirement for Natural Science.

ANIMAL SCIENCE

ANSC 100 - ANIMAL SCIENCE AND INDUSTRY - CONCURRENT ENROLLMENT
This is a concurrent enrollment course with designated high schools to acquaint high school students with animal science and industry. It offers an introduction to farm and companion animal production and its affiliated industries with emphasis on the biological nature of animals, infrastructures and economic uniqueness of affiliated industries, animal products and services, and the management of animal enterprises.

3 credits (minimum of 45 lecture hours), spring semester
AUTOMOTIVE SERVICE SPECIALIST
AUOS 127 - INTERNAL COMBUSTION ENGINES
Theory of the internal combustion engine including the fundamentals in nomenclature, measurement, wear analysis and repair procedures for all current automotive power plants. Laboratories focus on engine overhaul.
5 credit hours (2 lecture hours, 6 laboratory hours), spring semester

AUTOMOTIVE TECHNOLOGY TRADITIONAL PROGRAM
AUTO 102 - METALS
Characteristics and properties of metals, metallurgy, fabrication, oxyacetylene and arc welding. TIG and MIG welding and other industrial processes.
3 credits (1 lecture hour, 2 laboratory hours, 1 hour recitation)

AUTO 104 - BASIC AUTOMOTIVE ELECTRICAL SYSTEMS
Direct and alternating current circuits, magnetism, inductance, electrochemical action, and semiconductors. Introduction to automotive wiring diagrams, using voltage, amperage, and resistance measurements to troubleshoot opens, shorts, and excess resistance problems in basic DC circuits. Introduction to automotive cranking and charging systems.
3 credits (2 lecture hours, 3 laboratory hours), fall or spring semester

AUTO 105 – CAR AND LIGHT TRUCK DIESEL FUNDAMENTALS
This course explores the operation and service of modern car and light truck diesel engines. Principles and theories are studied by running, testing, dissembling, and reassembling components, systems and engines.
2 credits (2 lecture hours, 2 laboratory hours), spring semester, meets for 10 weeks.

AUTO 109 - CHASSIS ANALYSIS I
Construction, operation and repair of modern chassis components. Including: Brakes (disc, drum, diagonal, quick take-up, and anti-lock); Suspensions (coil, leaf, McPherson, wishbone, and active); Steering systems including: linkage and rack & pinion. Tires, wheels and bearings.
4 credits (3 lecture hours, 3 laboratory hours), fall semester

AUTO 260 – AUTO AIR CONDITIONING AND REFRIGERATION RECOVERY
Introduction to the theory, operation, service, repair and diagnosis of factory installed air conditioning.
1 credit (1 lecture hour, 2 laboratory hours), 8 weeks, fall semester

AUTO 261 - AUTOMOTIVE AIR CONDITIONING AND HEATING
Basic principles, nomenclature and operation as applied to the automotive air-conditioning and heating units. Labs prepare students for required certification in the handling of refrigerant as well as repairs.
3 credit hours (2 lecture hours, 3 laboratory hours), spring semester

BIOLOGICAL SCIENCE
BIOL 101 - INTRODUCTION TO BIOLOGY
This course provides a basic introduction to biological principals for non-biology related majors. Lecture topics in this course include: introduction to science, the chemistry of life, cellular organization of life, heredity and natural selection, biological diversity, and population and community ecology. The lab covers a variety of techniques and tools related to the investigation of selected topics in biology.
4 credits (3 lecture hours, 2 laboratory hours), fall or spring semester

This course satisfies the Liberal Arts and Sciences requirement and the SUNY General Education Requirement for Natural Science
BUSINESS ADMINISTRATION

BSAD 209 - SALESMANSHIP

Principles and techniques of personal selling and sales management are topics covered in this course. Concepts include background information a salesperson needs and analysis of the selling process. Sales planning and controlling, selection and training of salespeople, advertising, sales promotion and persuasive communication are part of the course. Software applications used to manage sales information and PowerPoint presentations are included in this course.

3 credits (3 lecture hours)

COMPOSITION

COMP 101 – COMPOSITION AND RESEARCH

College composition and research. Students practice modes of rhetoric by writing expository essays, culminating in an argumentative research paper.

Pre-requisite: Placement in COMP 101 or C or better in COMP 100 or equivalent

3 credits (3 lecture hours), fall or spring

This course satisfies the Liberal Arts and Sciences requirement and the SUNY General Education Requirement for Basic Communication.

COMP 110 - TECHNICAL COMMUNICATIONS

Designed to introduce students to internal and external workplace communications such as memos, manuals, instruction sheets, and proposals. Research and group projects are required and may include oral presentations and visual aids. Students cannot receive credit for both COMP 110 and COMP 310

Prerequisite: C or better in COMP 101

3 credits (3 lecture hours), fall or spring semester

This course satisfies the Liberal Arts and Sciences requirement and the SUNY General Education Requirement for Basic Communication.

DAIRY - ANIMAL SCIENCE

DANS 100 - DAIRY NUTRITION

Functions and properties of nutrients, comparative digestive anatomy of non-ruminants and ruminants, the effects of proper nutrition on health and reproduction. Labs will deal with the composition and nutritive value of feeds and ration balancing for different classes of livestock. Emphasis on dairy cattle.

3 credits (2 lecture hours, 2 laboratory hours), fall semester

DANS 110 - DAIRY BREEDING

Animal breeding including animal reproduction and basic genetics. Male and female reproductive anatomy and physiology, hormonal control of the reproductive system, the estrous cycle, fertilization, reproductive failures, diseases and management practices associated with reproduction and artificial insemination. Mendelian genetics utilizing simple dominance, sex influenced inheritance and systems of mating.

3 credits (2 lecture hours, 2 laboratory hours), spring semester

This course satisfies the Liberal Arts and Sciences requirement and the SUNY General Education Requirement for Natural Science.

DANS 115 - DAIRY ARTIFICIAL INSEMINATION

Provides students with skills associated with the modern concept of artificial insemination. Topics include history, economic importance, equipment, techniques, estrous cycle of the cow, timing of insemination, and record keeping.

1 credit (1 lecture hour), spring semester
DANS 160 - INTRODUCTION TO DAIRY SCIENCE
An introductory course to the dairy industry with a focus on its evolution and the scope of New York’s, United States’ and the world’s industry. It will include discussion of farm types, production techniques, breeds of cattle, cattle behavior and selection, economics and trends. Dairy products will be studied, as well as consumer trends, milk quality and processing, a section on farm organization, cooperative careers, farm management structure and the future of the industry will be included. The lab will supplement the lecture and will include animal behavior, marketing, performing milk quality tests, and field trips.
3 credits, (2 lecture hours, 2 laboratory hours), fall semester

DANS 200 - NUTRITIONAL MANAGEMENT OF DAIRY CATTLE
Complete nutritional program assessment emphasizing analysis of crop production, forage analysis, ration balancing, pasture management, feeding strategies and feeding systems for optimum production and profit on a dairy farm. Computer applications, on-farm visits, and introduction to advanced technology will be included.
Prerequisite: DANS 100
2 credits (1 lecture hour, 3 laboratory hours), spring semester

DANS 210 - DAIRY HEALTH
Prerequisite or Co-requisite: DANS 151
3 credits (3 lecture hours), fall semester

DANS 220 - DAIRY HERD MANAGEMENT
The focus is on the dairy industry as a business enterprise, its history, future, productivity trends, milk production and management strategies to be competitive and profitable. Discussion on the application of scientific principles associated with progressive dairy cattle management including breeding systems, feeding systems, herd health practices, dairy herd replacements and heifer programs. Lab will include computer applications on the farm, dehorning, hoof trimming, herd health monitoring, dairy records interpretation and analysis, and assessing housing and cow comfort.
Prerequisite or Co-requisite: DANS 150
3 credits (2 lecture hours, 2 laboratory hours), fall semester

DANS 225 - DAIRY PRODUCTION AND MANAGEMENT
This course is designed to study bovine mammary system, anatomy and physiology, milk secretion and ejection, milking machines, mastitis and prevention to attain high efficiency milk production. Herd record evaluation and use of Dairy management software will be used for production analysis. Students will work in teams and become assistant herd managers. The course will also include topics on housing systems and cost effective housing. Guest speakers, professional conferences and filed trips will be part of the course.
Prerequisite or Co-requisite: DANS 150, DANS 151
3 credits (2 lecture hours, 2 laboratory hours), spring semester

DIESEL TECHNOLOGY
DTEC 105 - DIESEL POWERTRAIN I
A course covering the operation, diagnosis, and repair of power transmission components on Heavy Equipment and Over-The-Road Tractors. Topics addressed will include: Clutches, Standard Transmissions, Torque Converters, Automatic Transmissions, and Drive shafts.
4 credits (3 lecture hours, 2 laboratory hours), spring semester

DTEC 110 - DIESEL POWERTRAIN II
A course covering the operation, diagnosis, and repair of chassis components on Heavy Equipment and Over-The-Road Tractors. Topics addressed will include: Chassis systems, alignment, PTOs, single and tandem rear axles, springs, shocks and other suspension components, tires, wheels, and bearings, and braking systems including ABS and brake chamber servicing.
4 credits (3 lecture hours, 2 laboratory hours), spring semester
DTEC 125 - DIESEL ELECTRICAL SYSTEMS
An introduction to the fundamentals of electricity and their application in diesel engines and equipment. Basic theory of AC and DC systems used for charging, starting, lighting, and accessory circuits is covered. Lectures emphasize understanding of common circuit configurations and sample wiring schematics. Labs emphasize testing of components, troubleshooting circuits, and common repair techniques.
4 credits (3 lecture hours, 2 laboratory hours) fall semester

DTEC 150 - DIESEL SYSTEMS
Theories and principles of diesel operation and construction. Engine removal, inspection, disassembly, part analysis, and rebuilding. Engine run-in, dyno testing, and principles of troubleshooting will be discussed.
3 credits (2 lecture hours, 2 laboratory hours), fall semester

DTEC 151 - SEMINAR IN CATERPILLAR POWER SYSTEMS
Theories and principles of caterpillar diesel engines, operation and construction, engine removal, inspection disassembly and rebuild are covered in this course. Caterpillar-specific software and reference material will be used.
Co-requisites: DTEC 150 or permission of the instructor.
2 credits (1 lecture hour, 2 laboratory hours), fall semester

DTEC 250 - MECHANICAL INJECTION SYSTEMS
Principles of injection systems, design, and construction of different systems. Inspection, tear down, and service of various components. Use of special testing and calibrating equipment. Special emphasis on diesel equipment used on farm tractors and power equipment.
3 credits (2 lecture hours, 2 laboratory hours), fall semester

DTEC 225 - DIESEL ELECTRONICS
A continuation of DTEC 125. Expanding on basic AC and DC theory, to include multiplexing, active and passive sensors and digital electronics, this course addresses more complex wiring schematics, sensor troubleshooting and wiring harness repair. Students will use diagnostic equipment, lap top computers and current manufacturers’ software and communication adapters to analyze and repair digital electronic systems fund on construction, on highway, agricultural and electric power generation systems.
Prerequisite: DTEC 125
Pre-or Co requisite: MAGN 101, or by permission of instructor
4 credits (3 lecture hours, 2 laboratory hours) spring semester

DTEC 290 - DIESEL EQUIPMENT TECHNOLOGY INTERNSHIP 1
This course is designed for Diesel Equipment Technology majors to complete a limited time internship as part of their program. The student must select a diesel industry employer to work for during a college break most likely during the winter break. Students will be introduced to on-the-job skills as well as interpersonal skills necessary to maintain a job.
Prerequisites: DTEC 150, AGEN 100, permission of instructor, overall GPA of 2.0.
1 credit, spring semester (internship to take place during winter break)

DTEC 295 - DIESEL EQUIPMENT TECHNOLOGY INTERNSHIP 3
This course is designed for Diesel Equipment Technology majors to complete a limited time internship as part of their program. The student must select a diesel industry employer to work for during a college break most likely during the winter break. Students will be introduced to on-the-job skills as well as interpersonal skills necessary to maintain a job. Concentration will be on advanced skills and management systems.
Prerequisites: Final semester status in diesel program, permission of instructor, overall GPA of 2.0.
1 credit, spring semester (internship to take place during winter break)

DTEC 300 - DIESEL EQUIPMENT TECHNOLOGY INTERNSHIP 2
This course is designed for Diesel Equipment Technology majors to complete a summer internship as part of their program. The student must select a diesel industry employer to work for during the summer (or other extended break from college) between their first and second year of study. Students will learn on-the-job skills as well as interpersonal skills necessary to maintain a job.
Prerequisites: DTEC 150, AGEN 100, DTEC 125, DTEC 105, permission of instructor, overall GPA of 2.0.
4 credits, fall semester
DTEC 325 – ELECTRICAL POWER GENERATION
Students will develop the knowledge and skills necessary to install, troubleshoot and service on-site power generation systems up to 50kW. This course emphasizes various generator types driven by both typical and atypical methods. Instruction is provided in the areas of diesel and gaseous fueled engines, control systems and governors. Advanced instruction is provided in electrical components necessary in the generation, storage, conversion, switching, and transmission of electric power. Students develop the practical skills needed to work with on-site electrical power generation equipment and related systems.
Prerequisites: DTEC 125 or ELEC 190 & DTEC 150 or AGEN 210 or by permission of instructor
Co-requisites: MAGN 101
3 credits (2 hours lecture, 2 hour lab), Fall semester

DTEC 350 - ADVANCED DIESEL FUEL SYSTEMS
A continuum of DTEC 250 involving more advanced concepts of diesel engines, injection systems, two and four cycle engines, use of advanced testing and calibration equipment. Electronic control of diesel fuel injection systems, operating principles and computer diagnostics will be addressed.
Prerequisite: DTEC 250
3 credits (2 lecture hours, 2 laboratory hours), spring semester

ENVIRONMENTAL SCIENCE
ENSC 101 - AGRICULTURAL SCIENCE
Basic introduction to general agricultural and life science principles as an aid to the understanding of plant, animal and soil functions, as well as fundamental computations as applied to agricultural production. This course is intended for non-ENSC majors.
3 credits (3 lecture hours), fall semester
This course satisfies the Liberal Arts and Sciences requirement and the SUNY General Education Requirement for Natural Science.

HORTICULTURE
HORT 100 - INTRODUCTION TO HORTICULTURE
A dual-credit course with designated high schools to acquaint selected high school students with horticulture basics such as: plant processes, function, reproduction, and growth. Lab activities include plant propagation and greenhouse growing of various ornamental plants. Lectures will review career opportunities in a wide range of horticultural professions.
3 credits (2 lecture hours, 1 recitation hour), fall semester

HORT 101 - PLANT MATERIALS
The identification and landscape characteristics of woody plants commonly found in landscapes of Northeastern United States. Part of each weeks labs include an outdoor plant walk to view various specimens in the landscape.
3 credits (2 lecture hours, 2 laboratory hours), fall semester

HORT 102 - FLORAL DESIGN I
Introduction to the principles, elements, and basic construction techniques of commercial floral design. Hands-on labs include: corsages, bud vases, assorted arrangements, dried flowers, wreaths, and holiday designs.
2 credits (1 lecture hour, 2 laboratory hours), fall semester

HORT 103 - LANDSCAPE PLANNING AND DESIGN I
This course is an introduction to the design process, principles and vocabulary used in landscape architecture. The course content addresses landscape planning and design specifically as it applies to residential site design. Students gain creative problem-solving skills and explore effective methods of graphic, written and oral communication in a series of design projects. The semester culminates in a final design project in which students develop a landscape design solution for an actual residential site.
3 credits (2 lecture hours, 2 laboratory hours), spring semester
HORT 108 - HERBACEOUS PLANT MATERIALS
Identification, culture, and landscape use of annuals, perennials, and tropical foliage plants. Emphasis on plants that are commercially common to the Northeast.
2 credits (1 lecture hour, 2 lab hours), spring semester

HORT 109 - LANDSCAPE AND TURF MANAGEMENT
This course addresses the principles and practices of landscape and turf installation, maintenance and management. The lectures focus on a wide range of topics such as the value of landscape management, the landscape industry, starting your own business, project site analysis, site preparation, landscape and turf installation, turf grass species, and landscape maintenance. Lab activities are organized around hands-on campus and community landscape projects that include planting, pruning, pest and weed control, fertilization, turf establishment or renovation.
3 credits (2 lecture hours, 2 laboratory hours), fall semester

HORT 210 - HORTICULTURE PRACTICES II
Horticulture Practices is an on-going series of courses designed to engage students in a wide range of horticulture practices. These practices include methods acceptable by both commercial and research sectors of the Green Industry. HORT 210 is a sophomore-level course which continues to introduce students to the basics while adding advanced production skills and technology. The level of students crop and entrepreneurial responsibilities will also increase.
2 credits (1 lecture hour, 2 laboratory hours), spring semester.

MATHEMATICS
Choosing Your First Mathematics Course
It is important that you begin your mathematics sequence at the appropriate level for which you are qualified. You need to know your initial mathematics placement and exit requirement for your program. If you do not know your initial placement, contact the chair of the Department of Mathematics and Computer Science. Following are the different options if you have been placed at, below, or above your program’s mathematics exit requirement.

If you have been placed at your program’s exit requirement, then take that mathematics course as specified in the college catalog.
If you have been placed below your program’s exit requirement, then take that mathematics course and then progress through the math sequence to the mathematics course listed as the exit requirement.
If you have been placed above your program’s exit requirement, then take the mathematics course you are placed at, or an appropriate mathematics course elective listed below to fill a math requirement.

Mathematics Sequence

<table>
<thead>
<tr>
<th>Algebra Sequence</th>
<th>Calculus Sequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>SKLS 091</td>
<td>MATH 147</td>
</tr>
<tr>
<td>MAGN 101</td>
<td>MATH 151 OR MATH 161</td>
</tr>
<tr>
<td>MATH 102</td>
<td>MATH 152 OR MATH 162</td>
</tr>
<tr>
<td>MATH 103</td>
<td>MATH 261</td>
</tr>
<tr>
<td>MATH 147</td>
<td>MATH 262</td>
</tr>
</tbody>
</table>

The above information contains the sequence of mathematics courses for The Department of Mathematics and Computer Science at Morrisville State College. This does not include mathematics electives. A student must pass a course with a C or better to meet the pre-requisite for the next course in the sequence. Any student who passes a course with a C or better may not take a course lower in the sequence to receive mathematics credit. If a student elects to take a mathematics course as Pass/Not Pass, a grade of pass does not imply that a student is able to progress in the sequence. In order to progress in the sequence, the numeric grade will be used to determine if the student has met the prerequisite.
Mathematics course electives

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Prerequisite/Placement</th>
<th>Prerequisite</th>
<th>Grade Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 123</td>
<td>Elementary Statistics</td>
<td>MAGN 101 placement</td>
<td>(C or better)</td>
<td>Required</td>
</tr>
<tr>
<td>MATH 141</td>
<td>Statistics</td>
<td>MATH 102 placement</td>
<td>(C or better)</td>
<td>Required</td>
</tr>
<tr>
<td>MATH 145</td>
<td>Discrete Mathematics</td>
<td>MATH 102 placement</td>
<td>(C or better)</td>
<td>Required</td>
</tr>
<tr>
<td>MATH 149</td>
<td>Elementary Linear Algebra</td>
<td>MATH 103 placement</td>
<td>(C or better)</td>
<td>Required</td>
</tr>
</tbody>
</table>

Transfer/Placement Information

Transfer credit: College mathematics courses taken at other institutions are evaluated and will be awarded transfer credit when appropriate.

How students are initially placed in a mathematics course

All incoming students are required to take a mandatory placement exam.* In addition to the result on the placement exam, other factors that may be considered include: high school mathematics grades, examinations (regents, state, SAT, or ACT), the number of attempts necessary to successfully complete high school mathematics courses, and the time elapsed since a student’s last mathematics course.

*In some cases, college mathematics courses taken at other institutions and successfully transferred for credit may be considered in lieu of the placement exam.

How to find a student’s mathematics placement/other questions

If a student’s mathematics placement is needed, or if students or advisors have any other questions about mathematics placement, please contact the chair of The Department of Mathematics and Computer Science, or any member of the department.

Lowering placement after unsuccessful attempt

If a student begins a course but is not capable of finishing it because it is too difficult, the student may meet with the department chair to determine if a lower mathematics placement is more appropriate for subsequent semesters.

SUNY General Education

Students who successfully complete MATH 123 will fulfill the SUNY General Education requirement for Mathematics. Students who successfully complete MATH 102 or a mathematics course that has MATH 102 or greater as a prerequisite will fulfill the SUNY General Education requirement for Mathematics.

SKLS 091 - PRE-ALGEBRA

(see Skills Courses)

MAGN 101 - ELEMENTARY ALGEBRA

Topics include: Review of basic arithmetic skills. Properties of the real number system, terminology, and vocabulary; Solving linear equations and inequalities in one variable; Literal equations and applications of algebra; Integer exponents; Operations on Polynomials; Factoring; Operations on Rational expressions; Graphing linear equations. (TI-30 required)

Prerequisite: SKLS 091 (C or better required) or equivalent

3 credits* (3 lecture hours), fall or spring semester

* These credits do NOT count toward the math/science requirements of the A.S., A.A.S., or A.A. degree.

MATH 102 - INTERMEDIATE ALGEBRA WITH TRIGONOMETRY

Topics include: Exponents, roots, and radicals; Functions and their graphs; Solving and graphing quadratic equations and applications; Solving, radical, equations; Equations in quadratic form; General angle trigonometry; Solving systems of linear equations in two or three variables and applications. (TI-83 plus or TI-84 plus required, TI-Nspire or similar calculator is not allowed.)

Prerequisite: MAGN 101 (C or better required) or equivalent

3 credits (3 lecture hours), fall or spring semester

This course satisfies the Liberal Arts and Sciences requirement and the SUNY General Education Requirement for Mathematics.
OFFICE ADMINISTRATION

OFFT 110 - INTRODUCTION TO SPREADSHEET SOFTWARE

This hands-on course introduces the concept of using spreadsheets, lists and charts. The course will cover basic data entry into worksheets, formatting the worksheets, using formulas, and creating charts. Spreadsheets provide the tools needed to manage, present and analyze numeric data for personal or business use.

1 credit (3 lecture hours), spring and fall semesters, five weeks

PHYSICS

PHYS 107 - INTRODUCTORY PHYSICS I

An introduction into the concepts and methods of scientific inquiry illustrated using elements of classical mechanics complemented with laboratory experiments. Topics include translational and rotational motions of particles and rigid bodies, analyzed using simple algebra-based Newtonian kinematics, dynamics and statics, and conservation of energy and momentum.

Pre- or Co-requisite: MATH 102 or equivalent
4 credits (3 lecture hours, 2 laboratory hours), fall or spring semester

This course satisfies the Liberal Arts and Sciences requirement and the SUNY General Education Requirement for Natural Science

RENEWABLE ENERGY

RENG 102 – RENEWABLE ENERGY RESOURCES

A scientific examination of the energy field with emphasis on alternate energy sources; their technology and application will be covered in this course, in addition to present needs and future demands; conventional sources, biomass conversions; wind power; geothermal; solar and nuclear energy. Conservation methods are stressed. Knowledge of intermediate algebra is highly recommended for this course.

3 credits (3 lecture hours), fall semester, (spring semester online only)

This course satisfies the Liberal Arts and Sciences requirement and the SUNY General Education Requirement for Natural Science.

SKILLS COURSES

SKLS 088 – WRITING ESSENTIALS

This course is designed to develop the basic language skills. It is a developmental skills course, grounding students in the mechanics of Standard English through sentence construction and paragraph organization and development.

Prerequisite: D or better in high school English
3 credits (3 lecture hours), fall or spring semester

These credits do NOT count toward graduation credit.

SKLS 091 – PRE-ALGEBRA

This course consists of basic mathematics with the ground work for introductory algebra. Topics include covers operations with whole numbers, integers, fractions, decimals, percents and application problems for each area. Students will learn strategies for solving problems without the use of a calculator. The goal of Pre-algebra is to prepare the student to deal with math as it occurs in everyday life and to prepare the student for introductory algebra.

3 credits (not to count toward graduation credit), 3 lecture hours, fall or spring semester
Appendix 7: SUNY General Education Courses by 10 Categories & A.O.S. General Education Requirements
SUNY General Education Requirements for the Agricultural Engineering A.A.S. & the Diesel Equipment Technology A.A.S. programs

SUNY General Education

The SUNY General Education Requirement (SUNY-GER) enables students to acquire knowledge and skills that are useful and important for all educated persons, regardless of their jobs or professions. *(SUNY Board of Trustees Resolution, January 2010).*

Students in baccalaureate degrees, Associate of Arts and Associate of Science degrees must complete 30 credit hours in 7 of 10 categories below. Basic Communication and Mathematics are required.

- Basic Communication (required)
- Mathematics (required)
- American History
- The Arts
- Foreign Language
- Humanities
- Natural Science
- Other World Civilization
- Social Science
- Western Civilization

In addition to completing the SUNY General Education Requirements some degrees require additional general education credits in the Liberal Arts and Sciences (LAS).

<table>
<thead>
<tr>
<th>Degree</th>
<th>SUNY GER Credits</th>
<th>Additional LAS Credits</th>
<th>Total General Education credits</th>
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</thead>
<tbody>
<tr>
<td>Associate in Applied Science</td>
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<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Associate in Arts</td>
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<td>15</td>
<td>45</td>
</tr>
<tr>
<td>Associate in Science</td>
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<td></td>
<td>30</td>
</tr>
<tr>
<td>Bachelor of Technology</td>
<td>30</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>Bachelor of Business Administration</td>
<td>30</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>Bachelor of Science</td>
<td>30</td>
<td>30</td>
<td>60</td>
</tr>
</tbody>
</table>
The following courses satisfy the SUNY General Education Requirements and/or Liberal Arts and Sciences Requirements

**MORRISVILLE STATE COLLEGE**  
**GENERAL EDUCATION/LIBERAL ARTS AND SCIENCES COURSE LIST**

<table>
<thead>
<tr>
<th>BASIC COMMUNICATION</th>
<th>SUNY GER</th>
<th>LAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMM 111 Introduction to Speech</td>
<td>GBC</td>
<td>LAS</td>
</tr>
<tr>
<td>COMM 300 Visual Communication</td>
<td>GBC</td>
<td>LAS</td>
</tr>
<tr>
<td>COMP 101 Composition and Research</td>
<td>GBC</td>
<td>LAS</td>
</tr>
<tr>
<td>COMP 110 Technical Communication</td>
<td>GBC</td>
<td>LAS</td>
</tr>
<tr>
<td>COMP 220 Writing in the Disciplines</td>
<td>GBC</td>
<td>LAS</td>
</tr>
<tr>
<td>COMP 221 Advanced Composition and Research</td>
<td>GBC</td>
<td>LAS</td>
</tr>
<tr>
<td>COMP 310 Advanced Technical Communication</td>
<td>GBC</td>
<td>LAS</td>
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</table>

<table>
<thead>
<tr>
<th>MATHEMATICS</th>
<th>SUNY GER</th>
<th>LAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 102 Intermediate Algebra with Trigonometry</td>
<td>GM</td>
<td>LAS</td>
</tr>
<tr>
<td>MATH 103 College Algebra with Trigonometry</td>
<td>GM</td>
<td>LAS</td>
</tr>
<tr>
<td>MATH 123 Elementary Statistics</td>
<td>GM</td>
<td>LAS</td>
</tr>
<tr>
<td>MATH 141 Statistics</td>
<td>GM</td>
<td>LAS</td>
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<tr>
<td>MATH 145 Discrete Mathematics</td>
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</tr>
<tr>
<td>MATH 147 Selected Topics in Precalculus</td>
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<tr>
<td>MATH 149 Elementary Linear Algebra</td>
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<tr>
<td>MATH 151 Analytical Geometry and Calculus I</td>
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<tr>
<td>MATH 152 Analytical Geometry and Calculus II</td>
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<tr>
<td>MATH 153 Business Calculus</td>
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<tr>
<td>MATH 161 Engineering Calculus I</td>
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<tr>
<td>MATH 162 Engineering Calculus II</td>
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<tr>
<td>MATH 261 Engineering Calculus III</td>
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<td>LAS</td>
</tr>
<tr>
<td>MATH 262 Differential Equations</td>
<td>GM</td>
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<table>
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<tr>
<th>AMERICAN HISTORY</th>
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</thead>
<tbody>
<tr>
<td>HIST 101 United States History to 1800</td>
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<td>LAS</td>
</tr>
<tr>
<td>HIST 102 United States History from 1800 to 1900</td>
<td>GAH</td>
<td>LAS</td>
</tr>
<tr>
<td>HIST 103 United States History from 1900 to the Present</td>
<td>GAH</td>
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<td>Course</td>
<td>SUNY/GER</td>
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<td>HIST 220 African American History</td>
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<td>HIST 225 Women in the United States</td>
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<td>HIST 320 History of New York State</td>
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<tr>
<td>ARTS</td>
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<tr>
<td>ARCH 101 Architectural Graphic Communications w/Lab</td>
<td>GA</td>
<td>LAS</td>
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<tr>
<td>ARCH 141 Architectural Design I w/Lab</td>
<td>GA</td>
<td>LAS</td>
</tr>
<tr>
<td>ARCH 142 Architectural Design II w/Lab</td>
<td>GA</td>
<td>LAS</td>
</tr>
<tr>
<td>ARCH 243 Architectural Design III w/Lab</td>
<td>GA</td>
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<tr>
<td>ARCH 244 Architectural Design IV w/Lab</td>
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<tr>
<td>ART 110 Introduction to the Visual Arts</td>
<td>GA</td>
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<tr>
<td>ART 120 Introduction to Drawing</td>
<td>GA</td>
<td>LAS</td>
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<tr>
<td>ART 121 Introduction to Painting</td>
<td>GA</td>
<td>LAS</td>
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<tr>
<td>ART 131 Introduction to Photography</td>
<td>GA</td>
<td>LAS</td>
</tr>
<tr>
<td>COMP 230 Creative Writing: Short Story</td>
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<td>COMP 231 Creative Writing: Poetry</td>
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<td>HORT 403 Planting Design</td>
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<td>HUMN 210 The Film Experience</td>
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<td>MUSI 101 Introduction to Music and Art</td>
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<td>LAS</td>
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<tr>
<td>MUSI 102 History of Jazz</td>
<td>GA</td>
<td>LAS</td>
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<td>MUSI 150 Ensemble I</td>
<td>GA</td>
<td>LAS</td>
</tr>
<tr>
<td>MUSI 155 Ensemble II</td>
<td>GA</td>
<td>LAS</td>
</tr>
<tr>
<td>MUSI 160 Ensemble III</td>
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<td>LAS</td>
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<td>MUSI 165 Ensemble IV</td>
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<td>THEA 124 Introduction to Theater</td>
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<td>THEA 125 Play Production</td>
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<td>THEA 150 Theater Production Lab</td>
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<td>FOREIGN LANGUAGE</td>
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<td>Black American Writers</td>
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<td>Soil Fertility and Fertilizers</td>
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<td>BIOL 101</td>
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<td>BIOL 102</td>
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<td>BIOL 103</td>
<td>Botany: Plant Diversity</td>
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<td>BIOL 105</td>
<td>Human Biology</td>
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<td>BIOL 107</td>
<td>Topics in Contemporary Biology</td>
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<tr>
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<tr>
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<td>ESCI 305</td>
<td>Equine Reproduction and Breeding Management</td>
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<td>HORT 150</td>
<td>Fruit and Vegetable Production</td>
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<td>MECH 213</td>
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<td>Principles of Arboriculture</td>
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<td>Dendrology</td>
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<td>Invasive Species Management</td>
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<td>NATR 232</td>
<td>Wildlife Ecology and Management</td>
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<td>NATR 250</td>
<td>Aquatic Ecology</td>
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<td>NATR 252</td>
<td>Fish Ecology and Management</td>
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<td>NATR 254</td>
<td>Fish Health Management</td>
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<td>NATR 260</td>
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<td>University Physics II (Electricity and Magnetism)</td>
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<td>PHYS 267</td>
<td>University Physics III (Sound and Thermodynamics)</td>
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<td>PHYS 268</td>
<td>University Physics IV (Optics and Modern Physics)</td>
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<td>ANTH101 Introduction to Anthropology</td>
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<td>GEOG 101 Introduction to World Regional Geography</td>
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<td>HIST 151 World History to 1600</td>
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<td>HIST 152 World History from 1500</td>
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<td>HIST 172 Latin American and Caribbean History</td>
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<td>HIST 181 History of Technology to 1800</td>
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<td>HUMN 220 Introduction to Islam</td>
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<tr>
<td>LITR 208 Eastern World Literature</td>
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<td>ECON 140 Introduction to Microeconomics</td>
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<td>ECON 300 Money, Banking and Financial Markets</td>
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<td>ECON 370 International Economics</td>
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<td>POLI 111 State and Local Governments</td>
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<td>PSYC 161 Social Science and Pseudoscience</td>
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<td>PSYC 221 Biological Psychology</td>
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<td>PSYC 242 Adolescent Development</td>
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<td>PSYC 243 Adult Development</td>
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<td>PSYC 284 Psychology of Gender</td>
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<td>PSYC 304 Industrial/Organizational Psychology</td>
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<td>PSYC 381 Personality</td>
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<td>PSYC 384 Group Behavior</td>
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<td>PSYC 386 Social Psychology</td>
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<td>SOCI 221</td>
<td>Death and Dying</td>
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<td>SOCI 270</td>
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<td>SOCI 360</td>
<td>Social Movements and Community Change</td>
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**WESTERN CIVILIZATION**

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<td>European History from 1500</td>
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<td>History of Technology from 1750</td>
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<td>The World Wars</td>
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<td>HIST 372</td>
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**COURSES FULFILLING ONLY THE LAS REQUIREMENT**

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<td>Water Supply and Sanitation</td>
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<td>Introduction to Architecture</td>
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<td>ARCH 151</td>
<td>Architecture: Prehistory to 1800</td>
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<td>ARCH 252</td>
<td>Architecture: 1800 to Present</td>
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<td>Intro to CJUS Systems</td>
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<td>Juvenile Delinquency</td>
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</table>
General Education Requirements for the Agricultural Mechanics A.O.S. and the Diesel Technology A.O.S. programs

SKILLS COURSES

SKLS 088 – WRITING ESSENTIALS

This course is designed to develop the basic language skills. It is a developmental skills course, grounding students in the mechanics of Standard English through sentence construction and paragraph organization and development.

Prerequisite: D or better in high school English

3 credits (3 lecture hours), fall or spring semester

These credits do NOT count toward graduation credit.

SKLS 091 – PRE-ALGEBRA

This course consists of basic mathematics with the ground work for introductory algebra. Topics include covers operations with whole numbers, integers, fractions, decimals, percents and application problems for each area. Students will learn strategies for solving problems without the use of a calculator. The goal of Pre-algebra is to prepare the student to deal with math as it occurs in everyday life and to prepare the student for introductory algebra.

3 credits (not to count toward graduation credit), 3 lecture hours, fall or spring semester

MATHEMATICS

Choosing Your First Mathematics Course

It is important that you begin your mathematics sequence at the appropriate level for which you are qualified. You need to know your initial mathematics placement and exit requirement for your program. If you do not know your initial placement, contact the chair of the Department of Mathematics and Computer Science. Following are the different options if you have been placed at, below, or above your program’s mathematics exit requirement.

If you have been placed at your program’s exit requirement, then take that mathematics course as specified in the college catalog.

If you have been placed below your program’s exit requirement, then take that mathematics course and then progress through the math sequence to the mathematics course listed as the exit requirement.

If you have been placed above your program’s exit requirement, then take the mathematics course you are placed at, or an appropriate mathematics course elective listed below to fill a math requirement.

Mathematics Sequence

<table>
<thead>
<tr>
<th>Algebra Sequence</th>
<th>Calculus Sequence</th>
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<tbody>
<tr>
<td>SKLS 091</td>
<td>MATH 147</td>
</tr>
<tr>
<td>MAGN 101</td>
<td>MATH 151 OR MATH 161</td>
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<tr>
<td>MATH 102</td>
<td>MATH 152 OR MATH 162</td>
</tr>
<tr>
<td>MATH 103</td>
<td>MATH 261</td>
</tr>
</tbody>
</table>
The above information contains the sequence of mathematics courses for The Department of Mathematics and Computer Science at Morrisville State College. This does not include mathematics electives. A student must pass a course with a C or better to meet the pre-requisite for the next course in the sequence. Any student who passes a course with a C or better may not take a course lower in the sequence to receive mathematics credit. If a student elects to take a mathematics course as Pass/Not Pass, a grade of pass does not imply that a student is able to progress in the sequence. In order to progress in the sequence, the numeric grade will be used to determine if the student has met the prerequisite.

Mathematics course electives

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Prerequisite</th>
<th>Placement Required</th>
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</thead>
<tbody>
<tr>
<td>MATH 123</td>
<td>Elementary Statistics</td>
<td>MAGN 101 (C or better) or placement into MATH 102</td>
<td></td>
</tr>
<tr>
<td>MATH 141</td>
<td>Statistics</td>
<td>MATH 102 (C or better) or placement into MATH 103</td>
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</tr>
<tr>
<td>MATH 145</td>
<td>Discrete Mathematics</td>
<td>MATH 102 (C or better) or placement into MATH 103</td>
<td></td>
</tr>
<tr>
<td>MATH 149</td>
<td>Elementary Linear Algebra</td>
<td>MATH 103 (C or better) or placement into MATH 147</td>
<td></td>
</tr>
</tbody>
</table>

Transfer/Placement Information

Transfer credit: College mathematics courses taken at other institutions are evaluated and will be awarded transfer credit when appropriate.

How students are initially placed in a mathematics course

All incoming students are required to take a mandatory placement exam.* In addition to the result on the placement exam, other factors that may be considered include: high school mathematics grades, examinations (regents, state, SAT, or ACT), the number of attempts necessary to successfully complete high school mathematics courses, and the time elapsed since a student’s last mathematics course.

*In some cases, college mathematics courses taken at other institutions and successfully transferred for credit may be considered in lieu of the placement exam.

How to find a student’s mathematics placement/other questions

If a student’s mathematics placement is needed, or if students or advisors have any other questions about mathematics placement, please contact the chair of The Department of Mathematics and Computer Science, or any member of the department.

Lowering placement after unsuccessful attempt

If a student begins a course but is not capable of finishing it because it is too difficult, the student may meet with the department chair to determine if a lower mathematics placement is more appropriate for subsequent semesters.

SUNY General Education

Students who successfully complete MATH 123 will fulfill the SUNY General Education requirement for Mathematics. Students who successfully complete MATH 102 or a mathematics course that has MATH 102 or greater as a prerequisite will fulfill the SUNY General Education requirement for Mathematics.

SKLS 091 - PRE-ALGEBRA

(see Skills Courses)

MAGN 101 - ELEMENTARY ALGEBRA

Topics include: Review of basic arithmetic skills. Properties of the real number system, terminology, and vocabulary; Solving linear equations and inequalities in one variable; Literal equations and applications of algebra; Integer exponents; Operations on Polynomials; Factoring; Operations on Rational expressions; Graphing linear equations. (TI-30 required)

Prerequisite: SKLS 091 (C or better required) or equivalent

3 credits* (3 lecture hours), fall or spring semester

* These credits do NOT count toward the math/science requirements of the A.S., A.A.S., or A.A. degree.
Appendix 8: Relevant Course Outlines

Course Title: Metals: Auto 102  
Semester: Spring 2017  
Credit Hours: 3 credits (1 lecture hour, 2 laboratory hours, 1 hour recitation)  
Prerequisites and/or Co-requisites: None  
Classroom and/or Laboratory Location(s): Design Building Room 102, Lab Galbreath 160  
Classroom and/or Laboratory Time(s): Lecture Monday 9-10 and 10-11  Lab Monday 1-2:50, Tuesday 9-11:50, 2-4:50, Wednesday 1-3:50

Instructor: Graham Jones  
Office Location: Automotive Building 1 Room 109  
Office Hours: Monday 11-12, Tuesday 12-1, Thursday 2-3, other times by appointment  
Office Email: Jonesgc@Morrisville.edu  
Office Phone: 315-684-6731  
Other Contact Information: Welding Lab 315-684-6342

Course Description:  
This course is designed as an introduction to basic welding operations. Metallurgy, characteristics and properties of metals are discussed and analyzed. Various types of steels, cast iron, aluminum and brass are discussed and identified. Oxyacetylene, shielded metal arc welding, gas metal arc welding, gas tungsten arc welding and various cutting operations are discussed and practiced.

Course Learning Outcomes:  
Using the information and activities provided by this course, after successfully completing this course, the student will be able to:

- Will be able to identify filler material requirements  
- Will be able to join steel using any of the, three Metal joining processes  
- Will be able to adjust the Oxyacetylene equipment for Cutting, Welding, or Brazing  
- Will be able to cut steel using the plasma cutter.

Additional Learning Resources: Welding helmet with shade 10 lenses or darker, Leather welding gloves, Flame resistant welding jacket, Leather work Boots

Tests, Quizzes, Homework and Assignment  
You will be expected to read assignments, which may be followed by a quiz, as well as take notes in lecture, lab, and demonstrations. You should plan to spend one to two hours preparing for each lecture. Any assignment not handed in on time due to absence will be accepted at the next lecture only if legitimate excuse is given. All homework papers handed in will be graded on content, spelling, grammar, and neatness. **You must remove the loose edges of the paper in order to be accepted.** Please use only one side of your paper and staple multiple sheets together.

Assessment and Grading
Final Grading:
A  = 95-100  A- = 90-94
B+ = 87-89   B  = 83-86   B- = 80-82
C+ = 77-79   C  = 75-77   C- = 70-74
D  = 65-69   F  < 65

- Overall Grade Lecture 1/3 and Lab 2/3
- Lecture: Participation 25%, Homework 25%, quizzes 25%, and Tests 25%
- Lab: Participation 50%, Proficiencies 50%

Course Calendar/Assignments/Topics:
EXAMPLE:
- Week 1: Introduction
- Week 2: Welding Safety Equipment
- Week 3: Physics of Welding
- Week 4: Weld Joints and Positions
- Week 5: History and types of welding
- Week 6: Flame Cutting and welding
- Week 7: SMAW welding and equipment
- Week 8: SMAW Electrodes
- Week 9: SMAW welding positions
- Week 10: GMAW welding and equipment
- Week 11: GMAW welding Supplies
- Week 12: GTAW welding Positions
- Week 13: Plasma Arc Cutting
- Week 14: GTAW welding and Equipment
- Week 15: Final Exam

Class Attendance:
Students are expected to attend all scheduled classes and laboratories. However, special circumstances such as illness, religious
holidays, travel difficulties, family emergencies and participation in college sponsored events may make certain absences
unavoidable. In such instances, students should notify instructors of these special circumstances.
A faculty member can suspend a student from class or laboratory for disruptive behavior, that is, for actions which interfere
with the orderly conduct of the session or which threaten bodily harm to others.
Although regular class attendance will not guarantee passing grades, irregular attendance will usually have an adverse effect
upon them.
Students should review the Morrisville State College Student Handbook for further details.
- No Tobacco Product Usage
- No Vaporizers
- No Food or Drink
- Cell Phones Turned Off

Academic Support:
The Academic Enrichment Center (AEC) provides free learning assistance services to all students at Morrisville
State College. Tutoring by qualified peer and professional tutors is available in most subject areas on a walk-in or
appointment basis at the AEC on the first floor of Butcher Library. A comprehensive tutoring schedule is posted in
the AEC as well as on the Tutoring Services webpage of the College’s website. The AEC also offers workshops
entitled Student Success Seminars and handouts on such topics as time management, study skills, taking notes, and
reading strategies. Students with questions about tutoring should contact Stephanie Lawhorne, Director of Academic
Support, on the first floor of Butcher Library, by phone at 315-684-6067, or by email at
LawhorSL@morrisville.edu.
Students should review the Morrisville State College Student Handbook for further details.
Students with Disabilities:
The office of the Coordinator of Services for Students with Disabilities is located in the Butcher Library on the 2nd floor. The Norwich Campus Office for Students with Disabilities is located on the 1st floor of Roger W. Follett Hall, room 133. All services for students with disabilities are coordinated through the Students with Disabilities office at Morrisville or at Norwich. Students with a documented disability who wish to utilize services and/or academic accommodations should contact the Coordinator for their respective campus before or at the start of each semester. David Symonds is the Coordinator and can be reached at 315-684-6349 or symondda@morrisville.edu. Patricia Davis is the Coordinator for the Norwich Campus and can be reached at 607-334-5144 or davispm@morrisville.edu. Students should review the Morrisville State College Student Handbook for further details.

The Code of Academic Honesty:
Academic honesty promotes continued academic and occupational success. Maintenance of academic honesty and quality education is the responsibility of both faculty and students. Students should review the Morrisville State College Student Handbook for further details.

The Student Code of Conduct:
Morrisville State College (MSC) is a community established for educational purposes, and like any community, depends upon rules for its orderly existence. Individuals are expected to assume responsibility for their academic progress, their conduct, and for the actions of groups to which they belong. Students should review the Morrisville State College Student Handbook for further details.

Safety:
New York State law requires all students wear safety glasses in the lab at ALL times. Failure to wear safety glasses will result in two (2) warnings; then you will be dismissed for the remainder of the lab period. Work shoes are required, no sandals. You must wear appropriate work attire (no shorts). The following is required by the automotive department; work pants and work shirt (“Dickies”-dark color, no jeans/no logo t’s).

GRIEVANCE PROCEDURE:
A student may appeal an academic decision that involved a violation of college rule, or policy; alleged unfair or inequitable treatment; alleged prejudice, capricious, or unjust evaluation. Information on steps to follow may be found in the Student Handbook.

AGEN 100 Tractor Care and Maintenance Syllabus
Mr. Cross

Credits: Three credit hours
Lecture: Tuesday & Thursday 10:00 – 10:50
Lab:
Tuesday (03L) 2:00 – 3:50
Wednesday (01L) 1:00 – 2:50
Wednesday (02L) 3:00 – 4:50
Tuesday (04L) 4:00 – 5:50

Office Hours: Monday 11:00 – 11:50, 1:00-1:50
            Tuesday 11:00-11:50
Course Description:
This course will focus on the care, adjustments and maintenance of gasoline and diesel powered machinery and equipment used in farm and industrial power applications. The fuel, lubrication, cooling, exhaust, clutch, and hydraulic systems will all be investigated. Principles of safety as applied to the operation, maintenance and repair of mobile machinery will be applied throughout the course. Tractor Care and Maintenance is designed to develop a basic competency in the respected field.

Course Objectives:
1. To develop the ability to recognize common machine hazards and an understanding of workplace safety
2. An understanding of workplace safety will be developed.
3. To develop a competency in the use of proper tools and various fasteners.
4. To provide an understanding in the care and maintenance of modern spark and compression ignition equipment.
5. A fundamental knowledge of drive trains (both mechanical as well as hydraulic) will be explored
6. To form a basic understanding of bearings and seals.

Course Materials:
1. Course handouts given in class and/or available at the instructor’s web page.

Student Responsibilities:
1. To read the course syllabus and to ask questions if the material is unclear.
2. To attend all classes and labs
3. To attend one’s scheduled lab unless previous arrangements are made with the instructor.
4. To make up any and all class work covered during their absence.
5. To complete on time all work including reading, homework, lab write-ups and the term project.
6. Student’s work will demonstrate careful, neat, complete and individual efforts.

Lab:
1. Safety is the most important aspect of the lab work. If a student performs in an unsafe manner, he/she will first receive a verbal warning. If a second instance occurs the student will receive a written warning and the third instance could result in removal from the lab and course. Needed safety materials will be discussed during the first week’s lab meeting.
2. A lab write-up will be due after each lab. The lab write-up is due at the beginning of the following week’s lab. Unless otherwise noted, each lab will be downloaded from the course’s webpage and a printout will be handed in.
3. Students are required to attend their scheduled lab unless previous arrangements have been made. Due to the fact that labs are balanced, every effort should be made to attend the scheduled lab.

Attendance Policy:
- All attendance policies as listed below from the Student Handbook will be followed.
- If a student doesn’t attend a class, then he/she cannot participate.
- The missing of four classes will likely lead to removal from the class.

Excerpts from the student handbook regarding attendance:
- Students are expected to attend all scheduled classes and laboratories. However, special circumstances such as illness, religious holidays, travel difficulties, family emergencies and participation in college sponsored events may make certain absences unavoidable. In such instances, students should notify instructors of these special circumstances.
- Although regular class attendance will not guarantee passing grades, irregular attendance will usually have an adverse effect upon them. Because final student evaluation is based upon measurable academic achievement, however, instructors will not lower final grades solely on the basis of attendance.

Testing Accommodations:
If you wish to use test accommodations for an exam or need extra help to be successful in the course please speak with the instructor.

Plagiarism:
- The Student Handbook’s policy on plagiarism will be strictly followed. Students that plagiarize can receive an F for the entire course.

The Code of Academic Honesty from the Student Handbook
Academic honesty promotes continued academic and occupational success. Maintenance of academic honesty and quality education is the responsibility of both faculty and students. Any written assignment (including all electronic media) submitted by a student must be original authorship. Representation of another’s work as his/her own shall constitute plagiarism. Any charge of plagiarism must be substantiated by a direct correlation in wording and organization between the original and plagiarized copy.

Any examinations must be taken according to prescribed procedure, as determined by the faculty member in charge. Any form of unauthorized written material used by a student or evident on his/her person during or directly following an examination shall be deemed a violation of academic honesty. Unauthorized correspondence between students during any examination or preparation of submitted work, which cannot be substantiated by physical proof or eye witness verification, shall be considered an infraction of the code and shall subject involved parties to corrective procedures.

Use of Technology:
Morrisville State College is very proactive with the use of technology as is evident with your laptop computer and cellular phone. These are tools that you will likely use throughout your working career but it will be important to know proper technology etiquette. To help in this quest for proper etiquette, the following rules will be strictly enforced.
- An important feature of the cellular phone is the on/off switch. Discover where it is and the only expectable position of that switch is “OFF” during classes and labs.
Many times throughout the course the instructor will inform the student that a laptop will be required for an upcoming lecture or lab.

**Grading:**
15% Participation  
45% Lab work  
30% Homework, Quizzes and Tests  
10% Final Exam

**Course Topics:**
1. Equipment Safety  
2. Intake and Exhaust Systems  
3. Fuel Systems  
4. Cooling Systems  
5. Lubrication Systems  
6. Precision Measuring  
7. Fasteners  
8. Power Trains  
9. Information resources

**Lab Topics:**
- Lab 1 Introduction to Procedures  
- Lab 2 SP/2  
- Lab 3 Valve adjustment  
- Lab 4 Compression & Cylinder Leakage Testing  
- Lab 5 Fuel Systems (gasoline versus diesel)  
- Lab 6 Coolants & Lubricants  
- Lab 7 Bearings & Seals  
- Lab 8 Powertrains Lab I: (Free Play & Universal Joints)  
- Lab 9 Powertrains Lab II: (transmissions, torque multiplication, gear identification)  
- Lab 10 Fasteners  
- Lab 11 Parts Resources  
- Lab 12 Service Literature Resources  
- Lab 13 Electronic Diagnostics Basics

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**AGEN 110**  
**SMALL POWER EQUIPMENT**  
**2 CREDITS (1 LECTURE HOUR, 2 LABORATORY HOURS)**

**LECTURE** – 102 Marshall Hall  
01 Tuesday 11:00-11:50

**LABORATORY** - 115 Marshall Hall  
01L Monday 3:00-4:50

**INSTRUCTOR** – Charles Ax, III

**OFFICE** - 124 Marshall Hall
OFFICE HOURS - Can be arranged by appointment, but will be regularly held as follows:

- **Monday**: 11:00-11:50
- **Tuesday**: 12:00-12:50
- **Wednesday**: 10:00-10:50
- **Thursday**: 11:00-11:50
- **Friday**: 10:00-10:50


TOOLS - Safety Glasses (will be required for every lab), Appropriate Work Clothing

The tool set will be required from the second lab on and should include the following:

- A 3/8” drive socket set
- Needle nose pliers
- A 4” and a 6” flat blade screwdriver
- A #2 Phillips screwdriver
- A wrench set with 1/4”, 5/16”, 3/8”, and 7/16” wrenches (open end or combination)
- Hammer
- A set of feeler gauges

DESCRIPTION - The course will introduce the student to the principles of operation of 2 stroke cycle and 4 stroke cycle air cooled engines, as well as their repair and maintenance. Classroom instruction will be valued equally with laboratory experience, and the student will be asked to master challenges in both areas.

Revised August 27, 2016

Subject to revision as needed during semester.

COURSE OBJECTIVES – Students will be able to:

1. Practice safe and efficient industry standards for a small gas engine service technician.
2. Explain basic operation of 2 stroke cycle and 4 stroke cycle air cooled engines.
3. Accurately diagnose general problems on a range of different small gas engines and power equipment.
4. Compile a concise list of solutions and form a list of the correct repair options with estimated costs for each option.
5. Develop required preventive maintenance procedures for different equipment.
6. Perform maintenance and basic repair procedures on different small gas engines and typical power equipment applications.

ATTENDANCE - Students are expected to attend all scheduled classes and laboratories. If special circumstances such as illness, religious holidays, travel difficulties, family emergencies or active participation in college-sponsored events make absence unavoidable you must see me to make up the work. No student will be allowed to complete graded work after that work has been returned to
others in the class. If absences place you in academic jeopardy of not passing the course, the dean of your school will be notified. All cell phones must be turned off during class and laboratory. All computers must be closed and stored during lecture.

**HOMEWORK** - Is a required part of the course and will checked each week for completeness. Homework turned in late but before the work has been corrected will be given ½ credit. Homework may not be turned in after the corrected work has been returned to other students. A tutor can be made available if requested. In short: **You must turn in every homework assignment done to the best of your ability to succeed in this course.**

**ACADEMIC HONESTY** – The Code of Academic Honesty from the Student Handbook will be strictly adhered to. The first violation will result in a zero grade for the work and a letter to the student’s dean. The second violation will result in an automatic F in the course as a final grade.

**SPECIAL LEARNING ACCOMMODATIONS** – If you have any special learning needs and need some accommodations then please alert this instructor immediately, during the first two weeks of this course. Work is done with David Symonds, the Learning Specialist in the Academic Enrichment Center located in the Butcher Library.

**QUIZZES** - Bi-Weekly quizzes will be given during the last 10-15 minutes of the class. No make-up quizzes will be given. If you know in advance that you will be absent, see me to take the quiz beforehand.

**FINAL EXAM** - The Final Exam will be comprehensive and given during week 15.

**GRADING** - The laboratory based exercises will be worth 40% of your grade, and the classroom-based testing 60%. The grade breakdown is as follows:

- 15% - Homework
- 30% - Quizzes
- 15% - Final Exam
- 40% - Lab exercises

The range for grades will be as follows:

- A+ 97-100
- A 93-96
- A- 90-92
- B+ 87-89
**TOPICAL OUTLINE** – The following is a detailed outline of the class activities for the semester. Please pay close attention to the reading and written assignments.

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture Topic</th>
<th>Reading Assignment</th>
<th>Written Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction, Materials, Safety</td>
<td>Chapter 1 (p. 1-12)</td>
<td>Workbook Chapter 1 - Questions: M.C., T-F, Completion, S.A., Matching</td>
</tr>
<tr>
<td>2</td>
<td>4 Stroke Cycle</td>
<td>Chapter 4 (p. 37-42)</td>
<td>Workbook Chapter 4 - Questions: M.C., Completion, T-F</td>
</tr>
<tr>
<td>3</td>
<td>Two-Stroke Cycle, Components</td>
<td>Chapter 4 (p. 42-47)</td>
<td>Workbook Chapter 4 - Questions: Short Answer</td>
</tr>
<tr>
<td>4</td>
<td>Small Engine Systems Overview</td>
<td>Chapter 4 (p.48-62)</td>
<td>Workbook Chapter 4 - Questions: Matching</td>
</tr>
<tr>
<td>5</td>
<td>History of Small Engines</td>
<td>Chapter 2 (p. 13-22)</td>
<td>Workbook Chapter 2 - Questions: M.C., T-F, Completion, S.A., Matching</td>
</tr>
<tr>
<td>Chapter</td>
<td>Title</td>
<td>Pages</td>
<td>Workbook</td>
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<tr>
<td>5</td>
<td>Power Equipment Drive Devices</td>
<td>Chapter 5 (p. 63-72)</td>
<td>Workbook Chapter 5</td>
</tr>
<tr>
<td>7</td>
<td>Preventive Maint. and Storage</td>
<td>Chapter 5 (p.72-80)</td>
<td>Workbook Chapter 5</td>
</tr>
<tr>
<td>8*</td>
<td>Basic Maintenance</td>
<td>Chapter 6 (p. 81-93)</td>
<td>Workbook Chapter 6</td>
</tr>
<tr>
<td>9</td>
<td>Basic Maintenance</td>
<td>Chapter 6 (p. 94-104)</td>
<td>Workbook Chapter 6</td>
</tr>
<tr>
<td>10</td>
<td>Intermediate Maintenance</td>
<td>Chapter 7 (p. 105-118)</td>
<td>Workbook Chapter 7</td>
</tr>
<tr>
<td>11</td>
<td>Intermediate Maintenance</td>
<td>Chapter 7 (p. 119-138)</td>
<td>Workbook Chapter 7</td>
</tr>
<tr>
<td>12</td>
<td>Advanced Maintenance</td>
<td>Chapter 8 (p. 139-174)</td>
<td>Workbook Chapter 8</td>
</tr>
<tr>
<td>13</td>
<td>Power Equipment Applications</td>
<td>Chapter 3 (p. 23-35)</td>
<td>Workbook Chapter 3</td>
</tr>
<tr>
<td>14</td>
<td>Lawn Mowers and Garden Tractors</td>
<td>Handout</td>
<td>Questions 1-15</td>
</tr>
<tr>
<td>15</td>
<td>Final Exam</td>
<td>All Chapters</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** When written assignments for the same chapter are spread over more than one week students may choose to turn the homework from entire chapter the last week that chapter is assigned.

**Personal Notes:**

**LABORATORY TOPICAL OVERVIEW**

1. Safety and Lab Orientation
2. 4 Stroke Cycle Engine Disassembly/Reassembly
3. 2 Stroke Cycle Engine Disassembly/Reassembly
4. Pulsa-Jet and Flo-Jet Carburetor disassembly and assembly
5. Diaphragm Carburetors, Adjusting Carburetors
6. Ignition systems - Disassembly and assembly
7 Tecumseh Timing - Ignition system testing
8 Small Gas Engine Lubrication
9 Starting Systems and Engine Cooling
10 Lawn Mower Blade Sharpening/Balancing and Maintenance
11 Air cooled engine tune-up and off season storage
12 Small Gas Engine Troubleshooting
13 Repair Ground Maintenance Equipment
14 Repairing Lawn and Garden Tractors
15 Field Trip
11-15 Work on customer projects

Notes:

SMALL GAS ENGINE LAB SAFETY AND PROCEDURES

1. No swearing, chewing, or smoking is allowed.
2. Safety glasses will be worn at all times.
3. All petroleum products will be stored in the appropriate cabinet.
4. All engines will be run with ventilation system running, or taken outside of the building.
5. The lid on the parts cleaner will be closed when not in use.
6. Dirty rags will be stored in the appropriate metal container.
7. Oil spills will be covered immediately with floor absorbent.

8. All tools will be returned to their appropriate locations – SGE tools in the designated cabinet.

9. All personal engines will be stored beneath the benches at the end of the day.

10. Note the location of the fire extinguishers at the front and back of lab.

11. Note the location of the first aid kit in front of classroom.

12. Note the location of the Briggs and Stratton, Tecumseh, and Kohler service manuals at the front table.

AGEN 105 Principles of Farm Machinery Syllabus
Mr. Cross

Credits: 2 credit hours
Lecture: Thursday 9:00 – 9:50
Lab: Thursday 2:00 – 3:50
Lab: 4:00 – 5:50

Office Hours: Monday 11:00 – 11:50, 1:00-1:50
Tuesday 11:00-11:50
Thursday 11:00 – 11:50

Office: 136 Marshall Hall
Lecture: 125B Marshall Hall
Lab: 117 Marshall Hall
Office phone: (315) 684-6728
Course Description:
The care, adjustment, operation and repair of tillage, planting and harvesting field machinery common to New York State farms will be discussed in this class. A primary focus of the course will be the adjustment and maintenance of machinery in the laboratory. Efficient machinery selection and use will also be investigated. Principles of safety as applied to the operation, maintenance and repair of agricultural machinery will be applied throughout the course.

Course Objectives:
1. To develop the ability to recognize common machine hazards and to be able to lessen the chances of being affected by them.
2. To comprehend that efficient and therefore economic operation of machinery is dependent on proper maintenance, adjustment and operation.
3. To understand the functioning of each piece of machinery discussed in the course.
4. To understand common breakdowns in agricultural machinery and know how to fix them.
5. To consider aspects of efficiency including equipment size and efficient operation.

Course Materials:
1. Course handouts given in class and/or available at the instructor’s web page.

Student Responsibilities:
1. To read the course syllabus and to ask questions if the material is unclear.
2. To attend all classes and labs.
3. To attend scheduled lab unless previous arrangements are made with the instructor.
4. To make up any and all class work covered during their absence.
5. To complete on time all work including reading, homework, lab write-ups and the term project. Student’s work will show careful, neat, complete and individual effort.

Lab:
1. A lab write-up will be due after each lab. The lab which frequently will be handed in electronically is due at the beginning of the following week’s lab.
2. Students are required to attend their scheduled lab unless previous arrangements have been made. Due to the fact that labs are balanced, every effort should be made to attend the scheduled lab.
3. Safety is the most important aspect of the lab work. If a student performs in an unsafe manner, s(he) will first receive a verbal warning. The second instance the student will receive a written warning and the third instance will mean removal from the lab and course.

Attendance Policy:
- All attendance policies as listed below from the Student Handbook will be followed.
- If a student doesn’t attend a class, then he/she cannot participate.
- The missing of four classes will likely lead to removal from the class.

Excerpts from the student handbook regarding attendance:
- Students are expected to attend all scheduled classes and laboratories. However, special circumstances such as illness, religious holidays, travel difficulties, family emergencies and participation in college sponsored events may make certain absences unavoidable. In such instances, students should notify instructors of these special circumstances.
- Although regular class attendance will not guarantee passing grades, irregular attendance will usually have an adverse effect upon them. Because final student evaluation is based upon measurable academic achievement, however, instructors will not lower final grades solely on the basis of attendance.

Testing Accommodations:
If you wish to use test accommodations for an exam or need extra help to be successful in the course please speak with me.
Plagiarism:
- The Student Handbook’s policy on plagiarism will be strictly followed. Students that plagiarize can receive an F for the entire course.

The Code of Academic Honesty from the Student Handbook

Academic honesty promotes continued academic and occupational success. Maintenance of academic honesty and quality education is the responsibility of both faculty and students. Any written assignment (including all electronic media) submitted by a student must be original authorship. Representation of another's work as his/her own shall constitute plagiarism. Any charge of plagiarism must be substantiated by a direct correlation in wording and organization between the original and plagiarized copy.

Any examinations must be taken according to prescribed procedure, as determined by the faculty member in charge. Any form of unauthorized written material used by a student or evident on his/her person during or directly following an examination shall be deemed a violation of academic honesty. Unauthorized correspondence between students during any examination or preparation of submitted work, which cannot be substantiated by physical proof or eye witness verification, shall be considered an infraction of the code and shall subject involved parties to corrective procedures.

Use of Technology:

Morrisville State College is very proactive with the use of technology as is evident with your various devices. These are tools that you will likely use throughout your working career but it will be important to know proper technology etiquette. To help in this quest for proper etiquette, the following rules will be strictly enforced.

- An important feature of the cellular phone is the on/off switch. Discover where it is and the only expectable position of that switch is “OFF” during classes and labs.
- Many times throughout the course the instructor will inform the student that a laptop will be required for an upcoming lecture or lab.

Grading:
- 10% Participation
- 25% Homework and Quizzes
- 25% Tests and Final
- 25% Labs
- 15% Final Project

Lab Topics:
1. Agricultural Machinery Safety
2. Combines
3. Round Balers
4. Forage Harvester Sharpening
5. Forage Harvester Observation (Field Efficiencies)
6. Planters
7. Small Square Balers/Combine Observation (Loss Calculations)
8. Small Square Balers/Combine Observation (Loss Calculations)
9. Large Round Balers
10. Power Requirements/Fuel Consumption
11. Agriculture Tires and Ballasting
12. Tillage Equipment
13. OXBO Fieldtrip
14. Final Project Presentations

AGEN 115
Agricultural Engineering Industry Overview
1 Credit

Instructor  Mr. Cross
Lecture  102 Marshall Hall
Tuesday  6:00 – 7:30 P.M  (August 30th – November 8th)
Office Hours:  
Monday    11:00 – 11:50, 1:00-1:50  
Tuesday 11:00-11:50  
Thursday 11:00 – 11:50

Office:  136 Marshall Hall  
Office phone:  (315) 684-6728  
Email:  crossrr@morrisville.edu  
Web page:  http://people.morrisville.edu/~crossrr

TEXT AND MATERIALS:  There will be no required text for the course, but reference materials listed in the bibliography are available in the library.  The course will rely heavily on the use of the laptop computer for course management.

COURSE DESCRIPTION:  The course will expose the student to the many and varied opportunities that exist for graduates in Agricultural Engineering Technology and Agricultural Mechanics.  The course will present a broad spectrum of speakers who will describe their careers and the linkages that exist to their educational background.  Topics related to standard practices for safety, effective communication, and computer use in the industry will be discussed.

MEANS OF EVALUATION:  Students will electronically submit weekly summaries of the speaker’s presentation.  Each summary will be graded and the simple average of the grades will be used to determine the final grade.  No student will be allowed to submit a report for a presentation for which they were not present.

ATTENDANCE:  Students are expected to attend all scheduled classes and laboratories.  If special circumstances such as illness, religious holidays, travel difficulties, family emergencies or active participation in college-sponsored events make absence unavoidable you must see me to make up the work.  No student will be allowed to complete graded work after that work has been returned to others in the class.  If absences place you in academic jeopardy of not passing the course, the dean of your school will be notified.

While in class please keep laptops, cell phones and other forms of technology turned off.

Detailed Topical Outline:
I:  Introductory lecture  –  Introduction to the course.  –  Speaker:  Rob Cross  (August 30th)
II:  Discussion of Career Opportunities as Technical Communicator  –  Speaker:  Ben Atkinson of Milton Caterpillar.  (September 6th)
III:  Discussion of Career Opportunities in Ownership & Operation of an independent service shop.  –  Speaker:  Chris Davis of Davis Willowbrook Service.  (September 13th)
IV:  Discussion of Career Opportunities in Agricultural Equipment Sales  –  Speaker:  Wade Heineman of Oxbo International.  (September 20th)
V:  Discussion of Career Opportunities in Renewable Energy with an Agricultural Engineering Technology Background:  –  Speaker:  Ryan Storke of CEC Energy, a division of Cazenovia Equipment Company.  (September 27th)
VI: Discussion of Career Opportunities in Dealership Product Support and Sales – Tom Rauscher from Monroe Tractor. (October 4th)

VII: Discussion of Career Opportunities in Education/Higher Education – Speaker: Jeff Perry of Cornell University, Department of Agricultural Education, Jan Woodworth of SUNY Oswego & Terry Hughes of the NY FFA Foundation. (October 18th)

VIII: Discussion of Career Opportunities in Small Power/Recreational Power Equipment– Speaker: Jeff Hull of Don Hull and Sons (October 25th)

IX: Discussion of Career Opportunities in Manufacturer Product Support- Speaker: Sean Galley of Case New Holland (November 1st)

X: Discussion of How to Gain Employment in Agricultural Machinery Service –Speaker: John Schoeck of Tracey Road Equipment. (November 8th)

Attendance Policy: No student will be allowed to submit a report for which they were not present

AGEN 131
Fundamentals of Hydraulics
3 credits (2 lecture hours, 2 laboratory hours)

Lecture Marshall hall 125B
Laboratory Marshall 119

Instructor Lecture F. Bach
Instructors, lab F. Bach, J Ford

DESCRIPTION

Students will develop a foundation of hydraulic principles and system operation as found on mobile hydraulic systems. Topics studied will include the principles of flow and pressure, how force can be multiplied with in a mobile hydraulic system. The student will be introduced to components used in hydraulic systems, pumps (gear, vane and piston) valves, cylinders and accumulators. Students will also develop an understanding of how an open center hydraulic system functions

COURSE OUTCOMES- upon completing the course the student will be able to

1. Demonstrate proper safety procedures when working around mobile hydraulic systems
2. Explain and apply Pascal’s law to mobile hydraulic systems
3. Explain how flow and pressure is created with in a hydraulic system
4. Define terminology used in the fluid power industry
5. Demonstrate and explain the operation, evaluation and repair of gear pumps
6. Demonstrate and explain the operation, evaluation and repair of vane pumps
7. Demonstrate and explain the operation, evaluation and repair of piston pumps
8. Demonstrate and explain the operation and repair of common hydraulic cylinders used in the industry
9. Describe and explain the various accumulator systems used on mobile hydraulic systems

**TEXT**

1. Fluid power—hydraulics and pneumatics by James R. Daines (Text)
2. Fluid power—hydraulics and pneumatics by James R. Daines (work book)
3. Fundamentals of Service Hydraulics John Deere

**SUPPLEMENTAL REFERENCES**

1. Caterpillar technical Manuals
2. Caterpillar SIS
3. Komatsu tech manuals

**STUDENT RESPONSIBILITIES**

1. To read this course outline and ask questions if any of the material is unclear
2. To make up any and all class work covered during their absence
3. To attend scheduled lab unless PREVIOUS arrangements are made with the instructor
4. To complete on time lab write-ups, study guides, problem sets and term projects, which reflect careful, neat, complete and individual effort.
ACADEMIC HONESTY the code of Academic Honesty from the student Handbook will be strictly adhered to. The first violation will result in a zero grade for the work and a letter to the student’s dean. The second violation will result in an automatic F in the course as a final grade.

SPECIAL LEARNING ACCOMMODATIONS If you have any special learning needs and need some accommodations then please alert the instructor immediately or before the first two weeks of the course. Accommodations will be made with Mr. Symonds the Learning Specialist in the Academic Enrichment Center located in Butcher Library.

LAB

Lab sections are balanced; therefore, students are expected to attend their scheduled lab unless previous arrangements have been made to switch into another lab section

Field trips and other sponsored events must be arranged prior to lab time so arrangements for makeup work can be planned

Students are expected to conduct themselves in a safe mature manner. Any student who poses a hazard to themselves or others will, on the first offense receive a verbal warning; on the second offense, a written warning; on the third offense, will be removed from the lab/class

ATTENDANCE POLICY

All attendance regulations as found in the Student Handbook, College Catalog and Faculty Handbook will be enforced. After 3 unexcused absences in lecture or lab the student will be subject to review and may face possible termination from the course.

MAKE UP TESTS AND QUIZZES
There will be no makeup quizzes in lecture or lab due to their unannounced nature. Test makeups only under extenuating circumstances.

**GRADING**

The grade is based on Lecture (50%) and Lab (50%)

The lecture grade will equal ½ (50%) of the class grade and is based on class tests, quizzes, study guides, and a final exam.

The lab grade will be based on lab write-ups, lab quizzes, and a final project and will make-up ½ (50%) of the class grade.

Lecture grade (50%) + lab grade (50%) = class grade

Lab grading

Check plus = 95 well done write-up, neat, and complete which reflects Work and effort BEYOND that required in the write-up

Check = 85 lab which is neat and complete, reflects an Understanding of the material

Check minus = 75 a lab that reflects the minimum effort, but still is Complete

X = 60 lab write up that has parts missing

0 lab write up not turned in on time

**LECTURE AND LABORATORY OUTLINES** – The following is a detailed outline of the course activities for the semester. Please pay close attention to the reading and written assignments. Note: outlines are subject to change with progression of course.

**LECTURE OUTLINE**

<table>
<thead>
<tr>
<th>week</th>
<th>Topic</th>
<th>Textbook</th>
<th>Reading</th>
<th>Written</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Course Overview intro to fluid power</td>
<td>Syllabus Handout</td>
<td>Review Syllabus intro to fluid power</td>
<td>Read text chapter 1</td>
</tr>
<tr>
<td>2</td>
<td>Introduction to Fluid power</td>
<td>Cp 1</td>
<td>Intro to fluid power</td>
<td>Questions from chapter 1 text</td>
</tr>
<tr>
<td>3</td>
<td>Fluid power systems</td>
<td>Cp 2</td>
<td>Functions of fluid power systems</td>
<td>Read text chapter 2</td>
</tr>
</tbody>
</table>
LABORATORY OUTLINE

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Textbook</th>
<th>Reading /Reference</th>
<th>Written</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gear pumps</td>
<td>167-179</td>
<td>Text chapter 7</td>
<td>Gear pump lab write up</td>
</tr>
<tr>
<td>2</td>
<td>Gear pump tear down</td>
<td>179-180</td>
<td>Lab Handout</td>
<td>Gear pump lab write up questions from W.B cp. 7 103-105</td>
</tr>
<tr>
<td>3</td>
<td>Vane pumps</td>
<td>179-180</td>
<td>Lab handout on vane pumps</td>
<td>Cat vane pumps, 980G vane pump lab</td>
</tr>
<tr>
<td>4</td>
<td>Piston pumps</td>
<td>181-205</td>
<td></td>
<td>Text Cp.7 questions piston pump lab Wb. Pg 99-101</td>
</tr>
<tr>
<td>5</td>
<td>Hydraulic cylinders</td>
<td>Cp. 9</td>
<td>233-248</td>
<td>Cylinder lab</td>
</tr>
<tr>
<td>7</td>
<td>Hydraulic motors</td>
<td>253-270</td>
<td>Service Documents</td>
<td>Wb. Activity 9-2 pg. 149-154</td>
</tr>
<tr>
<td>8</td>
<td>Accumulators</td>
<td>Cp. 11</td>
<td>Text 331-345</td>
<td>Accumulator lab write up questions page 346 text</td>
</tr>
<tr>
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<td>------------------------------------------------</td>
</tr>
<tr>
<td>9</td>
<td>Storage and distribution</td>
<td>Cp. 8</td>
<td>Cp 8 pg. 209-231</td>
<td>Hose and fitting lab write up Wb. 189-190</td>
</tr>
<tr>
<td>10</td>
<td>Hoses lines and fittings</td>
<td>Cp.8</td>
<td>Wb. 125-128</td>
<td>Lab write up hydraulic hoses Wb. Activity 8-2 pg.125-128</td>
</tr>
<tr>
<td>12</td>
<td>Controlling the system (valves)</td>
<td>Cp. 10</td>
<td>Text cp.10</td>
<td>Directional control valve lab</td>
</tr>
<tr>
<td>13</td>
<td>Controlling the system (valves)</td>
<td>Cp. 10</td>
<td>Text cp 10</td>
<td>Wb. Activity 10-2 text questions 328-329</td>
</tr>
<tr>
<td>14</td>
<td>final</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**LABORATORY SAFETY AND PROCEDURE**

1. Show respect for each person, machine, and tool and lab facility.

2. No foul language or tobacco products will be used in lab.

3. Safety glasses and appropriate shop clothing will be worn at all times.

4. All petroleum products will be stored in the appropriate cabinet/locations.

5. All engines will be run with ventilation system running, or taken outside of the building.

6. The lid on the parts cleaner will be closed when not in use.

7. Waste rags will be stored in the appropriate metal container.

8. Oil spills will be covered immediately with absorbent pads.

9. All tools/components will be returned to their appropriate location.

10. Note the location of the fire extinguishers at the front and back of lab.

11. Note the location of the eye wash station next to the sink.
AGEN 161
Basic Hydraulics Syllabus

Course Description:
This course will present the fundamental principles of hydraulic and pneumatic systems on mobile agricultural, construction and on-highway machinery. Disassembly and inspection of the various components in hydraulic systems will be completed throughout the course. Introduction to ISO graphic symbols and how they are represented in actual systems will be stressed. Additionally, diagnostics and testing of equipment will be discussed.

Instructor:
Mr. Cross
136 Marshall Hall
684-6728
crossrr@morrisville.edu

Credits: 3 credit hours

Lecture: Tues & Thurs 9:00-9:50 AM Spader 125

Lab:
Lab 01 Tuesday 2:00-3:50 PM Marshall 117
Lab 02 Tuesday 4:00-5:50 PM Marshall 117
Lab 03 Tuesday 8:00-9:50 PM Marshall 117

Prerequisite/Co requisite:
MAGN 101

Textbook:
• Hydraulics: Fundamentals of Service: Deere and Company

Objectives:
• To develop an understanding of the basic principles of hydraulics and pneumatics and the various designs and systems used on mobile machinery.
• To provide students with the basic skill necessary to read, interpret, and produce hydraulic schematics utilizing ISO graphic symbols.
• To develop the ability to identify, and properly service common hydraulic fittings, and hydraulic conduits used on mobile machinery.
• To develop a fundamental understanding of the theory and application of the testing of hydraulic systems.

Student Responsibilities:
6. To read the course syllabus and to ask questions if the material is unclear.
7. To attend all classes and labs
8. To attend scheduled lab unless previous arrangements are made with the instructor.
9. To make up any and all class work covered during his/her absence.
10. To complete on time all work including reading, homework, lab write-ups and the term project. Student’s work will show careful, neat, complete and individual effort.
Lab:
4. A lab write-up will be due after each lab. The lab is due at the beginning of the following week’s lab.
5. Students are required to attend their scheduled lab unless previous arrangements have been made. Due to the fact that labs are balanced, every effort should be made to attend the scheduled lab.
6. Safety is the most important aspect of the lab work. If a student performs in an unsafe manner, he/she will first receive a verbal warning. The second instance the student will receive a written warning and the third instance will mean removal from the lab and course.

Attendance Policy:
- All attendance policies as listed below from the Student Handbook will be followed.
- If a student doesn’t attend a class, then he/she cannot participate.
- The missing of four classes will likely lead to removal from the class.

Excerpts from the student handbook regarding attendance:
- Students are expected to attend all scheduled classes and laboratories. However, special circumstances such as illness, religious holidays, travel difficulties, family emergencies and participation in college-sponsored events may make certain absences unavoidable. In such instances, students should notify instructors of these special circumstances.
- Although regular class attendance will not guarantee passing grades, irregular attendance will usually have an adverse effect upon them. Because final student evaluation is based upon measurable academic achievement, however, instructors will not lower final grades solely on the basis of attendance.

Testing Accommodations:
If you wish to use test accommodations for an exam or need extra help to be successful in the course please speak with me.

Plagiarism:
- The Student Handbook’s policy on plagiarism will be strictly followed. Students that plagiarize can receive an F for the entire course.

The Code of Academic Honesty from the Student Handbook

Academic honesty promotes continued academic and occupational success. Maintenance of academic honesty and quality education is the responsibility of both faculty and students. Any written assignment (including all electronic media) submitted by a student must be original authorship. Representation of another’s work as his/ her own shall constitute plagiarism. Any charge of plagiarism must be substantiated by a direct correlation in wording and organization between the original and plagiarized copy.

Any examinations must be taken according to prescribed procedure, as determined by the faculty member in charge. Any form of unauthorized written material used by a student or evident on his/ her person during or directly following an examination shall be deemed a violation of academic honesty. Unauthorized correspondence between students during any examination or preparation of submitted work, which cannot be substantiated by physical proof or eye witness verification, shall be considered an infraction of the code and shall subject involved parties to corrective procedures.

Grading:
10% Participation
40% Lab work
40% Homework, quizzes and tests
10% Final Exam

Course Topics:

I) Introduction, History and Development
   a) Overview and course procedures

Bobcat Handout
b) Advantages and applications of fluid power

II) Fluid Power Principals
   a) Fundamentals
      i) Force, pressure, and area
      ii) Work, horsepower, and torque
      iii) Basic lever principles
   b) Pascal's Law
      i) Application
      ii) Multiplication of forces
      iii) Fluid properties

III) Open and Closed Center Systems

IV) Hydraulic Pumps
   a) Displacement of pumps
      i) Fixed
   b) Variable
   c) Types of Hydraulic Pumps
      i) Gear pumps
         (1) Internal
         (2) External
      ii) Vane pumps
         (1) Balanced
         (2) Unbalanced
      iii) Piston pumps
         (1) Axial piston
         (2) Radial piston
   d) Pump Malfunctions
      i) Contaminated fluid
      ii) Improper fluid
      iii) Poor operating procedures
      iv) Poor maintenance
      v) Pump Failure analysis

V) Reservoirs Oil Coolers and Filters
   a) Reservoirs
      i) Capacity of reservoirs
      ii) Features of reservoirs
   b) Oil Coolers
      i) Types and locations of oil coolers
   c) Filters

VI) Hoses, Pipes, Couplers and Seals
   a) Hoses
      i) Basic parts
      ii) Types and selection of hoses
      iii) Hose failures
      iv) Installing hoses
      v) Hose fittings
   b) Pipes and Tubing
      i) Application
      ii) Construction of pipes and tubing
      iii) Selection of pipes and tubing
iv) Installation of pipes and tubing
v) Tube fittings
c) Quick Disconnect Couplers

VII) Hydraulic Valves
FOS Chap. 5
a) Directional
   i) Rotary
   ii) Open center spool
   iii) Closed center spool
   iv) Flow divider
b) Flow Control
   i) Needle
   ii) Globe
   iii) Gate
   iv) Check
   v) Relief
c) Pressure Control
   i) Pressure Relief Valve
   ii) Direct-Acting Pressure Relief Valve
   iii) Pilot-Operated Pressure Relief Valve
   iv) Other Pressure Control Valves
d) Flow Control
   i) Needle
   ii) Globe
   iii) Gate
   iv) Check
   v) Relief

VIII) Hydraulic Actuators
FOS Chap. 6 – 7
a) Cylinders
b) Motors

IX) Hydraulic Symbols, Diagrams, and Schematics
a) J.I.C. and I.S.O. Symbols
b) Application of symbols to components
c) Reading and interpretation of diagrams, and schematics

X) Diagnosing and Testing of Tractor Hydraulic Systems
a) Use of a Hydraulic Tester
   i) What a tester does
   ii) Installing a tester
   iii) Operating a hydraulic tester

Labs:
1. Lab safety, computer skills & Pascal’s Law worksheet
2. Schematic drawing I: backhoe lab
3. Flow & velocity lab
4. Caterpillar 248B/Takeuchi schematic lab
5. Caterpillar 248B/Takeuchi pilot circuit testing
6. Powershift/balewagon schematic lab
7. Hampden meter in/out & check balls Lab
8. Pump size shopping list lab
9. Flow testing lab
10. Small hydrostatic disassembly lab
11. Pressure compensated pump lab I
12. Pressure compensated pump lab II
13. Flow testing pressure compensated pumps
AGEN 210

ADVANCED SMALL POWER EQUIPMENT
3 CREDITS (2 LECTURE HOURS, 3 LABORATORY HOURS)

LECTURE - Marshall Hall 101

01 Wednesday, Friday 12:00-12:50

LABORATORY - Marshall Hall 115

01L Thursday 2:00-4:50

INSTRUCTOR – Charles “Chip” Ax, III

OFFICE – 124 Marshall Hall
Phone x-6648 (684-6648)
E-mail axcj@morrisville.edu

OFFICE HOURS - Can be arranged by appointment, but will be regularly held as follows:

Monday 10:00-11:50
Wednesday 10:00-11:50
Friday 10:00-10:50

TEXTS - Small Engines by R. Bruce Radcliff and Dann L. Roark, American Technical Publishers, Inc.
Third Edition

Come to first class before purchasing textbooks!

TOOLS - Safety Glasses (will be required for every lab)
Ag Eng/Diesel work shirt, shop coat or appropriate shop attire
The Agricultural Engineering/Agricultural Mechanics tool set will be required for all labs.

DESCRIPTION - The course is intended to prepare the student in the technical and business aspects of operating an equipment repair service. The lecture section of the course will cover the functional systems of four-stroke cycle and two-stroke cycle engines, and explore their application on various different types of equipment. The laboratory section of the course will be structured to simulate repair shop conditions. Students will be responsible for the repair of equipment from members of the campus community.
COURSE OBJECTIVES – Student will be able to:

1. Practice safe and efficient industry standards for a small gas engine service technician.
2. Complete a clearly written service work order that accurately follows repair procedures.
3. Accurately diagnose problems on a range of different small gas engines and their associated power equipment applications.
4. Compile a concise list of solutions, develop an accurate estimate of costs involved and clearly communicate the repair options and estimates to a customer.
5. Properly repair the problem, test unit and clearly describe repairs in detail on the service work order.
6. Educate the customer as to how to avoid a reoccurrence of the problem if applicable.

ATTENDANCE – Students are expected to attend all scheduled classes and laboratories. If special circumstances such as illness, religious holidays, travel difficulties, family emergencies or active participation in college-sponsored events make absence unavoidable you must see me to make up the work. No student will be allowed to complete graded work after that work has been returned to others in the class. If absences place you in academic jeopardy of not passing the course, the dean of your school will be notified.

SPECIAL LEARNING ACCOMMODATIONS – If you have any special learning needs and need some accommodations then please alert this instructor immediately, during the first two weeks of this course. Work is done with David Symonds, the Learning Specialist in the Academic Enrichment Center located in the Butcher Library.

ACADEMIC HONESTY – The Code of Academic Honesty from the Student Handbook will be strictly adhered to. The first violation will result in a zero grade for the work and a letter to the student’s dean. The second violation will result in an automatic F in the course as a final grade.

GRADING – The grade in the course will be determined by achievement in both the lecture and laboratory sections of the course. The final grade will be determined as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quizzes</td>
<td>30%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>20%</td>
</tr>
<tr>
<td>Lecture Homework</td>
<td>10%</td>
</tr>
<tr>
<td>Laboratory Assignments</td>
<td>20%</td>
</tr>
<tr>
<td>Laboratory projects/reports</td>
<td>20%</td>
</tr>
</tbody>
</table>

The range for grades will be as follows:

- A+  97 -100
- A   93-96
- A-  90-92
- B+  87-89
- B   83-86
- B-  80-82
Quizzes- Each week a quiz will be given on the previous week’s material. No make-up quizzes will be given.

Final Exam – The EETC Four-stroke technician certification exam or comparable final will be given as the final exam for the course. The EETC exam will be given prior to final exam week. If the EETC Four-stroke technician certification exam is used you will have the results during finals week.

Homework – Homework will be assigned for the first thirteen weeks. Homework is due on Friday. Late homework will not be accepted after the graded work has been returned to others.

Customer Evaluation – The equipment worked on in lab will be “graded” for the quality of the repair by the customer. A copy of the customer evaluation form can be found on the “Q” drive.

Laboratory work and work orders – The weekly progress made on each job will be recorded on the job work orders. These work orders will be kept on the “Q” drive, and kept current on a weekly basis. A grade will be given based on the accuracy, current-ness and completeness of these orders.

Lecture and Laboratory Outlines– The following is a detailed outline of the course activities for the semester. Please pay close attention to the reading and written assignments.

Note: outlines are subject to change with progression of course.

COURSE OUTLINE

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture Topic</th>
<th>Reading Assignment</th>
<th>Written Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction/Expectations, Basic Internal Combustion Engines and Safety</td>
<td>Course Syllabus, Chapters 1 &amp; 2</td>
<td>Chapter 1 – Test 1,2, Chapter 2 – Test 1,2</td>
</tr>
<tr>
<td>2</td>
<td>Four-stroke cycle and Two-stroke cycle engine operation</td>
<td>Chapter 3</td>
<td>Chapter 3 – Test 1,2</td>
</tr>
<tr>
<td>3</td>
<td>Fuel system</td>
<td>Chapter 5</td>
<td>Chapter 5 – Test 1</td>
</tr>
<tr>
<td>4</td>
<td>Fuel system</td>
<td>Chapter 5</td>
<td>Chapter 5 – Test 2</td>
</tr>
<tr>
<td>5</td>
<td>Electrical system</td>
<td>Chapter 7</td>
<td>Chapter 7 – Test 1</td>
</tr>
<tr>
<td>6</td>
<td>Electrical system</td>
<td>Chapter 7</td>
<td>Chapter 7 – Test 2</td>
</tr>
<tr>
<td>7</td>
<td>Compression system</td>
<td>Chapter 4</td>
<td>Chapter 4 – Test 1</td>
</tr>
<tr>
<td>8</td>
<td>Compression system</td>
<td>Chapter 4</td>
<td>Chapter 4 – Test 2</td>
</tr>
<tr>
<td></td>
<td>Spring Break</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Governor systems</td>
<td>Chapter 6</td>
<td>Chapter 6 – Test 1,2</td>
</tr>
<tr>
<td>10</td>
<td>Cooling and Lubrication system</td>
<td>Chapter 8</td>
<td>Chapter 8 – Test 1,2</td>
</tr>
<tr>
<td>11</td>
<td>Troubleshooting</td>
<td>Chapter 10</td>
<td>Chapter 10 – Test 1,2</td>
</tr>
<tr>
<td>12</td>
<td>Failure analysis</td>
<td>Chapter 11</td>
<td>Chapter 11 – Test 1,2</td>
</tr>
<tr>
<td>13</td>
<td>Multi-Cylinder Engines</td>
<td>Chapter 9</td>
<td>Chapter 9 – Test 1,2</td>
</tr>
<tr>
<td>14</td>
<td>Electronic Fuel Injection</td>
<td>Study Guide</td>
<td>Study Guide Questions</td>
</tr>
<tr>
<td>15</td>
<td>Final Exam (EETC)</td>
<td>EETC four stroke study guide</td>
<td></td>
</tr>
</tbody>
</table>
LABORATORY OUTLINE

Week 1 - Lab organization – Parts look-up, Service Manual Orientation

Week 2 - Compression testing, Engine disassembly and inspection

Week 3 - Micrometer reading, Internal engine measurements, Engine assembly

Week 4 - 2 Piece Flo Jet Carburetor disassembly and assembly, Diaphragm Carbs, Disassembly of Walbro LME carburetor on Intek engines

Week 5 – Small Gas Engine Ignition Systems

Week 6 – Regional Skills USA Competition (Friday, February 26th, 2016)

Week 7 - Use of electrical multimeter, Electronic modules, Charging systems - Assign customer engines

Week 8 - Valve Reconditioning - Work on customer engines

Spring Break

Week 9 – Boring and Honing Cylinders – Work on customer engines

Week 10- Hydrostatic transmission teardown/reassembly – Work on customer engines

Week 11- Blade Sharpening and Balance – Work on customer engines

Week 12 – Timing Tecumseh engines – Work on customer engines

Week 13 – Field Trip

Week 14 - NYS Skills USA Competition – Work on customer engines

Week 15 – Final Exam and project completion
SHOP SAFETY AND PROCEDURE

1. Show respect for each person, machine, tool and lab facility.

2. No foul language or tobacco products will be used in lab.

3. Safety glasses and appropriate shop clothing will be worn at all times.

4. All petroleum products will be stored in the appropriate cabinet.

5. All engines will be run with ventilation system running, or taken outside of the building.

6. The lid on the parts cleaner will be closed when not in use.

7. Waste rags will be stored in the appropriate metal container.

8. Oil spills will be covered immediately with absorbent pads.

9. All tools will be returned to their appropriate locations - SGE tools in the designated cabinet.

10. All engines will be stored beneath the benches at the end of the lab.

11. Note the location of the fire extinguishers at the front and back of lab.

12. Note the location of the eye wash station next to the sink.


14. Work-orders and other paperwork will be updated at the end of each lab session.
AGEN 220

MAINTENANCE, REPAIR, AND PERFORMANCE TUNING OF ARCTIC CAT RECREATIONAL EQUIPMENT

4 CREDITS (2 LECTURE HOURS, 4 LABORATORY HOURS)

LECTURE - Marshall Hall 102

01 Monday and Thursday 12:00-12:50

LABORATORY - Marshall Hall 115

01L Tuesday 2:00-5:50

INSTRUCTOR – Charles “Chip” Ax, III

OFFICE – 124 Marshall Hall
Phone x-6648 (684-6648)
E-mail axcj@morrisville.edu

OFFICE HOURS - Can be arranged by appointment, but will be regularly held as follows:

Monday 10:00-11:50
Wednesday 10:00-11:50
Friday 10:00-10:50
**TEXTS** - No specific textbook required.

**REFERENCE MATERIALS:**

Arctic Cat service information and other documents will be used for the laboratory portion of the course, and is available in paper form and on-line in the laboratory. The course instructional materials will be copied and distributed as necessary and/or added to the “Q” drive.

**TOOLS** - Safety Glasses (will be required for every lab)
Ag Eng/Diesel work shirt, coveralls, shop coat or appropriate shop attire
The Agricultural Engineering/Agricultural Mechanics tool set will be required for all labs.

**DESCRIPTION** – This course will cover the maintenance, repair, and performance tuning of Arctic Cat Snowmobiles and All-Terrain Vehicles. The concepts taught will be common to many other sport equipment manufacturers’ products. The systems studied will include; Suspension, EFI, Drivetrain, Electrical, Fuel, and 2 and 4 stroke engines. The course may include mandatory testing that will allow the student to be certified at the basic level of Arctic Cat CatMaster Technician Certification.

Prerequisite: AGEN 210

Revised January 17, 2016 Subject to revision as needed during semester.

**COURSE OBJECTIVES** – The student will be able to:

1. Practice safe and efficient industry standards for a recreational vehicle service technician.
2. Develop a clear understanding of recreational vehicle engines and be able to diagnose, repair and maintain these units and their related systems.
3. Develop a clear understanding of recreational vehicle transmissions, gearboxes and drive train components and be able to diagnose, repair and maintain these units and their related systems.
4. The student will be able to suggest performance modifications, predict their effect, install components and test their effectiveness as project availability provides.

**ATTENDANCE** – Students are expected to attend all scheduled classes and laboratories. If special circumstances such as illness, religious holidays, travel difficulties, family emergencies or active participation in college-sponsored events make absence unavoidable you must see me to make up the work. No student will be allowed to complete graded work after that work has been returned to others in the class. If absences place you in academic jeopardy of not passing the course, the Dean of your school will be notified. All cell phones must be turned off during class and laboratory. All computers must be closed and stored during lecture.

**SPECIAL LEARNING ACCOMMODATIONS** – If you have any special learning needs and need some accommodations then please alert this instructor immediately, during the first two weeks of this course. Work is done with David Symonds, the Learning Specialist in the Academic Enrichment Center located in the Butcher Library.

**ACADEMIC HONESTY** – The Code of Academic Honesty from the Student Handbook will be strictly adhered to. The first violation will result in a zero grade for the work and a letter to the student’s dean. The second violation will result in an automatic F in the course as a final grade.

**GRADING** The grade in the course will be determined by achievement in both the lecture and laboratory sections of the course. The final grade will be determined as follows:
The range for grades will be as follows:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Score Range</th>
<th>Test Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>A +</td>
<td>97 - 100</td>
<td>Engine Theory: _________</td>
</tr>
<tr>
<td>A</td>
<td>93 - 96</td>
<td>Carburetors: _________</td>
</tr>
<tr>
<td>A-</td>
<td>90 - 92</td>
<td>EFI: _________</td>
</tr>
<tr>
<td>B+</td>
<td>87 - 89</td>
<td>Clutches: _________</td>
</tr>
<tr>
<td>B</td>
<td>83 - 86</td>
<td>Suspension: _________</td>
</tr>
<tr>
<td>B-</td>
<td>80 - 82</td>
<td></td>
</tr>
<tr>
<td>C+</td>
<td>77 - 79</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>73 - 76</td>
<td></td>
</tr>
<tr>
<td>C-</td>
<td>70 - 72</td>
<td></td>
</tr>
<tr>
<td>D+</td>
<td>67 - 69</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>63 - 66</td>
<td></td>
</tr>
<tr>
<td>D-</td>
<td>60 - 62</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>Below 60</td>
<td></td>
</tr>
</tbody>
</table>

Tests - A test will be given after completion of each unit for a total of 5 exams. No make-up tests will be given. Any missed test must be discussed with the instructor.

Final Exam – The EETC Two-stroke technician certification exam or comparable final will be given as the final exam for the course. This exam will be given prior to final exam week. If the EETC Two-stroke technician certification exam is used you will have the results during finals week.

Homework – Homework will be assigned for the first thirteen weeks. Homework is due on Thursday at the beginning of lecture. Homework which is late will be penalized 50%. Late homework will not be accepted after the graded work has been returned to others.

Customer Evaluation – The equipment worked on in lab will be “graded” for the quality of the repair by the customer. A copy of the customer evaluation form can be found on the “Q” drive.

Laboratory work, work orders and reports – Laboratory reports from the eight topical labs will be graded and returned the following week. These will constitute ½ of the lab work grade. The other ½ will come from the work orders created during the additional weeks. The weekly progress made on each job will be recorded on the job work orders. These work orders will be maintained in the work order center and kept current on a weekly basis. At the completion of each project a comprehensive report of the procedure(s) will be assembled according to the specified format provided and submitted for grading. A grade will be given based on the accuracy and completeness of these lab reports.

COURSE OUTLINE

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture Topic</th>
<th>Reading Assignment</th>
<th>Written Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Course Overview</td>
<td>Review Presentation</td>
<td>Review Syllabus</td>
</tr>
<tr>
<td>Week</td>
<td>Topic</td>
<td>Review</td>
<td>Homework</td>
</tr>
<tr>
<td>------</td>
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</tr>
<tr>
<td>2</td>
<td>Engine Theory – Compression Ratios</td>
<td>Review Presentation</td>
<td>Homework 1 – Compression ratios</td>
</tr>
<tr>
<td>3</td>
<td>Engine Theory - Mean Port time area</td>
<td>Review Presentation</td>
<td>Homework 2 - Porting</td>
</tr>
<tr>
<td>4</td>
<td>Engine Theory – Tuned Exhaust</td>
<td>Review Presentation</td>
<td>Homework 3 – Tuned Exhausts</td>
</tr>
<tr>
<td>5</td>
<td>Engine Theory - test</td>
<td>Review for test</td>
<td>None</td>
</tr>
<tr>
<td>6</td>
<td>Carburetors - VM</td>
<td>Review Presentation</td>
<td>Homework 4 – Air Density</td>
</tr>
<tr>
<td>7</td>
<td>Carburetors - VM</td>
<td>Review Presentation</td>
<td>Homework 5 – Re-jetting</td>
</tr>
<tr>
<td>8</td>
<td>Carburetors – TM - Test</td>
<td>Review for test</td>
<td>Handout</td>
</tr>
<tr>
<td>9</td>
<td>EFI - Test</td>
<td>Review for test</td>
<td>None</td>
</tr>
<tr>
<td>10</td>
<td>Clutches and Transmissions</td>
<td>Review Presentation</td>
<td>Homework 6 – CVT Operation</td>
</tr>
<tr>
<td>11</td>
<td>Clutches and Transmissions</td>
<td>Review Presentation</td>
<td>Homework 7 - Gearing</td>
</tr>
<tr>
<td>12</td>
<td>Clutches and Transmissions - test</td>
<td>Review for test</td>
<td>None</td>
</tr>
<tr>
<td>13</td>
<td>Suspension</td>
<td>Review Presentation</td>
<td>Homework 8 - Shocks</td>
</tr>
<tr>
<td>14</td>
<td>Suspension - test</td>
<td>Review for test</td>
<td>None</td>
</tr>
<tr>
<td>15</td>
<td>Final Exam/Reports Due</td>
<td>Review for test</td>
<td>Date to be announced</td>
</tr>
</tbody>
</table>

LABORATORY OUTLINE

Week 1 - Arctic Cat Service Information

Week 2 – Two-Stroke Engine Teardown (Engine Disassembly and Inspection)

Week 3 – Two-Stroke Engine Teardown (Port Mapping – Calculations)

Week 4 - Two-Stroke Engine Teardown (Engine Reassembly)

Week 5 - Two-Stroke Engine Final Assembly and Pressure Testing

Week 6– Carburetor Overhaul – VM & TM Carbs

Week 7 – Electronic Fuel Injection System (EFI)

Week 8 – (work time)

Spring Break

Week 9 - Clutch and Pulleys I (work time)
Week 10– Clutch and Pulleys II (work time)

Week 11 – Suspensions (work time)

Week 12 – (work time)

Week 13 – Field Trip/Testing (Actual date may be different based on business schedule)

Week 14 – Project Completion  

Week 15 – Lab Clean-Up

Notes:

SHOP SAFETY AND PROCEDURE

1. Show respect for each person, machine, tool and lab facility.

2. No foul language or tobacco products will be used in lab.

3. Safety glasses and appropriate shop clothing will be worn at all times.

4. All petroleum products will be stored in the appropriate cabinet.

5. All engines will be run with ventilation system running, or taken outside of the building.

6. The lid on the parts cleaner will be closed when not in use.

7. Waste rags will be stored in the appropriate metal container.

8. Oil spills will be covered immediately with absorbent pads.

9. All tools will be returned to their appropriate locations - small engine tools in the designated cabinet.

10. All engines will be stored beneath the benches at the end of the lab.

11. Note the location of the fire extinguishers at the front and back of lab.

12. Note the location of the eye wash station next to the sink.

13. Note the location of the Service Manuals/Information for all maintenance and repair guidance.

14. Work-orders and other paperwork will be updated at the end of each lab session.
AGEN 261 Hydraulics

COURSE SYLLABUS

Hours Required

2 lecture, 2 lab
1 recitation
4 credit hours

Lecture- F. Bach 125B Marshall hall
Lab- F. Bach 119 Marshall hall
Office- 135 Marshall Hall

DESCRIPTION

This course is a continuation of AGEN 161. This course will provide a more in depth study of the fundamental principles of hydraulics and the various designs and systems used. Application of hydraulics to both Agricultural and Construction equipment is emphasized. A study of the technical language of fluid power is made including graphic symbols, components and machine systems their design, application, operation and maintenance.

Disassembly, study, inspection testing and servicing hydraulic circuits, systems and components such as pumps, lift systems hydrostatic transmissions, electronic and pilot control of hydraulic systems. Electronic control of hydraulic circuits and
hydrostatic drives will be emphasized. Trouble shooting and system diagnostics, electronic troubleshooting and programming will be addressed. Appropriate testing procedures and equipment will be used.

Objectives

1. To develop and expand an understanding of the fundamental principles of hydraulics and the various designs and systems used.
2. To study and develop an understanding of hydraulic components, their design, application, operation and maintenance
3. To apply the principles of hydraulics to Agricultural and Construction equipment
4. To develop the abilities to test and service hydraulic circuits, hydrostatic drives electronic circuits, systems and components.
5. To develop an understanding of how pilot and electronic controls are used in hydraulic and hydrostatic applications.

TEXT

1. Fluid Power Technology- Norvelle
2. Fundamentals of Service- Hydraulics- John Deere
3. Vickers Portable Hydraulic Trainer

SUPPLEMENTARY REFERENCES

1. Fluid Mechanics for Technicians by Hardison
3. Caterpillar technical manuals
4. Caterpillar SIS
5. Komatsu tech manuals

STUDENT RESPONSIBILITIES

1. To read this course outline and to ask questions if any of the material is unclear.
2. To make up any and all class work covered during their absence
3. To attend scheduled lab unless PREVIOUS arrangements are made with the instructor.
4. To complete on time lab write-ups, study guides, problem sets and term projects, which reflect careful, neat, complete and individual effort.

HOME WORK

In relation to each lecture there will be reading assignments and or problem sets and study guides, the reading assignments reinforce and expand upon the lecture topic.

LAB

A specific area will be covered each week as outlined. Lab attendance is important as NO make-up labs will be given. Missed lab work will lead to an F or an incomplete in this course.

A lab write-up is due after each lab. They provide reinforcement of each lab topic and may stimulate further research or questions on the topic covered.

One (1) lab will be permitted without penalty; however, it must be submitted before or with the next week’s lab. Lab write-ups submitted after that time will not be accepted unless under extenuating circumstances. After the first late lab, the lab grade for a given lab will drop one letter grade per day. Failure to attend on a given day or to hand in a lab report after the grace period will be recorded as a Zero (0).

Lab sections are balanced; therefore, students are expected to attend their scheduled labs unless previous arrangements have been made to switch into another lab section.

Field trips and other sponsored events must be arranged prior to lab time, so arrangements for makeup work can be planned.

Students are expected to conduct themselves in a safe mature manner. Any student who poses a hazard to themselves or others will, on the first offense, receive a verbal warning; on the second offense, a written warning; on the third offense, will be removed from the lab/class.

TERM PROJECT
There will be a term project. Procedure and time will be announced later on during the semester.

ATTENDANCE POLICY

All attendance regulations as found in the Student Handbook, College Catalog and Faculty Handbook will be enforced. After 3 unexcused absences in lecture or lab, the student will be subject to review and may face possible termination from the course.

MAKE UP TESTS AND QUIZZES

There will be NO makeup quizzes in lecture or lab due to their unannounced nature. Test makeups only under extenuating circumstances.

CHEATING

Cheating will be dealt with the most severe manner possible as outlined in the Academic Handbook, cheating could result in receiving an F in this course.

GRADING

The grade is based on Lecture (%50) and Lab (%50)

The lecture grade will equal ½ (%50) of the class grade and is based on class tests, quizzes, study guides and a final exam.

The lab grade will based on lab write-ups, lab quizzes, and a final project and will make-up the second ½ (%50) of the class grade

Lecture grade (%50) + Lab grade (%50) = class grade

Lab grading
Check plus = 95  well done write-up, neat, and complete which reflects
Work and effort BEYOND that required in the write-up

Check = 85  Lab done- neat and complete, reflects an understanding
Of the material

Check minus = 75  a lab that reflects the minimum effort, but still complete

X = 60  lab write-up that has parts missing

MAJOR TOPICS

1. Introduction, history and development
2. Fluid power principles
3. Elements of hydraulic systems
4. Hydraulic symbols, diagrams schematics
5. Reservoirs, oil coolers, hoses, pipes and couplers
6. Hydraulic pumps
7. Hydraulic valves
8. Electronic control of valves and hydrostatic drives
9. Hydraulic motors
10. Servo valves and electrical components
11. Hydraulic fluids and seals
12. Hydraulic filters
13. General maintenance of hydraulic systems
14. Diagnosis and testing of hydraulic and hydrostatic systems

15. Tractor lift systems

16. Power steering systems

17. Hydraulic and hydrostatic transmission, mechanical, pilot and electronically controlled

LECTURE/LAB TOPICS

1. Introduction, history and development
   a. Scope and course procedures
   b. History of hydraulic developments
   c. Advantages and disadvantages of fluid power

2. Fluid power principles
   a. Fundamental
   b. Force, pressure, area
   c. Work, horsepower, torque
   d. Basic lever principles

3. Pascal’s law
   a. Application
   b. Multiplication of forces
   c. Fluid properties

4. Boyles law

5. Bernoulli’s theorem

6. Charles’s law, Darcy’s formula, Reynolds’s number, Torricelli’s Theorem

7. Hydrostatics and Hydrodynamics

8. Elements of hydraulic systems
   a. Components
   b. Basic circuits
   c. Open and closed center system
   d. Pilot control
   e. Electronic control
   f. Design factors

9. Hydraulic symbols, diagrams and schematics
   a. ISO symbols
b. Application of symbols and components
   c. Reading and interpretation of diagrams and schematics

10. Reservoirs, oil coolers, hoses, pipes and couplings

11. Hydraulic pumps
   a. Displacement of pumps
   b. Fixed
   c. Variable
   d. Pressure compensated
   e. Load sensing, pressure compensated
   f. Electronic controlled displacement

Types of pumps
   a. Gear external, internal
   b. Vane balanced, unbalanced
   c. Piston axial, radial

12. Pump efficiency

13. Pump malfunctions

14. Resolver networks

Hydraulic valves

1. Directional control
   a. Rotary
   b. Open center spool
   c. Closed center spool
   d. Flow divider
   e. Electronic controlled
   f. Pilot controlled

2. Flow control
   a. Needle
   b. Globe
   c. Gate
   d. Check
   e. Relief

HYDRAULIC MOTORS

1. Pump and motor design
   a. Open loop
   b. Closed loop

2. Displacement control
   a. Mechanical
b. Pilot
   c. Electronic
3. Types of motors
   a. Gear
   b. Vane
   c. Axial piston
   d. Radial piston
4. Application and efficiency
5. Hydraulic motor malfunctions

GENERAL MAINTENANCE OF HYDRAULIC SYSTEMS
1. Cleanliness
2. Cleaning and flushing of systems
3. Preventing leaks
4. Preventing overheating
5. Preventing air-in-oil problems
6. Checking system before operation
7. Safety rules.

DIAGNOSIS AND TESTING OF HYDRAULIC SYSTEMS
1. Use of hydraulic tester
   a. What a tester does
   b. Installing a tester
   c. Operating the hydraulic tester
2. System testing
3. Locating defects in the system

HYDRAULIC LIFT SYSTEMS
1. Components, design and operating principles
2. Depth and position control, weight transfer principle
3. Adjusting and servicing

POWER STEERING SYSTEMS
1. Power assist systems
2. Full hydraulic systems
3. Adjusting and servicing

HYDROSTATIC TRANSMISSIONS
1. Hydrostatic
2. Hydrodynamic
3. Hydraulic couplings
4. Torque converters
5. Power shift  
6. Adjusting and servicing  
7. Open loop  
8. Closed loop  
9. Mechanical controlled  
10. Pilot controlled  
11. Electronically controlled

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture topic</th>
<th>Lab topic</th>
<th>Assignment</th>
</tr>
</thead>
</table>
| 1    | Introduction to hydraulics  
 Fluid power principles | Axial piston pump-variable volume. Cat hand outs Vickers 1 linear motion. 980 G schematic | John Deere Chapter 1, 2 (hydraulic safety) pump lab, 980 G schematic |
| 2    | Fluid power principles | Radial piston pumps. Pressure compensated system John Deere hand outs and schematic. Cat 330 L schematic | John Deere Chapter 4 Hydraulic pumps. Finish chapter 1 and questions |
| 3    | Fluid power principles  
 Elements of hydraulic systems | Axial piston load sensing pressure compensated system. Allis schematic | Allis schematic. Review chapter 4 FOS read chapter 2 Hydraulic symbols |
| 4    | Elements of hydraulic systems  
 Hydraulic symbols, diagrams and schematics | Axial piston pump  
 Load sensing pressure compensated using a resolver network Cat 416 D as an example 416D schematic | John Deere FOS Review Chapter 4  
 Cat 416 lab and Schematic |
<table>
<thead>
<tr>
<th>5</th>
<th>Hydraulic pumps types and displacement control</th>
<th>Hydrostatic steering (HMU) units Oliver/White system and Cat 416D lab write up and schematic</th>
<th>FOS review unit 1 on steering systems. Cat and Oliver lab Cat schematic</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Hydraulic pumps types and Displacement/hydrostatic drive concept</td>
<td>Load sensing draft links, Ford. John Deere Cat Challenger lab write up cat challenger schematic</td>
<td>Review FOS unit 1 on draft sensing links Ford, J.D, Cat lab write up, cat schematic</td>
</tr>
<tr>
<td>7</td>
<td>Hydraulic valves, types methods of control</td>
<td>Work tool group hydraulics from the 248 b. pilot control of hydraulic valves, high flow low flow, lab write up and schematic</td>
<td>FOS chapter 5 cat 248B lab write up, schematic</td>
</tr>
<tr>
<td>8</td>
<td>Hydraulic valves, types methods of control</td>
<td>Cat 248B hydrostatic system overview closed loop pilot operated system. Hydrostatic system lab write-up</td>
<td>FOS Chapter 7 hydrostatic lab write up, Cat 248B hydrostatic system write-up 248B schematic</td>
</tr>
<tr>
<td>9</td>
<td>Hydraulic Motors/ hydrostatic systems</td>
<td>246C work tool group, electro/hydraulic controls. Electronic programing and troubleshooting</td>
<td>FOS Chapter 7 Cat 246C lab. Cat 246C schematic on the work tool group</td>
</tr>
<tr>
<td>10</td>
<td>Hydraulic Motors/ hydrostatic systems</td>
<td>Flow rate work tool group of the Cat 246C high flow and standard flow. Review the use of flow rater. Lab write up on flow rate</td>
<td>Review chapter 7 FOS</td>
</tr>
<tr>
<td>11</td>
<td>Accumulators, servo valves and electrical components</td>
<td>246C hydrostatic drive introduction electro/hydrostatic controls flushing and recharging the system</td>
<td>Lab write up on flushing the system 246C schematic hydrostatic system</td>
</tr>
<tr>
<td>12</td>
<td>Hydraulic fluids and seals</td>
<td>246C testing the hydrostatic system/ flow rate motors, use of ET for 2 speed controls. Lab on hydrostatic system</td>
<td>FOS Chapter 12 Cat lab on the hydrostatic system tests</td>
</tr>
<tr>
<td>13</td>
<td>Lines and couplers</td>
<td>Pressure testing pilot circuit of the 246C monitoring and troubleshooting the hydrostatic system using DMM, CAT ET, pressure gauges, flow rater</td>
<td>Lab write up on troubleshooting 246C and results</td>
</tr>
<tr>
<td>14</td>
<td>Diagnosis and testing</td>
<td>Open center testing using test stand in the lab</td>
<td>FOS chapter 15. Start final project write up</td>
</tr>
</tbody>
</table>
AGEN 270 TRACTOR OVERHAUL AND REPAIR
COURSE OUTLINE

Credit Hours: 5
Instructor lecture/lab
F. Bach
Lab Ford/Bach

Hours Required
Class 2 hours
Recitation-1 hour
Lab 4 hours

Part I – APPLIED FAILURE ANALYSIS
Principles of failure analysis. Fractures, wear and other factors related to part failure. Students will apply these principles to failed parts of their projects. Illustrated examples will be used

Part II- power trains
An understanding and application of the fundamentals and principles of mechanical and hydraulic systems for power transmission will be addressed

Part III Engines
Principles of internal combustion engines and various types of engines used in Agricultural, On HI way, and construction equipment will be addressed. Applications of these engines will be studied along with the designs and construction of engine components and related systems

For laboratory instruction students will be placed in groups and assigned to a specific machine, this machine may belong to one of the members of the group or assigned by the faculty for the purpose of instruction. Instruction starts with “how a component or system works”, “why the system or component failed” and “what to do about it”

Objectives

1. To develop an understanding of the mechanical principles in the operation and servicing of Agricultural, On-HI way and Construction equipment
2. To develop the abilities needed for servicing, diagnosing and repairing Agricultural, Oh-HI way and Construction equipment

3. To provide practical laboratory experience in the area of engine, transmission, hydraulic, electrical and other related system component repair and to develop the qualities of good workmanship

4. To develop the student’s confidence in his or her abilities and skills

TEXT

Fundamentals of Service- Engines John Deere
Fundamentals of Service-Power Trains John Deere
Fundamentals of Service- Parts Failure Analysis John Deere
Medium/Heavy duty truck engines fuel and computerized management systems Bennett
Applied Failure Analysis – Reference books Caterpillar

Students Responsibility

1. To read this course outline and to ask questions if any of the material is unclear

2. To make up any and all class work covered during their absence.

3. To attend scheduled lab unless previous arrangements have been made with the instructor

4. To complete on time lab write-ups, study guides, problem sets and term projects which reflect careful neat, complete and individual effort

5. To complete their given overhaul assignment with in the specified time and make reasonable weekly progress

Home work

In relation to each lecture there will be reading assignments, problem sets and Study guides. The reading assignments reinforce and expand upon the lecture
Students must wear safety glasses when working in the lab area

Students will be working on many different projects in the lab, a week to Week progress report will be required along with hours worked and progress made

During lab time a student is required to make progress on their project Secure parts etc. A student or group that fails to make reasonable weekly Progress will be subject to review by the instructors and face possible removal of The machine from the lab and face removal from the course.

The work area must be kept as neat and clean as possible, oil removed from the Floor, parts placed in a neat, secure arrangement and the floor swept before Leaving.

Students must punch in and out and check with the instructor before leaving the lab area. Don’t Leave the lab area until you are checked out

Extra help

Students should check in advance in regard to extra help or lab hours. We will Make an attempt to keep extra hours at OUR CONVENIENCE NOT YOURS

Students who request extra help or hours are asked to use the time working Not socializing, extra hours must be recorded as to job, hours worked and date

Attendance Policy

All the policies will be enforced as found in the student, academic hand book. After 3 absences a student will be subject to departmental review and may be removed from the class.
Make up tests and quizzes

There will be no makeup quizzes in lecture or lab due to their unannounced Nature.

Cheating

Cheating will be dealt with in the most severe manner possible as outlined in the academic hand book, cheating could result in receiving an “F” in this course

Grading

Lab work and Project presentation  (2/3 -3/4)

A. Quality and quantity of work
B. Attitude towards work- professionalism
C. Responsibility assumed by student in regard to lab work
D. Extra productive documented hours on their project
E. Presentation of project
F. Pier project evaluation and analysis

Class work  ¼ to 1/3
A. quizzes
B. final exam (20% of class average)
C. written assignments

TRACTOR OVERHAUL AND REPAIR
LAB REQUIREME NTS/REGULATIONS

1. All students must attend their assigned labs
2. Safety glasses must be worn at all times
3. Extra lab time will be provided at the instructors convince. Attendance is optional and at our discretion and is open to students in the course
4. All extra time spent must be recorded by time card or signup sheet
5. We don’t have time for any repair work on cars or trucks
6. All tractor work must be completed by May 1\textsuperscript{st}.
7. All work must be done during regular or optional lab periods. The machine must be repaired by the student or group in the lab
8. Students must ask permission to use special equipment, valve grinder, press, and hone and are responsible for that piece of equipment
9. Work area must be kept neat. All parts should be lined up on your parts bench, preferably in the order of removal. Place bolts and small parts in labeled boxes. It is your responsibility to remember how your machine came apart and how it goes back together
10. Start clean up twenty minutes before the end of the lab. It is your responsibility to put back all items you have used. All oil and anti-freeze must be removed from the floor
11. If you have heavy parts to bring into the lab, a parking permit for a short duration will be issued. No tickets will be voided if you do not obtain a permit from the instructor.
12. be sure equipment is properly blocked and secured before disassembly. Never rely on hydraulic lifts. Always use jack stands and blocks. Don’t take chances
13. Use hoists or lifting equipment or get help in moving heavy parts, i.e. heads, cranks, blocks. Etc. don’t try to move these parts alone.
14. Note the order or number and direction of parts i.e. rod and main bearing caps, gears, shims etc. These parts must be put together correctly or immediate failure will occur.
15. Before welding or cutting
   A. seek permission from the instructor
   B. have had pervious operation and safety instruction from another class i.e. welding (auto 102)
   c. Follow al safety procedures
   d. Wear all safety equipment
   E. have another person watch for sparks and flames
   f. Protect others from sparks and arc flash
   g. Remove all flammable materials from the area
   H. upon completion of the job return all equipment to their proper places
16. All flammable liquids, i.e. gasoline, must be removed from the lab or stored in approved containers and stored in a fire cabinet.

17. The parts washer must be kept closed when not in use. Proper equipment must be worn when using the parts washer.

18. Waste oil, solvents and other waste products must be disposed of in an appropriate manner. Check with the instructor before disposing of any waste products.

19. This is not an open lab. An instructor must be present at all times. Students will not be allowed to work without supervision.

20. Students who violate these rules:
   a. The first offense will receive a verbal warning.
   b. The second offense will receive a written warning and the Department chair/dean will be notified.
   c. The third a dean/department chair meeting with the student and instructor will result with possible expulsion from the Class.

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Course Outline for AGSC 132

INTRODUCTION TO COMPUTER APPLICATIONS IN PRECISION FARMING

Blackboard Access of Course Material On-line (for students enrolled in the course)

INSTRUCTOR:

Dr. Walid H. Shayya

Instructor Contact Information
GENERAL COURSE DESCRIPTION:

AGSC 132 introduces the student to site-specific crop management and precision farming. The course also involves the application of selective computer software and hardware in site-specific crop management. In addition, the course focuses on providing the student with an overview of the basics of global positioning system (GPS), an introduction to geographic information systems (GIS), and an introduction to remote sensing. Students enrolled in AGSC 132 will be introduced to these important systems through lectures and laboratory exercises. At the successful completion of the course, the student will be expected to have gained practical knowledge of GPS, GIS, and remote sensing technologies and their potential applications in precision agriculture and site-specific crop management.

2 credits (1 lecture hour, 2 laboratory hours), fall semester

EXPECTED COURSE OUTCOMES:

At the successful completion of AGSC 132, the student is expected to have:

1. Developed an understanding of precision agriculture and its major components including yield monitoring, soil sampling on site-specific basis, and variable rate applications.

2. Gained an understanding of GPS technology and its potential applications on the farm, including site-specific crop management and precision agriculture.

3. Gained an understanding of the concepts of GIS and the important role GIS plays in the overall management of the farm as well as site-specific crop management and precision agriculture.

4. Considered the importance of remote sensing and digital orthoimagery and how critical these may be for farm management and the implementation of a site-specific crop management system.

5. Recognized the importance of computer technology and how computers can be applied effectively in agriculture management and precision farming.
OFFICE HOURS:

The instructor has the following designated office hours per week:

- Mondays: 2:00 to 3:50 p.m.
- Tuesdays: 10:00 to 10:50 a.m. and 3:00 to 3:50 p.m.
- Fridays: 10:00 to 10:50 a.m.

If necessary, students are also encouraged to make appointments to see the instructor at other times.

CONTACT HOURS AND CLASS SCHEDULE:

AGSC 132 is a two-credit hour course. It includes three contact hours per week (one for lecture and two for laboratory). One section of the lecture and three sections of the laboratory are offered during the 2016 Fall semester. The schedule of the offered sections is as follows:

- AGSC 132 - Section 1 Lecture: Meets on Tuesdays (4:00 to 4:50 p.m.) in Room 101, Marshall Hall.
- AGSC 132 - Section 01 Lab.: Meets on Thursdays (2:00 to 3:50 p.m.) in Room 102, Marshall Hall (and at times in the GPS/GIS Computer Laboratory currently located in Room 208, Bicknell Hall -- as will be indicated in class).
- AGSC 132 - Section 02 Lab.: Meets on Thursdays (11:00 a.m. to 12:50 p.m.) in Room 102, Marshall Hall (and at times in the GPS/GIS Computer Laboratory currently located in Room 208, Bicknell Hall -- as will be indicated in class).
- AGSC 132 - Section 03 Lab.: Meets on Thursdays (9:00 to 10:50 a.m.) in Room 102, Marshall Hall (and at times in the GPS/GIS Computer Laboratory currently located in Room 208, Bicknell Hall -- as will be indicated in class).

TEXTBOOK(S):

Each student must purchase the following two course manuals which are available from the campus store.


The first manual includes the instructor’s PowerPoint presentations (printed in handout format), pertinent reading material, material for homework assignments, and printouts of some laboratory exercises. The second manual includes the GIS exercises to be completed during several of the course laboratories. Course material is also available on-line under Blackboard which is accessible only by those students who are enrolled in the course. Numerous resources are available on-line pertaining to the course’s main topics of precision farming (www.precisionag.org), geographic information systems (GIS.COM, USGS), and the global positioning system (Trimble). Students are encouraged to be actively involved in acquiring some pertinent knowledge from these and other resources available on the worldwide web.

STUDENTS WITH DISABILITY:

Any student who feels s/he may need an accommodation based on the impact of a disability should contact the Disability Services (DS) office immediately to register for services and receive a Notification of Disabilities form. Once you have this form, we will meet privately, to discuss your specific needs. Although you may register for services at any time, please attempt to make arrangements within the first two weeks of the semester so all appropriate academic accommodations can be set.

CLASS POLICIES:

- **Attendance**: First and foremost, students must always plan to be in class on time. Given the nature of the course, all students are also required to attend all classes and laboratories. Attendance will be taken during each class session and appropriate actions will be taken when students are absent for more than 20% of the course. A student with a few or no class absences during the semester will receive favorable considerations during the grading process.
when s/he is close to receiving the next higher letter grade. No make-up examination will be given without a written medical excuse, family emergency, or prior permission from the instructor. Students are responsible for all material covered in the class whether presented orally during the lectures (and laboratories) or assigned.

**Student Behavior:** As students in a technical program are preparing for a professional career, all students are expected to conduct themselves as professionals (in both manner and dress). Good behavior in the classroom is expected from all students. Students who engage in unacceptable or disruptive behavior will be asked to leave the class.

- Eating, drinking, or the consumption of any tobacco products is prohibited in the classroom situation (lecture hall, classroom, laboratory, or field). Doing so may result in the student's dismissal from that class period and will count as an unexcused absence.
- Cell phones and pagers must be turned off during instruction time. Use during or disruption of class by these devices will result in the student's dismissal from that class period and an unexcused absence. *Laptop computers may not be used during the lecture.*

**Assignments:** This course will include several laboratory exercises and homework assignments (to be turned in electronically, except when otherwise indicated) that will account for about 30% of the final grade. Therefore, it is important that students complete their assignments accurately, neatly, and submit them on time. Assignments received past the due date will be devalued 5% for each day that the item is late. No class assignment of any student will be graded (for credit) once the same assignment is corrected and returned to the class.

**Examinations:** Class examinations will cover class material, homework and Laboratory assignments, and assigned readings.

**Honesty Policy and Discipline (Due Process):** Honesty and integrity are major elements in professional behavior and are expected of each student. Any assignment (including those in electronic media) submitted by a student must be of the student's original authorship. Representation of another's work as the student's own shall constitute plagiarism. Cheating, in any form, is an unacceptable behavior within all college courses. Students having academic problems should consult their academic advisor or a college counselor. Instances of cheating will be dealt with in accordance to Morrisville State College policy. Standards of academic honesty and due process procedures for Morrisville State College are located in the Rules, Regulations, and Expectations section of the Student Handbook.

**Things to remember:** The material covered in AGSC 132 is not particularly difficult so long that the student keeps up with the material (understanding earlier lectures and laboratories will be critical to grasping concepts presented in subsequent lectures). Each student should plan to spend at least three hours per week for every lecture convened in class. Given the course's focus, students are also urged to spend the time in completing laboratory exercises and course assignments on time (and independently). Completing assignments well before the due date will give the student a chance to ask questions should s/he encounter problems. Students also should remember to ask questions of the instructor when they face difficulties, whether inside or outside the classroom. The instructor has an open-door policy and welcomes the opportunity to visit with students whenever needed.

**GRADING/EVALUATION OF STUDENT:**

Evaluation is a shared responsibility between the teacher and the student. The purpose of the evaluation is to demonstrate how well the professor has taught and the student has learned specific course materials, the principles, concepts, and terms relevant to the covered topics. Evaluation is also intended to assess the student's ability to utilize the acquired knowledge and how s/he can use this knowledge in problem-solving.

The breakdown of grading in this course will be as follows:

- Class Work Ethic and Participation ==> 5% of final grade
- Laboratory Exercises ==> 15% of final grade
- Homework Assignments ==> 14% of final grade
- Two Progress Examinations ==> 36% of final grade
- Final Examination (comprehensive) ==> 30% of final grade

The distribution of grades in this course will be based on the A-F College grading scheme. The letter grades correspond to the following percentage scale: A (90-100%), A- (87-89.9%), B+ (83-86.9%), B (80-82.9%), B- (77-79.9%), C+ (73-76.9%), C (70-72.9%), C- (67-69.9%), D+ (63-66.9%), D (60-62.9%), and F (<60%).

**OUTLINE OF TOPICS:**

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159
<table>
<thead>
<tr>
<th>Week - Date</th>
<th>Lecture Topic*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - Aug. 30</td>
<td>Introduction to AGSC132</td>
</tr>
<tr>
<td>2 - Sep. 6</td>
<td>Global Positioning Systems (GPS) Fundamentals</td>
</tr>
<tr>
<td>3 - Sep. 13</td>
<td>Differential GPS (DGPS)</td>
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<tr>
<td>4 - Sep. 20</td>
<td>Wrap-up Lecture on GPS</td>
</tr>
<tr>
<td>5 - Sep. 27</td>
<td>Introduction to GIS (GIS.COM, USGS)</td>
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<tr>
<td><strong>6 - Oct. 4</strong></td>
<td><strong>Progress Examination 1 - Tuesday, October 4</strong></td>
</tr>
<tr>
<td>7 - Oct. 4</td>
<td>October Break (no lecture)</td>
</tr>
<tr>
<td>8 - Oct. 18</td>
<td>QGIS and Farm Works Office Software</td>
</tr>
<tr>
<td>9 - Oct. 25</td>
<td>Map Scale Examples and Topographic Maps</td>
</tr>
<tr>
<td>10 - Nov. 1</td>
<td>Measuring, Monitoring, and Mapping Crop Yield</td>
</tr>
<tr>
<td>11 - Nov. 8</td>
<td>Soil Sampling and Analysis</td>
</tr>
<tr>
<td>12 - Nov. 15</td>
<td>Variable Rate Technology and Second Exam Study Guide</td>
</tr>
<tr>
<td><strong>13 - Nov. 22</strong></td>
<td><strong>Progress Examination 2 - Tuesday, November 22</strong></td>
</tr>
<tr>
<td>14 - Nov. 29</td>
<td>Remote Sensing</td>
</tr>
<tr>
<td>15 - Dec. 6</td>
<td>Digital Orthoimagery and Final Exam Study Guide</td>
</tr>
<tr>
<td><strong>16 - Dec. ?</strong></td>
<td><strong>Comprehensive Final Examination</strong> (to be scheduled during the finals week)</td>
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</table>

Click [here](#) to download and install Adobe® Acrobat® Reader™, a free software that lets you view and print Adobe Portable Document Format (PDF) files.

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<table>
<thead>
<tr>
<th>Week - Date</th>
<th>Laboratory Topic*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - Sep. 1</td>
<td>Precision Farming: An Overview (50-minute Lecture, No Laboratory Exercise)</td>
</tr>
<tr>
<td>2 - Sep. 8</td>
<td>Introduction to Windows and Pertinent Computer Software Installation of DNR GPS Software for use with ArcExplorer and QGIS</td>
</tr>
<tr>
<td>3 - Sep. 15</td>
<td>GPS Demonstration and Practice</td>
</tr>
<tr>
<td>4 - Sep. 22</td>
<td>Differential GPS Exercise</td>
</tr>
<tr>
<td>5 - Sep. 29</td>
<td>QGIS (Installation), GoogleEarth (Installation and Demonstration), and Bing Maps (Demonstration)</td>
</tr>
<tr>
<td>6 - Oct. 6</td>
<td>Review of the Results of Progress Examination 1 QGIS Exercise 1: Getting Vector Data into QGIS (QGIS Tutorial)</td>
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<tr>
<td></td>
<td>- Overview of QGIS</td>
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<tr>
<td></td>
<td>- Exercise overview</td>
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<tr>
<td></td>
<td>- Working with vector layers</td>
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<tr>
<td></td>
<td>- Working with vector data attributes</td>
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<tr>
<td></td>
<td>- Concluding remarks</td>
</tr>
<tr>
<td>7 - Oct. 13</td>
<td>QGIS Exercise 2: Querying and Symbolizing Vector Data (QGIS Tutorial)</td>
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<tr>
<td></td>
<td>- Overview of QGIS</td>
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<tr>
<td></td>
<td>- Exercise overview</td>
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<tr>
<td></td>
<td>- Querying vector layers</td>
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<tr>
<td></td>
<td>- Symbolizing vector layers</td>
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<tr>
<td></td>
<td>- Concluding remarks</td>
</tr>
<tr>
<td>8 - Oct. 20</td>
<td>QGIS Exercise 3: Labeling and Classifying Vector Data (QGIS Tutorial)</td>
</tr>
<tr>
<td></td>
<td>- Overview of QGIS</td>
</tr>
</tbody>
</table>
- Exercise overview
- Labeling vector layers
- Classifying vector data
- Concluding remarks

**QGIS Exercise 4: Creating Maps (QGIS Tutorial)**
- Exercise overview
- Getting started
- Using QGIS map composer
- Concluding remarks

**QGIS Exercise 5: Map Projections and Inventory Operations (QGIS Tutorial)**
- Exercise overview
- Getting started
- Changing the map projection
- Measuring distances
- Measuring areas
- Managing scale
- Concluding remarks

**QGIS Exercise 6: Creating Vector Data (QGIS Tutorial)**
- Exercise overview
- Getting started
- Creating a line vector layer
- Creating a polygon vector layer
- Creating a point vector layer
- Concluding remarks

**QGIS Exercise 7: Geospatial Analysis (QGIS Tutorial)**
- Exercise overview
- Getting started
- Vector analysis
- Terrain analysis
- Concluding remarks

[Second Exam Study Guide](#)
<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov. 24</td>
<td>Thanksgiving Break (no laboratory)</td>
</tr>
<tr>
<td>Dec. 1</td>
<td>Review of Soil Sampling Results</td>
</tr>
<tr>
<td>Dec. 8</td>
<td>Digital Orthoimagery Available from NYS GIS Clearing House</td>
</tr>
</tbody>
</table>

Click [here](#) to download and install Adobe Acrobat Reader™, a free software that lets you view and print Adobe Portable Document Format (PDF) files.

*The topics and corresponding dates listed in the tables above are tentative and may be subject to change during the semester.*
Course Description:
This course will cover the operation, diagnosis, and repair of power transmission components on heavy equipment. Topics addressed will include: clutches, standard transmissions, torque converters, powershift transmissions, drive shafts, differentials and hydraulic braking systems and final drives.

Course Objectives:

6. To understand the functioning of clutches and torque converters as well as to be able to identify components and to troubleshoot problems. Additionally, students will install a clutch on a stationary engine and inspect a torque converter as used in an off road application.

7. To discover how basic power transmission components work together to form a complete powertrain system. The student will learn about gear types, ratios, and perform speed, torque and horsepower calculations.

8. To create an understanding of the function of manual transmissions. A presentation of a manual transmission's function, distinct features as well as failure analysis if appropriate will also be required. Students will partially disassemble a transmission and a shift cover.

9. To develop an understanding of the functioning of how power shift transmissions work and the testing procedures required.

10. To comprehend the workings of drive shafts and universal joints as well as differentials, rear axles and final drives.

Course Materials:

3. Course handouts given in class and/or available at the instructor's web page.
Student Responsibilities:  
11. To read the course syllabus and to ask questions if the material is unclear.  
12. To attend all classes and labs  
13. To attend scheduled lab unless previous arrangements are made with the instructor.  
14. To make up any and all class work covered during their absence.  
15. To complete on time all work including reading, homework, lab write-ups and the term project.  
   Student’s work will show careful, neat, complete and individual effort.

Lab:  
7. A lab write-up will be due after each lab. The lab is due at the beginning of the following week’s lab.  
8. Students are required to attend their scheduled lab unless previous arrangements have been made. Due to the fact that labs are balanced, every effort should be made to attend the scheduled lab.  
9. Safety is the most important aspect of the lab work. If a student performs in an unsafe manner, he will first receive a verbal warning. The second instance the student will receive a written warning and the third instance will mean removal from the lab and course.

Attendance Policy:  
- All attendance policies as listed below from the Student Handbook will be followed.  
- If a student doesn’t attend a class, then he/she cannot participate.  
- The missing of four classes will likely lead to removal from the class.

Excerpts from the student handbook regarding attendance:  
   a. Students are expected to attend all scheduled classes and laboratories. However, special circumstances such as illness, religious holidays, travel difficulties, family emergencies and participation in college sponsored events may make certain absences unavoidable. In such instances, students should notify instructors of these special circumstances.  
   b. Although regular class attendance will not guarantee passing grades, irregular attendance will usually have an adverse effect upon them. Because final student evaluation is based upon measurable academic achievement, however, instructors will not lower final grades solely on the basis of attendance.

Testing Accommodations:  
If you wish to use test accommodations for an exam or need extra help to be successful in the course please speak with me.
Plagiarism:

- The Student Handbook’s policy on plagiarism will be strictly followed. Students that plagiarize can receive an F for the entire course.

The Code of Academic Honesty from the Student Handbook

Academic honesty promotes continued academic and occupational success. Maintenance of academic honesty and quality education is the responsibility of both faculty and students. Any written assignment (including all electronic media) submitted by a student must be original authorship. Representation of another’s work as his/her own shall constitute plagiarism. Any charge of plagiarism must be substantiated by a direct correlation in wording and organization between the original and plagiarized copy.

Any examinations must be taken according to prescribed procedure, as determined by the faculty member in charge. Any form of unauthorized written material used by a student or evident on his/her person during or directly following an examination shall be deemed a violation of academic honesty. Unauthorized correspondence between students during any examination or preparation of submitted work, which cannot be substantiated by physical proof or eye witness verification, shall be considered an infraction of the code and shall subject involved parties to corrective procedures.

Grading:

10 % Participation
40 % Lab work
40 % Homework, Quizzes, Tests and the Final Exam
10 % Manual Transmission Project

Course Topics:

15. Clutches:      Chap 14
  - Overview and terms
  - Dry
    - Push-type
    - Pull-type
    - Single & double disk
  - Wet
    - Single plate
    - Multiple plate
  - Troubleshooting & failure analysis

16. Gear Ratio, Speed and Torque Calculations      Handouts

17. Standard Transmissions:      Chap 15
  - Single Countershaft Theory of Operation
  - Double Countershaft Theory of Operation
    o Main Box
    o Auxiliary Box
    o Auxiliary Box Air Control

18. Electronically Automated Standard Transmissions      Chap 21
  - Theory of Operation
  - Diagnostics

19. Planetary Gearing Principles      Handouts
  - Components
  - Theory of Operation
  - Planetary Gear Ratio Calculation

20. Torque Converters      Chap 17
  - Theory of Operation
  - Torque dividers
  - Lock-up versus non locking converters
21. **Planetary Power Shift Transmissions:** Chap 18
   - Powerflow
   - Hydraulic control
   - Diagnostics

22. **Countershaft Powershift Transmissions** Handouts
   - Powerflow
   - Hydraulic control
   - Diagnostics

23. **Driveshafts and Universal Joints:** Chap 22
24. **Rear Axles:**
   - Semi-floating
   - Full-floating

25. **Differentials:** Chap 23
   - Operation
   - Limited Slip
   - Locking

26. **Final Drives:** Handouts
   - Inboard
   - Outboard
   - Bull gear
   - Planetary

27. **Hydraulic Braking Systems** Chap 29
   a. Overview
   b. Components

Labs:
- Lab safety and clutches
- Single countershaft (cover & mainshaft)
- Twin countershaft auxiliary box removal
- Transmission project
- Automated manual transmission lab (Ultrashift)
- Planetary & countershaft powershift theory (Deere 8 speed)
- Komatsu powershift transmission inspection
- Torque converter testing (Caterpillar 416D)
- Planetary powershift testing (Skidder)
- Driveshafts
- Differential/rear axle lab
- Roadranger training
- Hydraulic brake systems
DTEC 110 Powertrains II
Mr. Cross

Credits: 4 credit hours
Lecture: 3 hours
- Mon/Wed/Fri 10:00-10:50 Marshall 125B

Lab: 2 hours
- Lab 01L Friday  1:00-2:50 Marshall 117
- Lab 02L Friday  8:00-9:50 Marshall 117

Office: 136 Marshall Hall
Office phone: 315-684-6728
Email: crossrr@morrisville.edu
Web page: http://people.morrisville.edu/~crossrr

Course Description:
This course will cover the operation, diagnosis, and repair of chassis components on Heavy Equipment and Over-The-Road tractors. Topics addressed will include: Powershift transmission disassembly, chassis systems, alignment, springs, shocks and other suspension components, tires, wheels, and braking systems including ABS and brake chamber servicing.

Course Objectives:
Competencies to be developed:
11. To be able to disassemble and reassemble a powershift transmission and have a thorough knowledge of the transmission functioning
12. To be able to identify the main types of steering systems and steering geometry
13. To understand how various brake system components work together
14. To fully understand the various safety issues related to braking components
15. To understand the various suspension systems today
16. To comprehend frame components and how they are utilized in medium and heavy truck systems
17. To gain a basic knowledge of truck alignment and alignment issues
18. To be able to perform basic failure analysis to help prevent future failures

Course Materials:
5. Course handouts given in class and/or available at the instructor’s web page.
Student Responsibilities:
16. To read the course syllabus and to ask questions if the material is unclear.
17. To attend all classes and labs
18. To attend scheduled lab unless previous arrangements are made with the instructor.
19. To make up any and all class work covered during their absence.
20. To complete on time all work including reading, homework, lab write-ups and the term project. Student’s work will show careful, neat, complete and individual effort.

Lab:
10. A lab write-up will be due after each lab. The lab is due at the beginning of the following week’s lab.
11. Students are required to attend their scheduled lab unless previous arrangements have been made. Due to the fact that labs are balanced, every effort should be made to attend the scheduled lab.
12. Safety is the most important aspect of the lab work. If a student performs in an unsafe manner, he will first receive a verbal warning. The second instance the student will receive a written warning and the third instance will mean removal from the lab and course.

Attendance Policy:
- All attendance policies as listed below from the Student Handbook will be followed.
- If a student doesn’t attend a class, then he/she cannot participate.
- The missing of four classes will likely lead to removal from the class.

Excerpts from the student handbook regarding attendance:
  a. Students are expected to attend all scheduled classes and laboratories. However, special circumstances such as illness, religious holidays, travel difficulties, family emergencies and participation in college sponsored events may make certain absences unavoidable. In such instances, students should notify instructors of these special circumstances.
  b. Although regular class attendance will not guarantee passing grades, irregular attendance will usually have an adverse effect upon them. Because final student evaluation is based upon measurable academic achievement, however, instructors will not lower final grades solely on the basis of attendance.

Testing Accommodations:
If you wish to use test accommodations for an exam or need extra help to be successful in the course please speak with me.

Plagiarism:
- The Student Handbook’s policy on plagiarism will be strictly followed. Students that plagiarize can receive an F for the entire course.

The Code of Academic Honesty from the Student Handbook
Academic honesty promotes continued academic and occupational success. Maintenance of academic honesty and quality education is the responsibility of both faculty and students. Any written assignment (including all electronic media) submitted by a student must be original authorship. Representation of another’s work as his/her own shall constitute plagiarism. Any charge of plagiarism must be substantiated by a direct correlation in wording and organization between the original and plagiarized copy.
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Grading:
15% Participation
35% Lab work
30% Homework, Quizzes, Tests and the Final Exam
20% Air Brake Project
Course Topics:
1. Steering Systems Chapter 25
2. Vehicle Chassis Frame Chapter 32
3. Suspension Systems Chapter 20
4. Torque Converter & Powershift Review Chapters 17 & 18
5. Truck Brake Systems Chapter 28
6. Air Brake Servicing Chapter 31
7. Wheel & Tires Chapter 27 & Handout
8. ABS & EBS Chapter 30
9. Heavy Duty Truck Trailers Chapter 33
10. 5th Wheels & Coupling Systems Chapter 34

Lab Topics:
1. Lab Safety, Computer Use
2. Steering Component Inspection
3. Steering Geometry Lab
4. Frame & Axle Alignment
5. Computerized Frame & Axle Alignment
6. Powershift Transmission Project Familiarization
7. Powershift Transmission Project-Disassembly
8. Powershift Transmission Project-Assembly
9. Powershift Transmission Project-Presentation
10. Foundation Brakes Components
11. Brake Adjustment/Inspection
12. Wheel Bearing Adjustment/Inspection
13. Air Brake Supply Circuits Lab
14. RoadRanger Training Session (March 19th or March 20th)
15. Final Project Work

DTEC 125

DIESEL ELECTRICAL SYSTEMS
4 CREDITS (3 LECTURE HOURS, 2 LABORATORY HOURS)

LECTURE:
01 Monday, Greenhouse 107, 9:00 - 9:50
   Wednesday and Friday, Charlton Hall 125, 9:00 - 9:50

LABORATORY – 115 Marshall Hall
01L Monday 1:00-2:50
03L Tuesday 2:00-3:50
04L Tuesday 4:00-5:50
02L Wednesday 1:00-2:50

INSTRUCTOR – Charles “Chip” Ax, III, Assistant Professor

OFFICE - 124 Marshall Hall
   Phone - (684-6648)
   E-mail - axcj@morrisville.edu
OFFICE HOURS - Can be arranged by appointment, but will be regularly held as follows:
- Monday  11:00-11:50
- Tuesday 12:00-12:50
- Wednesday 10:00-10:50
- Thursday 11:00-11:50
- Friday  10:00-10:50

TEXTS -
- "A" - Modern Diesel Technology Electricity & Electronics
  2nd Edition by Joseph A. Bell
  Digital Multimeter Principles 4th Edition Workbook

COMPONENT KIT – Digital Multimeter Principles

OTHER REFERENCES – “Q” Drive Documents

TOOLS – Safety Glasses, Work Clothes, Extech 470 or equivalent multimeter*
(*Please attend first class to get sample specifications)

COURSE DESCRIPTION – An introduction to the fundamentals of electricity and their application in Diesel engines and equipment. Basic theory of AC and DC systems used for charging, starting, lighting, and accessory circuits. Lecture will emphasize understanding of common circuit configurations and sample wiring schematics. Lab will emphasize testing of components, troubleshooting circuits, and common repair techniques. 4 credits (3 hours lecture, 2 hour lab), fall semester

Revised August 27, 2016 Subject to revision as needed during semester.

COURSE OUTCOMES - Students will be able to:

1. Practice safe habits for working around medium and heavy duty diesel electrical systems.
2. Demonstrate the ability to select proper function and range on Digital Multimeters, accurately read results, and interpret readings when used in electrical component testing and circuit troubleshooting.
3. Identify common component symbols used in electrical schematics and demonstrate a knowledge of the function of each of these components in an electrical system.
4. Identify correct and incorrect electrical system functions given a circuit and/or schematic based on meter readings at various points in the circuit.
5. Demonstrate the ability to isolate problems and remove, test, and repair and/or replace faulty components in starting, charging, lighting and accessory circuits.

SEATING – A sign in sheet may be used to quickly take attendance each day the class meets. Be on time as attendance is taken at the beginning of class. Remain in your seats until class is dismissed.

ATTENDANCE – Students are expected to attend all scheduled classes and laboratories. If special circumstances such as illness, religious holidays, travel difficulties, family emergencies or active participation in college-sponsored events make absence unavoidable you must see me to make up the work. No student will be allowed to complete graded work after that work has been returned to others in the class. If absences place you in academic jeopardy of not passing the course, the dean of your school will be notified. All cell phones must be turned off during class and laboratory.
All computers must be closed and stored during lecture.
ACADEMIC HONESTY – The Code of Academic Honesty from the Student Handbook will be strictly adhered to. The first violation will result in a zero grade for the work and a letter to the student’s dean. The second violation will result in an automatic F in the course as a final grade.

SPECIAL LEARNING ACCOMMODATIONS – If you have any special learning needs and need some accommodations then please alert this instructor immediately, during the first two weeks of this course. Work is done with David Symonds, the Learning Specialist in the Academic Enrichment Center located in the Butcher Library.

GRADING - The laboratory based exercises will be worth 40% of your grade, and the classroom-based testing 60%. The grade breakdown is as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>15%</td>
<td>Homework</td>
</tr>
<tr>
<td></td>
<td>30%</td>
<td>Quizzes</td>
</tr>
<tr>
<td></td>
<td>15%</td>
<td>Final Exam</td>
</tr>
<tr>
<td>Laboratory</td>
<td>25%</td>
<td>Lab exercises</td>
</tr>
<tr>
<td></td>
<td>15%</td>
<td>Lab practical</td>
</tr>
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</table>

The range for grades will be as follows:

- A + 97-100
- A 93-96
- A- 90-92
- B+ 87-89
- B 83-86
- B- 80-82
- C+ 77-79
- C 73-76
- C- 70-72
- D+ 67-69
- D 63-66
- D- 60-62
- F Below 60

HOMEWORK - Is a required part of the course and will checked each week for accuracy. Each assignment will be collected on Friday the week that material is covered. Homework turned in late but before the work has been corrected will be given ½ credit. Homework may not be turned in after the corrected work has been returned to other students. A tutor can be made available if requested. In short: You must turn in every homework assignment done to the best of your ability to succeed in this course.

QUIZZES - Weekly quizzes will be given during the last 10-15 minutes of the Friday class. No make-up quizzes will be given. If you know in advance that you will be absent, see me to possibly take the quiz beforehand.

FINAL EXAM - The Final Exam will be in two parts, comprehensive and given the 15th week of classes.
LABORATORY PRACTICAL EXAM - Laboratory practical exam will be given during the 15th week regularly scheduled lab session

LABORATORY - Each week there will be a lab exercise which must be completed properly and checked for completeness to receive credit.

TOPICAL OUTLINE – The following is a detailed outline of the class activities for the semester. Please pay close attention to the reading and written assignments

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture Topic</th>
<th>Reading Assignment</th>
<th>Written Assignment (Homework)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Safety</td>
<td>A- Chapter 1 (p. 1-8)</td>
<td>Chapter 1 Review Questions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B- Chapter 1 (p.1-18)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Fundamentals of</td>
<td>A- Chapter 2 (p. 11-48)</td>
<td>Chapter 2 Review Questions 1-10</td>
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<tr>
<td></td>
<td>Electricity</td>
<td></td>
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<tr>
<td>3</td>
<td>Resistors and</td>
<td>Chapter 10 (Handout)</td>
<td>Review Question 5</td>
</tr>
<tr>
<td></td>
<td>Ohm’s law</td>
<td>Chapter 11 (Handout)</td>
<td>Review Questions 1-4, Problems 1-3, Critical Thinking 1-2</td>
</tr>
<tr>
<td>4</td>
<td>Series circuits</td>
<td>Chapter 12 (Handout)</td>
<td>Review Questions 1-4, Problems 1-3, Critical Thinking 1-2</td>
</tr>
<tr>
<td>5</td>
<td>Parallel Circuits</td>
<td>Chapter 13 (Handout)</td>
<td>Review Questions 1-4, Problems 1-3, Critical Thinking 1-2</td>
</tr>
<tr>
<td>6</td>
<td>Series Parallel</td>
<td>Chapter 14 (Handout)</td>
<td>Review Questions 1-5</td>
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<tr>
<td></td>
<td>Circuits</td>
<td></td>
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</tr>
<tr>
<td>7</td>
<td>Series Parallel</td>
<td>Chapter 14 (Handout)</td>
<td>Problems 1-4, Critical Thinking 1</td>
</tr>
<tr>
<td></td>
<td>Circuits</td>
<td></td>
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</tr>
<tr>
<td>8</td>
<td>Wiring systems</td>
<td>A- Chapter 4 (p.81-94)</td>
<td>Chapter 4 Review Questions TBA</td>
</tr>
<tr>
<td></td>
<td>and Diagrams</td>
<td></td>
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</tr>
<tr>
<td>9</td>
<td>Electrical</td>
<td>A- Chapter 4 (p. 94-126)</td>
<td>Chapter 4 Review Questions TBA</td>
</tr>
<tr>
<td></td>
<td>Components</td>
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<tr>
<td>10</td>
<td>Basic Electronics</td>
<td>A- Chapter 6 (p. 167-188)</td>
<td>Chapter 6 Review Questions</td>
</tr>
<tr>
<td>11</td>
<td>Truck Lighting</td>
<td>A- Chapter 9 (p.273-303)</td>
<td>Chapter 9 Review Questions</td>
</tr>
<tr>
<td></td>
<td>Systems</td>
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</tr>
<tr>
<td>12</td>
<td>Instrumentation</td>
<td>A- Chapter 12 (p. 383-404)</td>
<td>Chapter 12 Review Questions TBA</td>
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<tr>
<td></td>
<td>and Truck</td>
<td>Chapter 10 (p. 307-335)</td>
<td>Chapter 10 Review Questions TBA</td>
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<tr>
<td>Week</td>
<td>Activity</td>
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</tr>
<tr>
<td>1</td>
<td>Safety and Lab Orientation</td>
<td></td>
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<tr>
<td>2</td>
<td>Multimeter use, component ratings/functions, Voltage Testing</td>
<td></td>
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</tr>
<tr>
<td>3</td>
<td>Simple series circuits, Resistance Testing</td>
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<tr>
<td>4</td>
<td>Parallel circuits, Current Testing</td>
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<tr>
<td>5</td>
<td>Series-Parallel circuits, Ohm’s Law and Power Formula</td>
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</tr>
<tr>
<td>6</td>
<td>Wiring systems, trailer wiring, troubleshooting and repairs</td>
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<tr>
<td>7</td>
<td><em>Ignition System Diagnosis and Service (Break Week)</em>*</td>
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<tr>
<td>8</td>
<td>Reading Schematics</td>
<td></td>
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<tr>
<td>9</td>
<td>Truck/Equipment Electrical Components</td>
<td></td>
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</tr>
<tr>
<td>10</td>
<td>Truck Instrumentation and Electrical Accessories</td>
<td></td>
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</tr>
<tr>
<td>11</td>
<td>Batteries, DTAC testing</td>
<td></td>
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<tr>
<td>12</td>
<td>Starter components and operation</td>
<td></td>
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<tr>
<td>13</td>
<td><strong>(Thanksgiving Break – See Week 7 above)</strong></td>
<td></td>
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</tr>
<tr>
<td>14</td>
<td>Starting system, DTAC testing</td>
<td></td>
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<tr>
<td>15</td>
<td>Lab Practical</td>
<td></td>
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<tr>
<td></td>
<td>Final Exam Week</td>
<td></td>
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</tr>
</tbody>
</table>

Notes:
GENERAL LABRATORY SAFETY AND PROCEDURES

1. Show respect for each person, machine, tool and overall lab facility.

2. No foul language or tobacco products will be used in lab.

3. Safety glasses and appropriate shop clothing will be worn at all times.

4. All petroleum products will be stored in the appropriate cabinet/locations.

5. All engines will be run with ventilation system operating and connected correctly.

6. All lab materials/supplies will be properly stored prior to lab completion.

7. Waste rags will be stored in the appropriate metal container.

8. Oil spills will be covered immediately with absorbent pads.

9. All tools will be returned to their appropriate location.

10. All engines will be properly stored/shutdown at the end of the lab.

11. Note the location of the fire extinguishers at the front and back of lab.

12. Note the location of the eye wash station next to the sink.
DTEC 150 DIESEL SYSTEMS
COURSE SYLLABUS

Hours Required: 2 lecture, 2 lab
Professor: Mr. Bach
Lab: Mr. Bach, Mr. Davis
Lecture: Marshall 125B
Lab: Marshall 119
Galbreath (cat lab)

DESCRIPTION

Theories and principles of diesel operation and construction. Engine removal, inspection, disassembly, part analysis and rebuild. Engine testing and principles of troubleshooting will be discussed.

OBJECTIVES

1. To understand what a diesel engine is and how it works
2. To understand the structural parts of a diesel engine
3. To understand the diesel fuel system
4. To be able to rebuild various diesel engines
5. To understand the operation of the diesel engine
6. To understand the various systems on the engine- Fuel, Lube, cooling
   Intake and exhaust, etc

TEXT

1. Diesel technology fundamentals service and repair Norman/
   Corinchock text
2. Diesel technology fundamentals, service and repair, Norman/ Corinchock
   Work book
3. Shop manuals for specific engines
4. Electronic service media Cat SIS, Cummins Quick serve

STUDENT RESPONSIBILITIES

1. To read this course outline and to ask questions if any of the material is unclear
2. To make up any and all class work covered during their absence
3. To attend scheduled lab unless prior arrangements are made with the instructor
4. To complete on time lab write-ups, study guides, problem sets work book assignments and term projects, which reflect careful, neat, complete and individual effort.

LAB PROJECTS

Students will present to the class in an electronic format the various systems of the engine that they are working on, there will be at least 3 of these major presentations.

TERM PROJECTS
The engine assigned must be assembled in the time given
A written report will be required (more information in the section on lab requirements)

HOME WORK

In relation to each lecture topic there will be reading assignments from the text, workbook handouts, study guides and or problem sets. The reading assignments reinforce and expand upon the lecture topics. These readings are required and are a part of your responsibility

Lab

A specific area will be covered each week as outlined. Lab attendance is important as no make up labs will be given. Missed lab work will lead to an F or an incomplete in this course.

A lab write up (time sheet) is due after each lab. The time sheet provides the instructors with your progress and the amount of time that has been spent on your project. Time sheets and lab write-ups, assignments will be collected and graded. Failure to a given lab or to hand in a time sheet or lab write-up will be recorded as a 0.

Lab sections are balanced; therefore, students are expected to attend their scheduled labs unless previous arrangements have been made to switch into another lab section.

Field trips and other sponsored events must be arranged prior to lab time so arrangements for makeup work can be planned

Students are expected to conduct themselves in a mature safe manner. Any student who poses a hazard to themselves or others will not be allowed to work in the lab.

ATTENDANCE POLICY

All attendance regulations as found in the Student Hand book, College Catalog and Faculty Hand book shall be enforced. After 3 unexcused absences in lecture or lab, the student will be subject to review and may face termination from the course.
MAKE UP TESTS AND QUIZZES

There will be no makeup quizzes in lecture or lab due to their unannounced nature. Tests only under extenuating circumstances

CHEATING

Cheating on a quiz, lab write-up, or other assignment will be dealt with in the most severe manner possible as outlined in the Academic Handbook. Cheating could result in receiving an F in the course

GRADING

GRADE=  
50% class tests, quizzes, study guides, final exam  
50% lab presentations, time sheets, quizzes lab work final paper

Grading procedure for lab write-ups
Check Plus  95%  Well done write-up, neat complete which  
Reflects work and effort beyond that required  
On the write-up
Check  85%  Lab done- neat complete, reflects an understanding  
Of the material
Check minus  75%  A lab that reflects the minimum effort, but still  
Is complete
X  60%  (or lower) a write-up that has parts missing

MAJOR TOPICS

1. Introduction to diesel engines  
2. Shop safety  
3. Tools, precision tools and fasteners  
4. Principles of operation  
5. Engine blocks
6. Crankshafts
7. Pistons, Rings and Connecting rods
8. Cylinder heads and related components
9. Camshaft and valve train components
10. Lubrication systems
11. Cooling systems
12. Air intake systems
13. Exhaust systems
14. Basic fuel systems

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture topic</th>
<th>Lab topic</th>
<th>assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Intro to diesel engines</td>
<td>Intro to engines, lab procedures</td>
<td>Read text Cp. 1 text questions pg. 20 and 21</td>
</tr>
<tr>
<td>2</td>
<td>Intro to diesel engines cp. 1 shop safety cp. 2</td>
<td>Tools and Precision tools (text cp #3) lab handouts</td>
<td>Read Cp. #2 W.B. Pg. 9-14 Text pg. 29-30</td>
</tr>
<tr>
<td>3</td>
<td>Shop safety Cp. #2 tools and precision tools Cp. #3</td>
<td>Text cp #3 precision tools/fasteners W.B 21-32 form groups</td>
<td>Read Cp#3 Text pg 53-54</td>
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<tr>
<td>4</td>
<td>Precision tools/Cp. #4 principles of operation</td>
<td>Presentation topic Lube systems text Cp. 10 engine tear down presentation prep</td>
<td>Read cp. #4 text pg. 78-79</td>
</tr>
<tr>
<td>5</td>
<td>Principles of engine operation</td>
<td>Presentation prep, engine tear down,</td>
<td>Read cp. #5 W.B. 33-46</td>
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</tr>
<tr>
<td>6</td>
<td>Engine blocks</td>
<td>Lube presentations in lab, W.B. 97-109</td>
<td>Text 101-102</td>
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<tr>
<td>7</td>
<td>Engine blocks/ Crankshafts</td>
<td>Lab presentations, Prep for fuel systems presentation, text Cp. #15 fuel systems</td>
<td>Read Cp. #6 Text 123-124</td>
</tr>
<tr>
<td>8</td>
<td>Crankshafts</td>
<td>Prep for fuel system presentations, W.B 151-156</td>
<td>W.B. 59-66</td>
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<tr>
<td>9</td>
<td>Pistons, rings and con rods</td>
<td>Fuel system presentations</td>
<td>Read Text Cp. #7 text 145-146</td>
</tr>
<tr>
<td>10</td>
<td>Pistons rings and con rods</td>
<td>Fuel system presentations, prep for cooling system presentation text cp #11 text 255-256</td>
<td>Read Cp.# 8 W.B. 67-74</td>
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<tr>
<td>11</td>
<td>Cylinder heads</td>
<td>Presentation prep. W.B. 111-124</td>
<td>Read Cp. #9 text 171-172</td>
</tr>
<tr>
<td>12</td>
<td>Cylinder heads/ Cam and valve trains</td>
<td>Cooling system prep</td>
<td>W.B. 75-86</td>
</tr>
<tr>
<td>13</td>
<td>Cam, valve trains</td>
<td>Cooling system presentations</td>
<td>Read Cp.#12</td>
</tr>
<tr>
<td>14</td>
<td>Cam/valve trains, air intake systems</td>
<td>Lab clean up Text Cp.#28 text 578-579</td>
<td>Read Cp. #13 Text 273-274 W.B. 87-86</td>
</tr>
<tr>
<td>15</td>
<td>Air intake/ exhaust systems</td>
<td>Labs clean up. Term papers</td>
<td>Text 300-301 W.B. 125-134</td>
</tr>
</tbody>
</table>
DTEC 225

DIESEL ELECTRONICS
4 Credits (3 LECTURE HOURS, 2 LABORATORY HOURS)

LECTURE - Marshall Hall 125B
01 Monday, Wednesday, Friday 9:00 - 9:50

LABORATORY – 141 Galbreath Hall
01L Monday 1:00-2:50
02L Monday 3:00-4:50
03L Wednesday 1:00-2:50

INSTRUCTOR – Charles “Chip” Ax, III

OFFICE - 124 Marshall Hall
Phone x-6648 (684-6648)
E-mail - axcj@morrisville.edu

OFFICE HOURS - Can be arranged by appointment, but will be regularly held as follows:
Monday 10:00-11:50
Wednesday 10:00-11:50
Friday 10:00-10:50

TEXTS -
A* “Modern Diesel Technology Electricity & Electronics” by Joseph A. Bell
B “Modern Diesel Technology Electronic Diesel Engine Diagnosis” by Sean Bennett
Digital Multimeter Principles 4th Edition Workbook

*Textbooks from DTEC 125

COMPUTER TRAINING- Computer Based Electricity/Electronics Training

ADDITIONAL REFERENCES-
“Diesel Technology, Fundamentals, Service & Repair” by Norman And Corinchock (Textbook from DTEC 150)
“Electronic and Electrical Systems” John Deere FOS

TOOLS - Safety Glasses (will be required for every lab)
Hearing protection required
Ag Eng/Diesel work shirt, shop coat or appropriate shop attire
SPECIAL TOOLS – Extech 470 or equivalent digital multimeter.
---Please attend first class to get sample specifications---.

Revised January 17, 2016 Subject to revision as needed during semester.

COURSE DESCRIPTION

A continuation of DTEC 125. Expanding on basic AC and DC theory, to include multiplexing, active and passive sensors and digital electronics, this course addresses more complex wiring schematics, sensor troubleshooting and wiring harness repair. Students will use diagnostic equipment, lap top computers and current manufacturers’ software and communication adapters to analyze and repair digital electronic systems found on construction, on highway, agricultural, and electric power generation systems.

Prerequisites: DTEC 125 or by permission of instructor
Co-requisites: MAGN 101

COURSE OUTCOMES – Students will be able to:

1. Remember and model industry safe and efficient habits for Diesel electrical system technicians.

2. Apply skills necessary to analyze system operations, troubleshoot and repair diesel electronic systems using multimeters, lap top computers, diagnostic software and specialized diagnostic equipment.

3. Identify and evaluate various diesel electronic components and demonstrate appropriate repairs based on manufacturer recommended procedures.

4. Understand industry standard technical knowledge of diesel electronic systems.

SEATING – Be on time as attendance is taken at the beginning of class. Remain in your seats/lab station until class is dismissed.

ATTENDANCE – Students are expected to attend all scheduled classes and laboratories. If special circumstances such as illness, religious holidays, travel difficulties, family emergencies or active participation in college-sponsored events make absence unavoidable you must see me to make up the work. No student will be allowed to complete graded work after that work has been returned to others in the class. If absences place you in academic jeopardy of not passing the course, the dean of your school will be notified. All cell phones must be turned off during class and laboratory. All computers must be closed and stored during lecture.

ACADEMIC HONESTY – The Code of Academic Honesty from the Student Handbook will be strictly adhered to. The first violation will result in a zero grade for the work and a letter to the student’s dean. The second violation will result in an automatic F in the course as a final grade.

SPECIAL LEARNING ACCOMMODATIONS – If you have any special learning needs and need some accommodations then please alert this instructor immediately, during the first two weeks of this course. Work is done with David Symonds, the Learning Specialist in the Academic Enrichment Center located in the Butcher Library.
**GRADING** - The laboratory based exercises will be worth 40% of your grade, and the classroom-based testing 60%. The grade breakdown is as follows:

- **Lecture**
  - 15% - Homework
  - 30% - Quizzes
  - 15% - Final Exam(s)

- **Laboratory**
  - 20% - Lab exercises
  - 20% - Lab practical

The range for grades will be as follows:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Range</th>
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<tbody>
<tr>
<td>A+</td>
<td>97 - 100</td>
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<tr>
<td>A</td>
<td>93 - 96</td>
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<tr>
<td>A-</td>
<td>90 - 92</td>
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<tr>
<td>B+</td>
<td>87 - 89</td>
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<tr>
<td>B</td>
<td>83 - 86</td>
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<tr>
<td>B-</td>
<td>80 - 82</td>
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<tr>
<td>C+</td>
<td>77 - 79</td>
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<tr>
<td>C</td>
<td>73 - 76</td>
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<tr>
<td>C-</td>
<td>70 - 72</td>
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<tr>
<td>D+</td>
<td>67 - 69</td>
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<tr>
<td>D</td>
<td>63 - 66</td>
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<tr>
<td>D-</td>
<td>60 - 62</td>
</tr>
<tr>
<td>F</td>
<td>Below 60</td>
</tr>
</tbody>
</table>

**HOMEWORK** - Is a required part of the course and will checked each week for completeness. each assignment will be collected on Friday by the end of lecture. Homework turned in late but before the work has been corrected will be given 1/2 credit. Homework may not be turned in after the corrected work has been returned to other students. A tutor can be made available if requested. In short: **You must turn in every homework assignment done to the best of your ability to succeed in this course.**

**QUIZZES** - Weekly quizzes will be given during the last 15 minutes of the Friday class. No make-up quizzes will be given. If you know in advance that you will be absent, see me to take the quiz beforehand.

**FINAL EXAM** - The Final Exams will be comprehensive and given during the Final Exam period.

**LAB PRACTICAL** – Given during in last laboratory sessions.

**LABORATORY** - Each week there will be a lab exercise which must be completed properly to receive credit.

**LECTURE AND LABORATORY OUTLINES** – The following is a detailed outline of the course activities for the semester. Please pay close attention to the reading and written assignments. Note: outlines are subject to change with progression of course.

**LECTURE OUTLINE**
<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Textbook</th>
<th>Reading/Reference</th>
<th>Written</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Course Overview</td>
<td>B</td>
<td>Course Syllabus</td>
<td>Questions 1-10, pg. 15-16</td>
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<tr>
<td></td>
<td>Safety Review</td>
<td></td>
<td>Chapter 1 pg. 1-15</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Sources of Electricity</td>
<td>N/A</td>
<td>Handout</td>
<td>Review Questions 1-10 and Problem #1</td>
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<tr>
<td>3</td>
<td>Charging Systems, Part I</td>
<td>N/A</td>
<td>Generator Handout</td>
<td>Handout Questions</td>
</tr>
<tr>
<td>4</td>
<td>Charging Systems, Part II</td>
<td>A</td>
<td>Chapter 7, pg. 171-217</td>
<td>Questions 1-17</td>
</tr>
<tr>
<td>5</td>
<td>Diesel Computer Systems: Introduction and Data Types</td>
<td>B</td>
<td>Chapter 2, pg. 17-23</td>
<td>Handouts</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Chapter 6, pg. 95-99</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Diesel Computer Systems: Interfacing and CPU</td>
<td>B</td>
<td>Chapter 2, pg. 17-23</td>
<td>Handouts</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Chapter 6, pg. 95-99</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Electronic Service Tools</td>
<td>B</td>
<td>Chapter 3, pg.39-58</td>
<td>Questions 1-20</td>
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<tr>
<td>8</td>
<td>Diesel Computer Systems: Circuits &amp; Potentiometers</td>
<td>B</td>
<td>Chapter 2, pg. 23-34</td>
<td>Handouts</td>
</tr>
<tr>
<td></td>
<td></td>
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<td>Chapter 6, pg. 99-110</td>
<td></td>
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<td></td>
<td></td>
<td>Chapter 6, pg. 103-104</td>
<td></td>
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<tr>
<td>10</td>
<td>Diesel Computer Systems: Pulse Generators &amp; Output</td>
<td>B</td>
<td>Chapter 2, pg. 23-34</td>
<td>Handouts</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Chapter 6, pg. 99-110</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>C</td>
<td>Chapter 10, pg. 97-106</td>
<td></td>
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<tr>
<td>11</td>
<td>Diesel Computer Systems: Electronic Injectors</td>
<td>B</td>
<td>Chapter 2, pg. 31</td>
<td>Handouts</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ch. 6 &amp; Ch. 7 110-117</td>
<td></td>
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<tr>
<td>12</td>
<td>Diesel Computer Systems: Multiplexing &amp; Programming</td>
<td>B</td>
<td>Chapter 2, pg. 31-35</td>
<td>Handouts</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>Chapter 5</td>
<td></td>
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<tr>
<td>13</td>
<td>CAT Electronics</td>
<td>B</td>
<td>Chapter 11</td>
<td>Handouts</td>
</tr>
<tr>
<td>14</td>
<td>Detroit Electronics</td>
<td>N/A</td>
<td>Handout</td>
<td>Handouts</td>
</tr>
<tr>
<td>15</td>
<td>Introduction to Electrical Power Generation</td>
<td>N/A</td>
<td>Handout</td>
<td>Handouts</td>
</tr>
<tr>
<td>16</td>
<td>Written Final Exam</td>
<td>All</td>
<td>Study all material</td>
<td>To be announced</td>
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Notes:
LABORATORY OUTLINE

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Textbook</th>
<th>Reading/Reference</th>
<th>Written</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sources of Electricity</td>
<td>N/A</td>
<td>Lab Document</td>
<td>Lab Handout</td>
</tr>
<tr>
<td>2</td>
<td>DMM Operation and Uses, Engine Identification</td>
<td>C</td>
<td>Chapter 11</td>
<td>Lab Handout</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Chapter 12</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Charging Sys. Components and DTAC Testing</td>
<td>A</td>
<td>Textbook Chapter 7</td>
<td>Lab Handout</td>
</tr>
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<tr>
<td>4</td>
<td>Electrical Connections and Cummins Wiring diagrams</td>
<td>B</td>
<td>Textbook Chapter 4</td>
<td>Lab Handout</td>
</tr>
<tr>
<td>5</td>
<td>Basic Electronic Diagnostics Procedures</td>
<td>B</td>
<td>Textbook Chapter 3</td>
<td>Lab Handout</td>
</tr>
<tr>
<td>6</td>
<td>TPS Cummins Throttle Pedal, Idle Validation, Potentiometer</td>
<td>B</td>
<td>Chapter 2, pg. 25, Chapter 6, pg. 99-105</td>
<td>Lab Handout</td>
</tr>
<tr>
<td>7</td>
<td>Thermistors, Temp Sensors on ISM and ISM-02 Engines</td>
<td>B</td>
<td>Chapter 2, pg. 23-24, Chapter 6, pg. 104</td>
<td>Lab Handout</td>
</tr>
<tr>
<td>8</td>
<td>Pressure Sensors, Capacitive &amp; Piezo Sensors on ISM Engines</td>
<td>B</td>
<td>Chapter 2, pg. 23-25, Chapter 6, pg. 103-104</td>
<td>Lab Handout</td>
</tr>
<tr>
<td>9</td>
<td>Speed Sensors, Hall Effect, Variable Reluctance Units</td>
<td>B</td>
<td>Chapter 2, pg. 25-27, Chapter 6, pg. 99-110, Chapter 10, pg. 97-106</td>
<td>Lab Handout</td>
</tr>
<tr>
<td>10</td>
<td>Actuators, injectors, duty cycle, PWM signals, shut down</td>
<td>B</td>
<td>Chapter 2, pg. 31, Ch. 6 110-117 &amp; Ch. 7</td>
<td>Lab Handout</td>
</tr>
<tr>
<td>11</td>
<td>I.D. CAT Wiring and use of PWM signals, Throttle testing</td>
<td>B</td>
<td>Handout/Chapter 11</td>
<td>Lab Handout Questions</td>
</tr>
<tr>
<td>12</td>
<td>CAT Speed, Timing, Temp and Pressure Sensors, Testing</td>
<td>B</td>
<td>Handout/Chapter 11</td>
<td>Lab Handout Questions</td>
</tr>
<tr>
<td>13</td>
<td>Detroit 60 Series Wiring, Timing, Temp and PSI Sensors</td>
<td>B</td>
<td>Handout</td>
<td>Lab Handout Questions</td>
</tr>
<tr>
<td>14</td>
<td>Electrical Power Generation Components and Testing</td>
<td>N/A</td>
<td>Handout</td>
<td>Lab Handout Questions</td>
</tr>
<tr>
<td>15</td>
<td>Lab Practical Exam</td>
<td>Not Specified</td>
<td>All Notes &amp; Handouts</td>
<td>Complete Exam</td>
</tr>
</tbody>
</table>

Notes:

LABORATORY SAFETY AND PROCEDURE

1. Show respect for each person, machine, tool and lab facility.
2. No foul language or tobacco products will be used in lab.
3. Safety glasses and appropriate shop clothing will be worn at all times.
4. All petroleum products will be stored in the appropriate cabinet/locations.
5. All engines will be run with ventilation system operating and connected correctly.
6. All lab materials/supplies will be properly stored prior to lab completion.
7. Waste rags will be stored in the appropriate metal container.
8. Oil spills will be covered immediately with absorbent pads.
9. All tools will be returned to their appropriate location.
10. All engines will be properly stored/shutdown at the end of the lab.
11. Note the location of the fire extinguishers at the front and back of lab.
12. Note the location of the eye wash station next to the sink.
DTEC 325

ELECTRICAL POWER GENERATION
3 Credits (2 LECTURE HOURS, 2 LABORATORY HOURS)

LECTURE - Charlton Hall 109
01   Tuesday, Thursday 10:00 - 11:50

LABORATORY – 115 Marshall Hall
01L  Thursday  2:00-3:50

INSTRUCTOR – Charles “Chip” Ax, III

OFFICE - 124 Marshall Hall
Phone x-6648  (684-6648)
E-mail  - axcj@morrisville.edu

OFFICE HOURS - Can be arranged by appointment, but will be regularly held as follows:

Monday 11:00-11:50
Tuesday 12:00-12:50
Wednesday 10:00-10:50
Thursday 11:00-11:50
Friday 10:00-10:50

TEXTS -   “A” Brigg & Stratton Generator Familiarization & Troubleshooting Guide
          “B” Briggs & Stratton Portable Generator Rotor/Stator Resistance Tables Guide

COMPUTER TRAINING-  OSHA Construction 10 hr. & 30 hr. Safety Training
                      and exam recommended prior to lab 3.
                      Turn in a copy of certificate to receive credit.

ADDITIONAL REFERENCES- “Electricity 3” Power Generation and Delivery
                         By: Jeff Keljik
                         “On-Site Power Generation”, EGSA Publication

TOOLS -         Safety Glasses (will be required for every lab)
                Ag Eng/Diesel work shirt, shop coat or appropriate shop attire

SPECIAL TOOLS – Please attend first class to get sample specifications.

12 Volt Battery Charging lead set
Extech MA220 or equivalent multimeter

Revised August 27, 2016   Subject to revision as needed during semester.

COURSE DESCRIPTION

Students will develop the knowledge and skills necessary to install, troubleshoot and service on-site power generation systems up to 50kW. This course emphasizes various generator types driven by both typical and atypical methods. Instruction is provided in the areas of diesel and gaseous fueled engines, control systems and governors. Advanced instruction is provided in electrical components necessary in the generation, storage, conversion,
switching, and transmission of electric power. Students develop the practical skills needed to work with on-site electrical power generation equipment and related systems. 3 credits (2 hours lecture, 2 hour lab), Fall semester

Prerequisites: DTEC125 or ELEC190 & DTEC150 or AGEN210 or by permission of instructor

Co-requisites: MAGN 101

COURSE OUTCOMES – Students will be able to:

1. Remember and model industry standard safe habits for generator system technicians.

2. Apply skills necessary to analyze electrical power generation system operations, troubleshoot and make repairs using basic and specialized diagnostic equipment.

3. Identify and evaluate various electrical power generation components and make appropriate repairs.

4. Create an on-site electrical power generation system design up to 50kW including sizing, installation and service procedures.

5. Understand industry standard technical knowledge of electrical power generation systems.

SEATING – A sign-in sheet may be used to quickly take attendance each day the class meets. Be on time as attendance is taken at the beginning of class. Remain in your seats until class is dismissed.

ATTENDANCE – Students are expected to attend all scheduled classes and laboratories. If special circumstances such as illness, religious holidays, travel difficulties, family emergencies or active participation in college-sponsored events make absence unavoidable you must see me to make up the work. No student will be allowed to complete graded work after that work has been returned to others in the class. If absences place you in academic jeopardy of not passing the course, the dean of your school will be notified. All cell phones must be turned off during class and laboratory. All computers must be closed and stored during lecture.

ACADEMIC HONESTY – The Code of Academic Honesty from the Student Handbook will be strictly adhered to. The first violation will result in a zero grade for the work and a letter to the student’s dean. The second violation will result in an automatic F in the course as a final grade.

SPECIAL LEARNING ACCOMMODATIONS – If you have any special learning needs and need some accommodations then please alert this instructor immediately, during the first two weeks of this course. Work is done with David Symonds, the Learning Specialist in the Academic Enrichment Center located in the Butcher Library.

GRADING - The laboratory based exercises will be worth 40% of your grade, and the classroom-based testing 60%. The grade breakdown is as follows:

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>15% - Homework</td>
</tr>
<tr>
<td></td>
<td>30% - Quizzes</td>
</tr>
<tr>
<td></td>
<td>15% - Final Exams</td>
</tr>
<tr>
<td>Laboratory</td>
<td>20% - Lab exercises</td>
</tr>
<tr>
<td></td>
<td>20% - Lab reports</td>
</tr>
</tbody>
</table>

The range for grades will be as follows:
<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>97-100</td>
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<tr>
<td>A</td>
<td>93-96</td>
</tr>
<tr>
<td>A-</td>
<td>90-92</td>
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<tr>
<td>B+</td>
<td>87-89</td>
</tr>
<tr>
<td>B</td>
<td>83-86</td>
</tr>
<tr>
<td>B-</td>
<td>80-82</td>
</tr>
<tr>
<td>C+</td>
<td>77-79</td>
</tr>
<tr>
<td>C</td>
<td>73-76</td>
</tr>
<tr>
<td>C-</td>
<td>70-72</td>
</tr>
<tr>
<td>D+</td>
<td>67-69</td>
</tr>
<tr>
<td>D</td>
<td>63-66</td>
</tr>
<tr>
<td>D-</td>
<td>60-62</td>
</tr>
<tr>
<td>F</td>
<td>Below 60</td>
</tr>
</tbody>
</table>

**HOMEWORK** - Is a required part of the course and will be checked each week for completeness. Each assignment will be collected on Thursday before the quiz is given on that material. Homework turned in late but before the work has been corrected will be given ½ credit. Homework may not be turned in after the corrected work has been returned to other students. A tutor can be made available if requested. In short: **You must turn in every homework assignment done to the best of your ability to succeed in this course.**

**QUIZZES** - Periodic quizzes will be given during the last 10-15 minutes of the Thursday class. No make-up quizzes will be given. If you know in advance that you will be absent, see me to take the quiz beforehand.

**FINAL EXAM/ PRACTICAL** - The Final Exam will be a final project consisting of an on site electrical power generation system. Details distributed at a later date.

**LABORATORY** - Each week there will be a lab exercise which must be completed properly to receive credit.

**FIELD TRIPS** - Each field trip is a very important educational experience and attendance is mandatory as a regular laboratory session. Following each field experience students will be required to submit a write-up using the sample format provided.
**LECTURE AND LABORATORY OUTLINES** – The following is a detailed outline of the course activities for the semester. Please pay close attention to the reading and written assignments. Note: outlines are subject to change with progression of course.

**LECTURE OUTLINE**

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Textbook</th>
<th>Reading</th>
<th>Written</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Course Overview Safety</td>
<td>Syllabus Handout</td>
<td>Review Syllabus Safety Handout</td>
<td>Review Questions 1-17, Problem #1</td>
</tr>
<tr>
<td>2</td>
<td>EPG History and Electrical Fundamentals</td>
<td>Handout A</td>
<td>“Basic Electricity”</td>
<td>Handout Questions</td>
</tr>
<tr>
<td>3</td>
<td>Circuits &amp; Oscilloscopes</td>
<td>Handout</td>
<td>“Measurement, Testing, Formulas and Circuits”</td>
<td>Handout Questions</td>
</tr>
<tr>
<td>4</td>
<td>Prime Movers I (Spark Ignition Engines)</td>
<td>Handout</td>
<td>Review Handout</td>
<td>Handout Questions</td>
</tr>
<tr>
<td>Week</td>
<td>Topic</td>
<td>Textbook</td>
<td>Reading /Reference</td>
<td>Written</td>
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<td>------</td>
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<tr>
<td>5</td>
<td>Prime Movers II (Comp. Ignition Engines)</td>
<td>Handout</td>
<td>Review Handout</td>
<td>Handout Questions</td>
</tr>
<tr>
<td>6</td>
<td>Non-Synchronous Generator Operation (DC)</td>
<td>Handout</td>
<td>Review Handout</td>
<td>Handout Questions</td>
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<tr>
<td>7</td>
<td>Synchronous Generator Operation I (AC)</td>
<td>A</td>
<td>Review Handout and “Generator Systems”</td>
<td>Handout Questions</td>
</tr>
<tr>
<td>8</td>
<td>Synchronous Generator Operation II (AC)</td>
<td>A</td>
<td>Review Handout and “Generator Systems”</td>
<td>Handout Questions</td>
</tr>
<tr>
<td>9</td>
<td>Electricity Storage Batteries and Charging Systems</td>
<td>Handout</td>
<td>Review Handout</td>
<td>Handout Questions</td>
</tr>
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<td>10</td>
<td>Inverter Systems</td>
<td>Handout</td>
<td>Review Handout</td>
<td>Handout Questions</td>
</tr>
<tr>
<td>11</td>
<td>Circuit Protection Devices</td>
<td>Handout</td>
<td>Review Handout</td>
<td>Handout Questions</td>
</tr>
<tr>
<td>12</td>
<td>Manual and Automatic Switching Systems</td>
<td>Handout</td>
<td>Review Handout</td>
<td>Handout Questions</td>
</tr>
<tr>
<td>13</td>
<td>Typical Generator Applications</td>
<td>Handout</td>
<td>Review Handout</td>
<td>Handout Questions</td>
</tr>
<tr>
<td>14</td>
<td>Atypical Generator Applications</td>
<td>Handout</td>
<td>Review Handout</td>
<td>Handout Questions</td>
</tr>
<tr>
<td>15</td>
<td>Final Exam (Project)</td>
<td>All</td>
<td>Comprehensive</td>
<td>Date to be announced</td>
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</table>

**Notes:**

**LABORATORY OUTLINE**

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Textbook</th>
<th>Reading /Reference</th>
<th>Written</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Computer parts and technical data systems</td>
<td>None</td>
<td>Lab Handout</td>
<td>Handout Questions</td>
</tr>
<tr>
<td>2</td>
<td>Multimeter use and Ohms law practice</td>
<td>Handout</td>
<td>Lab Handout</td>
<td>Handout Questions</td>
</tr>
<tr>
<td>3</td>
<td>Generator Components Teardown/reassembly</td>
<td>A</td>
<td>“Generator Components”</td>
<td>Handout Questions</td>
</tr>
<tr>
<td>4</td>
<td>Field Trip – Wind Farm</td>
<td>Handout</td>
<td>Review Lab Handout</td>
<td>Handout Questions</td>
</tr>
<tr>
<td>5</td>
<td>Engine Governor Systems</td>
<td>Handout</td>
<td>Review Lab Handout</td>
<td>Handout Questions</td>
</tr>
<tr>
<td>6</td>
<td>Genset Maintenance</td>
<td>Handout</td>
<td>Review Lab Handout</td>
<td>Handout Questions</td>
</tr>
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<td>Service Documents</td>
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<td></td>
<td>Campus Genset Service</td>
<td>Handout</td>
<td></td>
<td>Lab Report</td>
</tr>
<tr>
<td>8*</td>
<td>Morrisville Diary Farm Digester Operation</td>
<td>Handout</td>
<td>Bio-fuel engine basic service requirements</td>
<td>Field Experience Write-up</td>
</tr>
<tr>
<td></td>
<td>Genset Troubleshooting</td>
<td>A</td>
<td>“Generator Diagnostics &amp; Adjustments”</td>
<td>Handout Questions</td>
</tr>
<tr>
<td>10</td>
<td>Field Trip – Land Fill</td>
<td>Handout</td>
<td>Review Lab Handout</td>
<td>Field Experience Write-up</td>
</tr>
<tr>
<td>11</td>
<td>Inverter and Battery Systems</td>
<td>Handout</td>
<td>Review Lab Handout</td>
<td>Handout Questions</td>
</tr>
<tr>
<td>12</td>
<td>Campus Genset Service</td>
<td>Handout</td>
<td>Service Documents</td>
<td>Lab Report</td>
</tr>
<tr>
<td>13*</td>
<td>Power Transfer Systems</td>
<td>Handout</td>
<td>Review Lab Handout</td>
<td>Handout Questions</td>
</tr>
<tr>
<td>14</td>
<td>Field Trip – Power Plant</td>
<td>Handout</td>
<td>Review Lab Handout</td>
<td>Field Experience Write-up</td>
</tr>
<tr>
<td>15</td>
<td>Final Exam (Project)</td>
<td>Not Specified</td>
<td>All Notes &amp; Handouts</td>
<td>Complete Project</td>
</tr>
</tbody>
</table>

**Notes:**

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2. No foul language or tobacco products will be used in lab.
3. Safety glasses and appropriate shop clothing will be worn at all times.
4. All petroleum products will be stored in the appropriate cabinet/locations.
5. All engines will be run with ventilation system running, or taken outside of the building.
6. The lid on the parts cleaner will be closed when not in use.
7. Waste rags will be stored in the appropriate metal container.
8. Oil spills will be covered immediately with absorbent pads.
9. All tools/components will be returned to their appropriate locations
10. All engines/generators will be properly stored at the end of the lab.
11. Note the location of the fire extinguishers at the front and back of lab.
12. Note the location of the eye wash station next to the sink.
DTEC 350 ADVANCED DIESEL SYSTEMS
COURSE SYLLABUS

Hours required     Professor   Mr. Bach
2 lecture, 2 lab    Office 135 Marshall Hall
                      Lecture 125B Marshall Hall
                      Lab GALB/125C Marshall hall

DESCRIPTION

Principles of the diesel engine with reference to design and construction of different types used in Agricultural, On Highway, Construction and EPG will be studied. Since many aspects of engines have been studied in previous courses, the emphasis in this course is on how a diesel engine differs for the gasoline (Otto) engine. The course will focus on diesel combustion, combustion chamber design, Electronic injection principles, fuel injection nozzles and injectors and injection systems.

OBJECTIVES
COMPETENCIES TO BE DEVELOPED

1. To understand what a diesel engine is and how it works
2. To understand the structural parts of the engine and fuel system
3. To understand the diesel air intake and exhaust system
4. To understand the basic requirements of the diesel fuel system
5. To understand the auxiliary systems of the diesel engine

TEXT

Medium/Heavy Duty Truck Engines, Fuel and Computerized Management System, Sean Bennett

SUPPLEMENTARY REFERENCES

1. Cat sis program
2. Cummins quick serve
3. Diesel Engineering Handbook
4. Fundamentals of Service John Deere
5. Tractors & Their Power Units
6. Diesel Engine Repair- Dagel
7. Diesel Fuel Systems- Brady
8. Diesel Fundamentals, Service and Repair- Tabolt

STUDENT RESPONSIBILITIES

1. To read this course outline and ask questions if any of the material is unclear
2. To make up any and all class work covered during their absence
3. To attend scheduled labs unless prior arrangements have been made with the instructor
4. To complete on time lab write-ups, study guides, problem sets, and term projects, which reflect careful, neat complete and individual effort.

HOME WORK
In relation to each lecture there will be reading assignments and/or problem sets and study guides. The reading assignments reinforce and expand upon the lecture topic.

LAB

A specific area will be covered each week as outlined. Lab attendance is important as no make up labs will be given. Missed lab work will lead to an F or an incomplete in this course.

A lab write-up is due after each lab. They provide reinforcement for each lab topic and may stimulate further research or questions on the topic covered.

One (1) late lab will be permitted without penalty; however, it must be submitted before or with the next week’s lab. Lab write-ups submitted after that time will not be accepted unless under extenuating circumstances. After the first late lab, the lab grade for a given lab will drop one letter grade per day. Failure to attend lab on a given day or to hand in a lab report after the grace period will be recorded as a (0).

Lab sections are balanced; therefore, students are expected to attend their scheduled labs unless previous arrangements have been made to switch into another lab section.

Field trips and other sponsored events must be arranged prior to lab time so arrangements for makeup work can be planned.

Students are expected to conduct themselves in a safe manner. Any student who poses a hazard to themselves or others will on the first offense receive a verbal warning, on the second offense a written warning, and on the third offense will be removed from the lab/course.

TERM PROJECT

There will be a term project. Procedure and time will be announced later on during the semester.

ATTENDANCE POLICY
All attendance regulations as found in the Student Handbook, College Catalog and Faculty Handbook shall be enforced. After 3 unexcused absences in lecture or lab, the student will be subject to review and may face termination from the course.

MAKEUP TESTS AND QUIZZES

There will be no makeup quizzes in lecture or lab due to their unannounced nature. Test make-ups only under extenuating circumstances.

CHEATING

Cheating will be dealt with in the most severe manner possible. As outlined in the Academic handbook, cheating could result in receiving an F in this course.

GRADING

GRADE=

50% class tests, quizzes, study guides, problem sets final exam
50% lab write-ups, quizzes term projects

A final exam will be given

GRADING PROCEDURE FOR LAB WRITEUPS

Check plus = 95%  Well done write-up, neat, and complete which reflects work and effort beyond that required
On the write-up
Check    = 85%  Lab done- neat and complete, reflects an understanding of the material
Check minus= 75%  A lab that reflects the minimum effort, but still complete
X = 60% (or lower)  Lab write-up that has parts missing

MAJOR TOPICS

I. History of Diesel Development and Major Fields of Application
II. Comparison of Diesel and Gas Engines
III. Engine Construction, Design and Types
IV. Fuels and Combustion

V. Diesel fuel

VI. Engine Power, Rating and Performance

VII. Combustion Chambers: Thermodynamic Characteristics

VIII. Fuel Injection systems Principles and Characteristics

IX. Super chargers/ turbochargers and their applications

LECTURE TOPICS

I. History of Diesel Development and fields of application
   1. Diesel Definitions
   2. Rudolph Diesel
   3. Advantages and Disadvantages
   4. Carnot, Constant pressure, Constant volume, Sabathe Cycle
   5. Development and application

II. Comparison of Diesel and Gas engines
   1. Original cost
   2. Fuel and Operating costs
   3. Operation, Maintenance and Repair

III. Engine construction, design and types
   1. Design by size, speed and use
   2. Two and Four Stroke cycle engines
   3. Design features and problems
   4. Scavenging and Supercharging
   5. Stationary and moving parts

IV. Fuels and Combustion
   1. Properties of Fuel Oils
   2. Combustion and Heat values
   3. Ignition Lag and Diesel Knock

V. Diesel and Alternative Fuels
1. Diesel fuel
2. Bio Diesel
3. Methanol
4. Natural gas
5. Propane
6. Etc

VI. Diesel engine operating fundamentals
1. Power Calculations
2. Power losses
3. Indicated, brake, frictional horsepower
4. Efficiency

VII. Combustion chambers: Thermodynamic Characteristics

1. Principles of Combustion
   a. Turbulence
   b. Oxygen for combustion
   c. Compression Ratio
   d. Combustion stages

2. Types of chambers
   a. Direct injection
   b. Pre-combustion chamber
   c. Energy cells
   d. Turbulence chambers
   e. Auxiliary
   f. Air cells

VIII Fuel Injection systems

1. Distributor pumps
2. Cummins PT
3. In line pumps
4. Unit injectors
5. Common rail
6. Electronically controlled
7. Etc

IX Principles and Characteristics of Injectors Nozzles and Pumps
1. Single Hole, Multiple Hole, Pintle and poppet
2. Spray patterns, sizes and dispersion of fuel
3. Nozzle reconditioning and repair
4. Pop testing procedures
5. Detroit unit injectors
6. Cummins Pt injectors
7. Robert Bosch inline pumps
8. Robert Bosch rotary
9. CAV pumps
10. Roosa Master Pumps

X. Blowers, Superchargers and their application
   1. Port and valve scavenging blowers
   2. Supercharging with rotary or centrifugal blowers
   3. Turbochargers
   4. Engine changes due to turbo charging/super charging

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture topic</th>
<th>Lab topic</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction cp 1 text</td>
<td>Intro to engines, history, text cp 5 questions Pg.100</td>
<td>Read text Cp. 1 and Cp#5</td>
</tr>
<tr>
<td>2</td>
<td>Engine Basics cp 4</td>
<td>Inlet metering rotary distributor pumps pump id</td>
<td>Cp # 23 read</td>
</tr>
<tr>
<td>3</td>
<td>Engine basics/ Power cp 4</td>
<td>Pump tear down</td>
<td>Read Cp #4 cp #23 lab</td>
</tr>
<tr>
<td>4</td>
<td>Power cp 6</td>
<td>Pump assemble and calibration</td>
<td>Cp 6 lab cp 323</td>
</tr>
<tr>
<td>5</td>
<td>Power/ cp 6</td>
<td>Rotary injection pump re assemble</td>
<td>Read Cp. #24</td>
</tr>
<tr>
<td>6</td>
<td>Chem. And combustion cp 17</td>
<td>Nozzle R+R Stanadyne 9.5 mm nozzle cp 21 text</td>
<td>Nozzle rebuild hand out text cp 21</td>
</tr>
<tr>
<td>7</td>
<td>Chem. Combustion/diesel fuel</td>
<td>Stanadyne 9.5 nozzle testing</td>
<td>Lab write up lab hand outs</td>
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<tr>
<td>8</td>
<td>Engine retarders Cp 13</td>
<td>Cummins electronic injector adj. Jake brake adj. cp 13</td>
<td>Lab write up lab hand outs</td>
</tr>
<tr>
<td>9</td>
<td>Cummins HPI-TP Cp 29</td>
<td>ISX overhead adj</td>
<td>Read Cp#29 lab hand outs and lab write up</td>
</tr>
<tr>
<td>10</td>
<td>Networking Cp 33</td>
<td>Intro to Cummins insite</td>
<td>Read Cp.#33 lab hand outs and lab write up</td>
</tr>
<tr>
<td>11</td>
<td>Vehicle computer systems cp #34</td>
<td>EGR testing and troubleshooting</td>
<td>Read Cp. 34 lab hand outs and lab write up</td>
</tr>
<tr>
<td>12</td>
<td>Common rail systems Cp 31</td>
<td>ISC injector cut out and troubleshooting</td>
<td>Read Cp.#31</td>
</tr>
<tr>
<td>13</td>
<td>Emissions management cp 47</td>
<td>ISC (Cummins) re gen</td>
<td>Read Cp.#47</td>
</tr>
<tr>
<td>14</td>
<td>Servicing and maintenance of exhaust after treatment cp 48</td>
<td>Cat et training</td>
<td>Cp 48 lab hand out and lab write up</td>
</tr>
<tr>
<td>15</td>
<td>Final exam</td>
<td>Clean up</td>
<td></td>
</tr>
</tbody>
</table>

### COURSE SYLLABUS

**RENG 102 – Renewable Energy Resources**

3 Credits (Three 50-minute lectures: 148 Galbreath M/W/F 10-10:50am)

Pre-requisites: none

**INSTRUCTOR:**

Dr. Benjamin D. Ballard,
Office building and room number: 103B Shannon Hall (next to 104B classroom)
On-campus mailbox: ASBE School Office, Marshall Hall
Office phone: 315-684-6780
E-mail: BallarBD@morrisville.edu
OFFICE HOURS:
Monday, Wednesday, Friday 9:00-9:40am and Tuesday/Thursday from 10:30-11:30 am. I have an open door policy as well; if my office door is not closed tight, please knock and enter. If a specific time is requested other than office hours, students are encouraged to make appointments to ensure I am in my office.

DISABILITIES:
Any student who feels s/he may need an accommodation based on the impact of a disability should contact the Disability Services office immediately to register for services and receive a Notification of Disabilities form. Once you have this form, we will meet privately, to discuss your specific needs. Although you may register for services at any time, please make arrangements within the first two weeks of the semester so all appropriate academic accommodations can be set. For additional information, contact David Symonds, symondda@morrisville.edu, 315-684-6349 in the Academic Enrichment Center of the Butcher Library.

COUNSELING SERVICES:
Successful academic performance is a mutual goal between students and the Morrisville State College community. Many problems may arise during your time here that could interfere with your academic course work. Things such as significant stress, mood swings, anxiety, and difficulties concentrating. Problems with strained relationships, drugs/alcohol, family concerns, loss or crisis may also contribute to decreased academic performance. Counseling services are available to assist you in addressing these and other concerns you may be experiencing. Services are free and confidential for all enrolled students through the Student Health Center. You can call 315-684-6078 to schedule an appointment or visit http://www.morrisville.edu/health_center/counseling.aspx to find out more about counseling services.

COURSE DESCRIPTION:
RENG 102 provides an introduction to energy systems and renewable energy resources, with a scientific examination of the energy field and an emphasis on alternate energy sources and their technology and application. The class will explore society’s present needs and future energy demands, examine conventional energy sources and systems, including fossil fuels and nuclear energy, and then focus on alternate, renewable energy sources such as solar, biomass (conversions), wind power, geothermal, and hydro. Energy conservation methods will be emphasized.

EXPECTED COURSE OUTCOMES:
At the successful completion of RENG 102, the student is expected to have/be able to:
1. List and generally explain the main sources of energy and their primary applications in the US, and the world.
2. Describe the challenges and problems associated with the use of various energy sources, including fossil fuels, with regard to future supply and the environment.
3. Discuss remedies/potential solutions to the supply and environmental issues associated with fossil fuels and other energy resources.
4. Evaluate home energy consumption and determine methods to increase energy efficiency.
5. List and describe the primary renewable energy resources and technologies.
6. Describe/illustrate basic electrical concepts and system components.
7. Convert units of energy—to quantify energy demands and make comparisons among energy uses, resources, and technologies.
8. Collect and organize information on renewable energy technologies as a basis for further analysis and evaluation.

INSTRUCTIONAL METHODS:
- Lecture/ problem solving sessions.
- Reading assignments.
- Reading current literature related to energy systems.

TEXT:
There is no required text for RENG 102. Handouts, readings, videos, and other course materials will be available on-line via Blackboard, accessible only by those students who are enrolled in the course.

**STUDENT REQUIRED EQUIPMENT:**
Notebook, textbook, scientific calculator, and computer with internet access.

**CLASS POLICIES:**

**Honesty Policy & Discipline (Due Process):** Honesty and integrity are major elements in professional behavior and are expected of each student. Any assignment (including those in electronic media) submitted by a student must be of the student’s original authorship. Representation of another’s work as his or her own shall constitute plagiarism. Cheating, in any form, is considered unacceptable behavior within all University courses. Students having academic problems should consult with their advisor or a college counselor. Instances of cheating will be dealt with in accordance to University policy. Standards of academic honesty and due process procedures for Morrisville College are located in the Rules, Regulations & Expectations section of the student handbook.

**Civility:**
My classroom revolves around professional civility – we will treat one another with respect and carry ourselves with integrity at all times. We come from different backgrounds, ethnicities, genders, and life experiences. Use this rich background as a means for expanding your personal boundaries rather than searching for differences to demean another person. I have a zero tolerance policy for crass behavior and you will be asked to leave the class and referred to the Dean if you cannot comply with this policy.

**Attendance:** Students are required to attend class. Since class sessions start on the hour, students are expected to be punctual. *There will be no late entries once a class has begun.* In this case, student’s absence will be counted as unexcused and will receive a zero for any assignments due.

If a student must leave class early during a regularly scheduled meeting, he/she must discuss reasons with the professor. If a student must miss a scheduled class meeting due to an acceptable, verifiable time conflict, he/she must resolve the time conflict prior to class.

If a student is unable to attend class because of an emergency, the professor or School of Agriculture Sustainability, Business and Entrepreneurship office must be contacted prior to the scheduled class meeting. The telephone number is 684-6780 (Dr. Ballard) or 684-6083 (School office). Use of e-mail (BallarBD@morrisville.edu) is highly recommended.

Students failing to call ahead or discuss absences prior to the class will be unexcused. If a student accumulates four unexcused absences, he/she will be given the option of dropping the course or receiving a failing grade for the semester.

**GRADING/EVALUATION OF THE STUDENT:**
Evaluation is a shared responsibility between the teacher and the student. The purpose of the evaluation is to demonstrate how well the professor has taught and the student has learned specific course materials, the principles, concepts and terms relevant to the renewable energy field, and to determine the students’ ability to apply that knowledge to specific situations.

**Grade Method:** The grade for this course will be based on attendance, homework “quizzes” related to reading assignments, lectures, and videos, “in-class” assignments during the lecture component of the course, and two exams (a midterm examination and a final examination). Online assignments (weekly quizzes) on Blackboard have a hard due date, which means late assignments will not be accepted (you get a zero for that quiz), so plan accordingly! Other assignments received past the due date will be devalued 50% for each day that the item is late. No class assignment of any student will be graded (for credit) once the same assignment is corrected and returned to the class.

The majority of the graded component of this course is comprised of weekly homework assignments (quizzes) and in-class exercises (60%). There will also be a midterm and final examination given. Each of these is worth 20% of your final grade (40% total).
Grading Scale:
100 - 94% = A  89 - 87% = B+  79 - 77% = C+  69 - 65% = D+
93 - 90% = A-  86 - 83% = B  76 - 73% = C  64 - 60% = D
82 - 80% = B-  72 - 70% = C- Below 60% = F

OUTLINE OF TOPICS:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics (HW Quiz will be due every Friday by 9:00 pm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introductions, syllabus, incoming quiz</td>
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<tr>
<td></td>
<td>Using Blackboard</td>
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<tr>
<td></td>
<td>Brief history of energy in the U.S.A.</td>
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<td>2</td>
<td>Petroleum, natural gas, and oil</td>
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<td>Global climate change</td>
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<td>Scientific Method</td>
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<td>3</td>
<td>Sustainability vs. Renewability</td>
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<td>Conservation vs. Efficiency</td>
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<td>Renewable portfolio standard</td>
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<td>4</td>
<td>Electricity overview</td>
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<td></td>
<td>The grid, smart grid, micro grid (in-class exercise)</td>
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<td>Ohm’s Law and Power Law</td>
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<td>5</td>
<td>Energy and Power</td>
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<td>In-class exercise (Electricity, energy, power)</td>
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<td></td>
<td>Electric cars (<a href="https://goo.gl/hqIIBv">https://goo.gl/hqIIBv</a>)</td>
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<tr>
<td>6</td>
<td>Heating and cooling (PHIUS)</td>
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<td>Lighting and appliances</td>
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<td>Water conservation</td>
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<tr>
<td>7</td>
<td>October Break (no class on Monday)</td>
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<tr>
<td></td>
<td>Renewable energy system components and net metering</td>
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<td></td>
<td>Batteries</td>
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<td>8</td>
<td>Controllers and inverters</td>
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<td></td>
<td>Midterm review</td>
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<td></td>
<td>Midterm examination</td>
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<td>9</td>
<td>Solar PV systems</td>
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<td>Solar thermal systems</td>
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<td>Solar resource</td>
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<tr>
<td>10</td>
<td>Solar PV system sizing</td>
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<td></td>
<td>PV Watts</td>
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<td></td>
<td>Power of the Sun</td>
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<tr>
<td>11</td>
<td>Wind resource</td>
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<td></td>
<td>Wind systems</td>
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<td></td>
<td>NYS Wind explorer</td>
</tr>
<tr>
<td>12</td>
<td>Hydro resource</td>
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<td></td>
<td>Measuring head and flow</td>
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</tbody>
</table>
In-class exercise (Wind, solar, hydro)

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<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>13</td>
<td>Woody biomass crops (forest and willow)</td>
</tr>
<tr>
<td></td>
<td>Thanksgiving Break (no class on Wednesday)</td>
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<tr>
<td></td>
<td>Thanksgiving Break (no class on Friday)</td>
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<tr>
<td>14</td>
<td>Biodiesel</td>
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<td></td>
<td>Ethanol</td>
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<td></td>
<td>In-class exercise (volumetric energy density)</td>
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<tr>
<td>15</td>
<td>Geoexchange systems</td>
</tr>
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<td></td>
<td>CO2 and electric vehicles</td>
</tr>
<tr>
<td></td>
<td>Industrial wind and hydro</td>
</tr>
<tr>
<td>16</td>
<td>Final Exam - TBA</td>
</tr>
</tbody>
</table>

*The topics and corresponding schedule listed in the table above are tentative and may be subject to change during the semester.
DETC 151
SEMINAR IN CATERPILLAR POWER SYSTEMS
COURSE OUTLINE

Hours required: 1 hour class, 2 hours lab
Lecture Marshall 102/125b R. Smith
Lab Marshall 119 R. Smith/ F. Bach

Description

Theories and Principles of Caterpillar Diesel Engine Operation and construction, engine removal, inspection, disassembly and rebuild. Caterpillar specific software and reference material will be used.

Objectives

1. To understand what a diesel engine is and how it works
2. To understand the structural parts of a Caterpillar diesel engine
3. To understand the lubrication, cooling, fuel and exhaust system of a Caterpillar diesel engine.
4. To understand and apply the various computer programs and diagnostic software used by Caterpillar

Text

Modern diesel technology Brady, Caterpillar software, Service Information System, Computer Based Training

Grading

The course grade will be based on classroom and lab performance.
Classroom (50%) quizzes, (4) classroom presentations, term paper
Lab (50%) Weekly time sheets, Engine measurement and evaluation sheet, the ability to disassemble, evaluate and reassemble to factory specifications a caterpillar diesel engine

Student Responsibility

1. To read this course outline and to ask questions if any of the material is unclear.
2. To make up any and all class work covered during their absence.
3. To attend scheduled lab unless previous arrangements have been made with the instructor.
4. To complete on time lab write-ups, study guides, problem sets and term projects which reflect careful, neat, complete and individual effort.
Homework

In relation to each lecture there will be reading assignments and/ problem sets and study guides. The reading assignments reinforce and expand upon the lecture topic.

Lab

A specific area of instruction will be covered each week as outlined. Lab attendance is important as no makeup labs will be given. Missed lab work will lead to an F on incomplete in this course.

Field trips and other sponsored events must be arranged prior to lab time so arrangements for make up work can be planned.

Students are expected to conduct themselves in a safe manner. Any student who poses a hazard to themselves or others will first receive a verbal warning; on the next offense they will receive a written warning and the dean will be informed of the infraction. On the third offense the student will be removed from the course.

Term Project

There will be a term project. Procedure and time will be announced later on during the semester.

Attendance Policy

All attendance regulations as found in the Student Handbook, College Catalog and faculty Handbook will be enforced. After 3 unexcused absences in lecture or lab the student will be subject to review and may be terminated from this course.

Makeup Tests and Quizzes

There will be no makeup quizzes in lecture or lab due to their unannounced nature. Test make ups and rescheduling of presentations will be made only under extenuating circumstances.

Cheating
Cheating will be dealt with in the most severe manner possible. As outlined in the Academic Handbook, cheating could result in receiving an F in this course.
Topical Outline
I. Engine measurement 15%
II. Service Information System (SIS) 10%
III. Fuel System 10%
IV. Lube. Systems 10%
V. Cooling Systems 10%
VI. Intake and Exhaust Systems 10%
VII. Engine disassembly, evaluation, and reassembly 30%
VIII Safety 5%

<table>
<thead>
<tr>
<th>Week 1 Introduction</th>
<th>Lecture</th>
<th>Lab</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Introduction, engine assignment, organization of tools</td>
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<tr>
<td>Week 2 Measuring tools</td>
<td>Lecture</td>
<td>Lab</td>
<td>Assignment</td>
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<tr>
<td>Start engine disassembly</td>
<td>Worksheet on engine measurement</td>
<td></td>
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<tr>
<td>Week 3 Review of measuring tools, introduction to caterpillar service information system (sis)</td>
<td>Lecture</td>
<td>Lab</td>
<td>Assignment</td>
</tr>
<tr>
<td>Engine disassembly prep for fuel system presentations</td>
<td>Fuel system presentations prep.</td>
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<tr>
<td>Week 4 Instruction on and down loading of (sis) on student computers</td>
<td>Lecture</td>
<td>Lab</td>
<td>Assignment</td>
</tr>
<tr>
<td>Application of (sis), prep for fuel system presentations, engine disassembly</td>
<td>Sis assignment, collect outlines on fuel system presentations</td>
<td></td>
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<tr>
<td>Week 5 Fuel system presentations</td>
<td>Lecture</td>
<td>Lab</td>
<td>Assignment</td>
</tr>
<tr>
<td>Fuel system presentations</td>
<td>Collect fuel system presentation outlines</td>
<td></td>
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</tr>
<tr>
<td>Week 6</td>
<td>Finish fuel system presentations</td>
<td>Finish fuel system presentations</td>
<td>Prep for lube system presentation</td>
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<tr>
<td>Week 7</td>
<td>Review (sis) prep for lube system presentation</td>
<td>Engine disassembly engine analysis prep for lube system presentation</td>
<td>Prep for lube system presentation, sis exercise</td>
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<tr>
<td>Week 8</td>
<td>Lube system presentations</td>
<td>Lube system presentations</td>
<td>Collect outlines on lube system presentations sis exercise</td>
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<tr>
<td>Week 9</td>
<td>Lube system presentations</td>
<td>Lube system presentations</td>
<td>Prep for cooling system presentations</td>
</tr>
<tr>
<td>Week 10</td>
<td>Prep for cooling system presentations, introduction to Caterpillar computer based training program</td>
<td>Prep for cooling system presentation, intro to computer based training</td>
<td>Computer based training (diesel engines)</td>
</tr>
<tr>
<td>Week 11</td>
<td>Cooling systems presentations, review sis assignment</td>
<td>Cooling system presentations</td>
<td>Sis assignment Collect cooling system outlines</td>
</tr>
<tr>
<td>Week 12</td>
<td>Finish cooling systems presentations, review sis assignment</td>
<td>Engine measurement, engine reassembly</td>
<td>Prep for intake and exhaust system presentations</td>
</tr>
<tr>
<td>Week 13</td>
<td>Prep for intake and exhaust system presentations</td>
<td>Engine measurement and reassembly</td>
<td>CBT diesel engines</td>
</tr>
<tr>
<td>Week 14</td>
<td>Intake and exhaust system presentations</td>
<td>Intake and exhaust system presentations</td>
<td>Collect intake and exhaust system Outlines</td>
</tr>
<tr>
<td>Week 15</td>
<td>Finish presentations</td>
<td>Finish engine assembly</td>
<td>Collect intake and exhaust system outlines</td>
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<td>--------------------------------------------</td>
</tr>
<tr>
<td>Week 16</td>
<td>Collect term projects</td>
<td>Clean shop, move engines to storage</td>
<td>Collect term projects</td>
</tr>
</tbody>
</table>
Appendix 9: Curriculum Vita & Resumes for Department Faculty & Staff:

Curriculum Vitae
Charles J. Ax, III

Addresses:
200 West Market Street 4228 Trestle Lake Drive
P.O. Box 271 Munnsville, New York
13409
Beavertown, Pennsylvania 17813 Phone: (570) 765-3593

Formal Education:
Master of Science in Education, General Professional Education
SUNY Potsdam, August 2004-May 2006

Bachelor of Science, Agriculture Education
Pennsylvania State University, August 1989-December 1991
Specialty Areas: Agricultural Engineering
Plant Science
Agricultural Business Management

Horticulture Minor
Alpha Tau Alpha
Gamma Sigma Delta

Associate of Applied Science, Agricultural Engineering
Morrisville State College, August 1988-May 1989
Dean’s List
Honor Student
Phi Theta Kappa

Associate of Applied Science, Fruit and Vegetable Production
Morrisville State College, August 1986-May 1988
Dean’s List
Honor Student

Informal Education:


George Rowley Advanced School of Electrical Power Generation, 2016

AED College Diesel Instructors Conference, 2014
Specialized Portable Generator Service and Repair Procedures, 2012

Energy Management Conference, 2011
CAT Electrical Power II, 2010
Educators Life Space Crisis Intervention Training, 2004
Effective Teacher Training, 2002-2003
Title III Technology Literacy Challenge, 2002
HACCP Training for Cider Producers, Pennsylvania State University, April 1998
Cider Makers School, Michigan State University, March 1998
• Wildlife Habitat Training for Teachers, PA Game Commission School, July 1996
• Juice Technology Workshop, Cornell University, August 1996
• Small Engine Institute for Teachers, Briggs & Stratton Corporation, July 1995
• New Jersey Cider Symposium, Rutgers University, March 1994

Other Certifications:
• New York Public School Teaching Certification (Agriculture)
• Pennsylvania Public School Teaching Certification (Agriculture/General Science)
• Pennsylvania Auctioneer License
• Globe Certified Education Systems Teacher
• Leopold Education Project Certified Teacher
• Emergency Medical Technician/CPR/Wilderness First Aid
• Certified Level II Interior Firefighter/EVOC/Extrication/Pump Operator
• Commercial Driver’s License with Passenger Endorsements

Professional Experience:
Assistant Professor
Morrisville State College, 2010-Present
• Specialized instruction teaching courses in electricity including Diesel Electrical Systems, Diesel Electronics and uses of electronic controls in heavy equipment and over the road truck applications.
• Developing course work and moving forward toward a degree option in electrical power generation technology to provide students with opportunities in a growing field of employment producing electrical power throughout the country.
• Represent Morrisville State College in the New York STAR Committee as part of the National Teach Ag Campaign. The State Teach Ag Results (STAR) program was launched in the spring of 2014 to increase recruitment and retention efforts of Agricultural Educators in each state.
• New York Association of Agricultural Educators State Post-Secondary Education Representative
• Collegiate FFA Co-Advisor, Advisor

Maintenance Director/Advisor
Oswegatchie Education Center, Summers: 2006-Present
• Provide hands on training opportunities/In-service for Ag. Educators
• Maintain grounds and buildings for safe summer program operations.
• Perform construction, electrical and plumbing repairs as needed.
• Conduct evaluations of facilities and recommend future changes/repairs.
• Inspect, maintain and repair facility vehicles and equipment.
Environmental Technology Instructor

*St. Lawrence-Lewis B.O.C.E.S., 2001-2009*

- Environmental Technology Instructor for junior and senior high school students at all three Career and Technical Education Centers located in St. Lawrence County.
- Teach agricultural topics including horticulture, small gas engines, equipment maintenance and operation, landscape design, landscape construction and maintenance, pest management, entrepreneurship and business management.
- Key developer in creating the Career and Technical Center (CTE) based Environmental Technology Program. This program was developed due to loss of twelve key High School Agricultural Education Programs in the county.
- Program certified by the New York State Education Department.
- Developed program articulation agreements with several Colleges.
- Established 3 – FFA Chapters for the Environmental Technology Program.

Education Director and Special Projects Manager

*“A” Patch Orchard, 1997-2001*

- Developed and managed a school tour program for students ages 3 to 8 which has educated over 14,000 students about agriculture since 1997.
- Designed and constructed one of the only fresh fruit juice plants in central Pennsylvania with a production capacity of 1,800 gallons per hour.
- Directed a high-density orchard Integrated Pest Management Program for 15,000 fruit trees.
- Marketed over 100 varieties of fruit products annually to retail customers, supermarkets and multiple wholesale distributors.
- Handled procurement, maintenance, and repairs for over 128 different machines.

Agriculture Instructor and Young Farmer Chapter Advisor

*Manheim Central School District, 1994-1997*

- Head Agricultural Engineering Instructor for one of the largest High School Agriculture Programs in the Eastern United States.
- Developed several environmental and leadership training programs that provided extensive hands on education for students, some of which were conducted outside of the Commonwealth of Pennsylvania.
- Granted Professional Teaching Status 1996.
- Designed a new agriculture engineering facility and helped layout the overall department for the school renovation project, 1995-96.
Professional Activities:
- New York Association of Agricultural Educators, Current Member
- National Association of Agricultural Educators, Current Member
- Pennsylvania Association of Agricultural Educator, Current Member
- New York Farm Bureau, Current Member
- Association for Career and Technical Education, Current Member
- Snyder County, PA Cooperative Extension Board of Directors, Pres. 1998-2000
- Pennsylvania Council of Cooperative Extension Associations.
- Central Pennsylvania Fruit Growers Association, President, 1990-1998
- Pennsylvania Farm Bureau, 1993-1998
- Pennsylvania Vocational Agriculture Teachers Association 1994-1997
- National Education Association 1994-1997 & 2001-Present
- National Young Farmers Association, 1986-Present
- Manheim Chapter Advisor 1994-1997
- Pennsylvania State Executive Committee, Advisor 1994-1997

Honors and Awards:
- National Association of Agricultural Educators Region IV Outstanding Postsecondary/Adult Agricultural Education Program Award 2013-2014
- New York Association of Agricultural Educators Outstanding Post-Secondary Program Award 2013-2014
- New York Honorary Empire FFA Degree 2010, 2015
- Stockbridge Valley Honorary Chapter FFA Degree 2014
- Manheim Honorary Chapter FFA Degree 1993

Community Service:
- BSA Leatherstocking Council Executive Board Member 2016-Present
- Boy Scouts of America, Cubmaster, Scoutmaster 2005-Present
- Munnsville Volunteer Fire Department, Member 2014 - Present
- American Youth Soccer Organization, Assistant Coach 2005 - 2009
- Richville Volunteer Fire Department, Captain 2003-2014
- Gouverneur Volunteer Rescue Squad, Associate Member 2003-2010
- Boy Scouts of America, Assistant Scoutmaster, 1986-2002
- National FFA Alumni Association, Life Member since 1989
- National Eagle Scout Association, Life Member Since 1988

Select Publications, Presentations and Activities
Course Recently Developed: DTEC 325 Electrical Power Generation – Catalog

Description:

Students will develop the knowledge and skills necessary to install, troubleshoot and service on-site power generation systems up to 50kW. This course emphasizes various generator types driven by both typical and atypical methods. Instruction is provided in the areas of diesel and gaseous fueled engine control systems and governors. Advanced instruction is provided in electrical components necessary in the generation, storage, conversion, switching, and transmission of electric power. Students develop the practical skills needed to work with on-site electrical power generation equipment and related systems. 3 credits (2 hours lecture, 2 hour lab), Fall semester

Publication/Presentation: Contributing Author of Cornell University PRO-DAIRY Curriculum

Specifically, authored the genset maintenance, troubleshooting and reconditioning portion of the Cornell University PRO-DAIRY Program training curriculum. This project was coordinated at Morrisville State College by Dr. Ben Ballard of the Renewable Energy Training Center in conjunction with Cornell University Biological and Environmental Engineering Department. Following development of the curriculum I presented along with Dr. Ballard and Cornell University Faculty at the first training workshop conducted on December 14, 2012 at the Morrisville State College Renewable Energy Training Center.

Workshop Presenter: 2012 Professional Development Conference for Agricultural Educators

Published Description: Are you interested in enhancing your Agricultural Mechanics curriculum? Would you like to help your students become the small engine specialists in your community? Then this workshop is for you! You will participate in hands-on learning activities that will aid your teaching of small gas engines in your classroom. No prior mechanical skills are needed; however this workshop will also challenge the seasoned agricultural engineer! As part of above workshop I secured over 450 or $350,000.00 in small gas engines for educational purposes and distributed them to Agriculture Education Programs throughout New York and surrounding states.

Convention Host: 90th New York FFA State Convention

Procured and served as the Host Site Coordinator while Morrisville State College hosted the 90th New York FFA State Convention. This annual three day event brought almost 1,500 visitors to campus. A majority of the visitors were high school students in tenth through twelfth grade but also include many other teachers, parents, volunteers and other guests. Some of these visitors have never been to
Morrisville State College and all had a chance to see the vast opportunities our campus has to offer students. A key catalyst to success of this event was made possible by the selfless help of numerous faculty, staff and current students. Overall this event exposed opportunities at Morrisville State College to well over 1,000 potential future students and will take place again in 2017.
CURRICULUM VITAE

Fredrick W Bach

Address: 10 Callahan Drive
P.O. Box 532
Morrisville New York 13408

Formal Education:
Master of Science in Agricultural Engineering Cornell University (1980)
Bachelor of Science in Agricultural Engineering Cornell University (1977)
Associate in Applied Science in Agricultural Engineering Morrisville State College (1975)
Associate in Applied Science in Music Onondaga Community College (1974)

Applicable Informal Education:
.A.E.D, College Diesel Instructors Conference (2014)
.Cummins Engine Company service schools (1980-Present)
.Cummins Engine Company trainer status (1997-Present)
.Caterpillar Service schools (1981 –Present)
.General Motors Diesel training (1979-1982)
.Stanadyne fuel systems service school (1987)
.ATANY certificates of training
   Alternators (1981)
   Combines (1981)
.Seminar in Effective Teaching Methods, Morrisville State College (1986)
Garret Turbocharger Training (1993-1994)  
Gehl Farm Machinery Training (1991-1993)  
Komatsu Training (2012)  

Professional Growth:  
- Promotion to Full Professor (1997)  
- Promotion to Associate Professor (1986)  
- Assistant Professor (1981)  
- Distinguished Faculty Award Morrisville State College (2007)  
- New York State Council On Vocational Education Champion of Vocational Education (1985)  
- NACTA (National Association of Colleges and Teachers Of Agriculture) John Deere Award in Agricultural Power And Machinery (national award) (1987)  
- Trainer for the Cummins Engine Company  

Campus/Community Involvement:  
- Coordinator for the 4-H tractor certification program (1981-present)  
- Chairperson for Skills USA (state level) diesel Technology contest (2001-present)  
- Judge FFA state level contest (2005-present)  
  High School/BOCES visits/guest lecturer  
- Oneida County BOCES Ag. Mech  
- Madison County BOCES Diesel  
- Onondaga County BOCES Diesel  
- Orleans Niagara BOCES Diesel  
- Livingston county BOCES Ag Mech  
- Finger Lakes BOCES Diesel  
- Courtland County BOCES Ag. Mech  
- Lewis County BOCES Diesel  
- Jefferson County BOCEs Diesel  
- Elmira BOCES Diesel  
- Plattsburg BOCES Diesel  
- Binghamton Boces Diesel  
- Buffalo BOCES Diesel  
- Auburn BOCES Diesel  

- Advisor to Agricultural Engineering Club (1981-Present)  
- CETA Grant diesel test equipment $100,000 (1982)  
- CETA Grant Caterpillar 246 C Skid steer loader $50,000 2010  

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. Donation from the Cummins Engine Company
Four ISM engines for the DTEC 225 course (2007)
. Co-Chair NACTA National Conference Held at
Morrisville State College (1990)
. Morrisville Rep/Presenter NACTA Conference Knoxville
Tennessee (1989)
. Morrisville Rep/Presenter NACTA conference Columbia
Missouri (1987)
. Crane Lodge Repair Project (2007-present)
. Department Chair (1995-2001)
. Piano Selection Committee Chair
. Piano Repair Committee Chair for:
  Baldwin SD 10
  Baldwin SF 7
  Steinway D
. Piano Prep for Fieldsmen Concert (1990)
. Pianist for:
  Alumni weekend
  Presidential Inauguration (2015)
  Numerous campus memorial services
  Graduation
  Convocation
  Chancellors visit (1996)
  Received Honorary Phi Theta Kappa induction for
  Pianist in induction ceremony (1990 to present)

Curriculum Development

. AOS Degree Program Agricultural Mechanics
  (1982)
. AOS Diesel Program Diesel Technology (1988)
. AAS Diesel Program Equipment Technology
  (1998)

Courses Developed and Teaching
. DTEC 150 diesel systems (3 credits)
. DTEC 151 Seminar in Caterpillar Power Systems (2
  Credits)
. DTEC 225 Diesel Electronics (4 credits) (not currently
  Teaching)
. DTEC 350 Advanced Diesel Fuel Systems (3 credits)
. DTEC 290 Diesel Equipment Technology
Internship 1 (1 credit)
. DTEC 295 Diesel Equipment Technology
Internship 3 (1 credit)
. DTEC 300 Diesel Equipment Technology
Internship 2 (4 credits)
. AGEN 131 Fundamentals of Hydraulics (3 credit hours)
. AGEN 261 Advanced Hydraulics (4 credits)
. AGEN 270 Tractor Overhaul and Repair (5 credits)

Publications/Presentations
. Research on Diesel Fuel Additive XRG. The Effects of XRG on Engine Horse power, Fuel Consumption, and Exhaust gas temperatures as tested on a Ford T401 Engine (1996)
. Agri Tech Prep 2000 curriculum developer
. Article for local newspaper: Bach Fred Ag. Safety topic Oneida Daily Dispatch September 15, 1982
. Article for ATANY Magazine Bach Fred Keeping up to Date in Agricultural Engineering. The Empire State Vo-Ag Teacher Volume XX Number 1 summer 1981
. Ten Exploratory Units in Agricultural Mechanics. I.M.S. Cornell University Ithaca New Yor
EDUCATION

State University of New York College of Environmental Science and Forestry (SUNY-ESF)
Syracuse, New York.
Major Field: Forest Ecosystem Science and Applications, Forest and Natural Resources Management.

Syracuse University
Syracuse, New York

SUNY-ESF
Syracuse, New York.
Major Field: Forest Resource Management

SUNY-ESF
Syracuse, New York

WORK EXPERIENCE

Associate Professor. January 2016 – present. Renewable energy faculty, Department of Agricultural Engineering, School of Agriculture, Sustainability, Business and Entrepreneurship, Morrisville State College, Morrisville, New York. Responsible for renewable energy curriculum development and teaching (A.A.S. in Renewable Energy Technology and B.Tech in Renewable Energy). Responsible for development and management of renewable energy research and demonstration projects, including biomass thermal applications, on-farm anaerobic digestion, on-campus small-batch biodiesel production, and on-campus bioenergy demonstration plantations.

Director. April 2008 – present. Morrisville State College’s Renewable Energy Training Center. Responsible for administrative and programmatic management of the Renewable Energy Training Center, ensuring the fulfillment of its mission which includes training, outreach (K-12), and educational awareness of renewable energy as a career opportunity. Teaching responsibilities include the development and delivery of a new two-year curriculum and workforce development programs on alternative/renewable energy and the integration of renewable energy systems with agriculture and natural resources. Teaching includes delivery in traditional instruction, including hands-on, laboratory and in-field instruction, as well as distance-learning environment.

Assistant Professor. October 2007 – December 2015. Renewable energy faculty, dual appointment to Department of Environmental Science and Department of Agricultural Engineering, School of Agriculture and Natural Resources, Morrisville State College, Morrisville, New York. Responsible for renewable energy curriculum development and teaching (A.A.S. in Renewable Energy Technology and B.Tech in Renewable Energy). Responsible for development and management of renewable energy research programs. Renewable energy research and demonstration projects have included wood gasification for small- and commercial-scale combined heat and power, on-farm anaerobic digestion (monitoring and testing), on-campus small-batch biodiesel production for greenhouse heating and farm equipment, controlled environmental agriculture system integrating hydroponics, aquaculture, and algaculture, evaluation of algae and horse manure/bedding for biofuels.


Research Scientist (Post doctorate). January 2007 – October 2007. Willow Biomass and Bioenergy Program at SUNY-ESF (Research Foundation of SUNY), Syracuse, New York. Supervisor: Dr. Timothy A. Volk (315-470-6774). Responsible for designing, planning, and implementing field studies, including willow biomass crop planting density, duration of storage on viability of willow planting stock, timing of willow harvesting operations throughout the year, monitoring quality of harvested willow chips (storage), and yield trials for variety selection and screening. Additional responsibilities include: writing, compiling, and editing reports and grant proposals; hiring and coordinating logistics of field crews (10 students in 2007); monitoring and maintaining established...
willow plantings and studies on biomass/bioenergy, living snow fences, and phytoremediation (e.g., Solvay waste beds); providing support/monitoring for commercial willow bioenergy scale-up efforts; evaluating planting and harvesting machinery; developing and refining standard operating procedures for quality assurance; reorganizing and developing hard copy and electronic systems for study files, data management, and archiving; mentoring and providing computer, statistical, and technical support and training for students; and assisting with various education/outreach events and programs (e.g., Earth Day and field tours with high school students, SUNY-ESF willow booth at the New York Farm Show, Empire Farm Days, and New York State Fair).

**Research Scientist.** May 1999 – October 2007. Research Foundation of SUNY at SUNY-ESF, Syracuse, New York. Supervisor: Dr. Christopher A. Nowak (315-470-6575). Responsible for managing or co-managing more than 40 studies (field studies and experiments, literature reviews, annotated bibliographies, and field guides) including topics related to vegetation management on powerline rights-of-way (ROWs): shrub ecology, shrub management, shrub identification, vascular plant species diversity, stability of low-growing plant communities, short- and long-term impacts of herbicides on vegetation dynamics, efficacy and effectiveness of ROW treatments (mowing and herbicides); non-herbicide alternatives for vegetation management on roadside ROWs; and phytoremediation of brownfield sites using shrub willows.

Specific responsibilities also include the following: designing, planning, and implementing studies, from grant proposal to final reporting; promoting quality assurance through study and sampling design, crew training, data entry, and data management; organizing field crews, equipment, and vehicles; providing training and supervision of field crews of 4-12 people (over 60 in the past 8 years); mentoring students through individual and weekly team meetings and providing computer, statistical, and technical support and training; developing and conducting technical workshops for vegetation management professionals and students; presenting research results at technical and scientific meetings and conferences; managing and analyzing data; and preparing and formatting maps and graphics, status reports, final reports, annotated bibliographies, manuscripts, and two books (one published, one in preparation).


**Biological Science Technician.** May 1995 - August 1995. United States Department of Agriculture, Forest Service, Northeastern Research Station, Forestry Sciences Laboratory, Irvine, PA. Supervisors: Steve Steele and Dr. Susan L. Stout. Worked with a field crew conducting regeneration and herbaceous sampling for herbicide impact studies; trail maintenance; constructing and repairing deer fence; marking forest boundaries; and conducted sampling for delineating old growth: including overstory measurements, coarse woody debris tallies, increment boring, core mounting and age assessment.

**Research Aide.** May 1993 - May 1995 and September 1995 – Dec. 1995. Research Foundation, SUNY-ESF, Syracuse, New York. Supervisor: Dr. Lawrence P. Abrahamson. Worked on the U.S. Department of Energy research project “Willow for Bioenergy”. Responsible for leading field crews for harvest and planting; extensive computer work, including data entry and management; soil and foliage sampling, sample preparation and chemical analysis; equipment maintenance; stand fertilization; upkeep of an irrigation system; insect and disease surveys; survival surveys; pest control; and site preparation, including herbicide application and operating heavy equipment.

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**COURSES TAUGHT**

**College courses (taught and developed)**:

RENG 102 Online – Renewable Energy Resources, Spring 2017, MSC.
RENG 331 – Introduction to Solar Thermal Systems, Spring 2016, MSC.
AGEN 400 – Instructional Assistance Experience, Taught Fall 2014, Spring/Fall 2016.
*RENG 315 – Biomass Energy Resources II, Spring semesters 2013-2016, MSC.
*RENG 490 – Renewable Energy Internship, Fall 2012, Spring/Summer/Fall 2013-2016 MSC. Developed with Phil Hofmeyer.
*RENG 415 – Biomass Energy Conversions – Thermochemical, Spring semesters 2012-2015, Fall 2016, MSC.
*RREN 450 – Renewable Energy Internship Orientation, Spring semesters 2012-2016, MSC.
*RENG 410 – Biomass Energy Conversions – Biochemical, Fall semesters 2011-2013 MSC.
*RENG 225 – Tower Climbing and Rescue, Spring semesters 2011 (taught as SPPR), 2012-2016, MSC. Co-taught and developed with Phil Hofmeyer.
*RENG 310 – Biomass Energy Resources, Fall semesters 2010-2016, MSC.
*RENG 150 – Analysis Techniques for Renewable Energy, Spring semesters 2010-2016, MSC.
*RENG 103 – Renewable Energy Seminar, Fall semesters 2009-2016, Spring semesters 2010-2012, MSC.
*Special projects (SPPR): Fall 2008 (1 student @ 2 cr., and 1 student @ 1 cr.), Spring 2009 (1 student @ 1 cr.). Fall 2010 (1 student @ 3 cr., and 1 student @ 1 cr.), Spring 2011 (1 student @ 1 cr., and tower climbing-see RENG 225 above), Fall 2011 (1 student @ 1 cr.), Fall 2013 (1 student @ 1 cr.). MSC.
APM 391: Introduction to Probability and Statistics, 3 credit hour college course (150-180 students), lecture and lab/recitation, three graduate assistants, SUNY-ESF, Spring 1999 and Spring 2000.

Professional workshops/short courses taught (*while employed at MSC):
*“Introduction to Biodiesel” (half-day workshop, two sessions, for BOCES/HS Automotive teachers). June 16, 2014. Renewable Energy Training Center. Morrisville, NY.


**“Willow identification and management on New York State powerline corridors,” SUNY-ESF workshop (15 participants), July 9, 2008, sponsored by New York Power Authority, Camden, NY.**

“Transferring knowledge of shrub ecology and management to promote Integrated Vegetation Management on powerline corridors,” SUNY-ESF workshop (short course, 30 participants), SAF and ISA accredited, October 25-26, 2003, sponsored by US EPA Pesticide and Environmental Stewardship Program, the EPRI, and Niagara Mohawk, a National Grid Company. Co-taught with Chris Nowak, ESF faculty.


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**AWARDS AND HONORS**

SUNY Chancellor’s Award for Excellence in Faculty Service. Spring 2014.

Academic Hall of Fame inductee, Groton Central School. Spring 2014.

Albert L. Leaf Memorial Award recipient. SUNY-ESF. Fall 2003.

Graduate Student Representative to the Society of American Forester’s (SAF) Accreditation Committee. SUNY-ESF. Spring 1997.

Member of the Alpha Xi Sigma Honor Society, SUNY-ESF. Fall 1995.


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**PROFESSIONAL ASSOCIATIONS**

New York Bioenergy Association member since 2013.

Biomass Thermal Energy Council member since 2013.


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**SERVICE**


Hosted anaerobic digester tours: (average ~5/year, 2008-2014) per visitor requests from outside MSC, including students (and faculty) from SUNY-ESF, HCCC, RIT, SUNY Oswego, home school groups, and local high schools.


Invited: radio show guest, Green Local 175, promoting MSC/RETC. Spring 2012.


Academic/campus service:
Program review committee: Technology Management B. Tech. degree. Spring 2017
Search committee (ASBE faculty rep.): Morrisville State College President. Spring 2015.
Search committee: Environmental Science AQ Faculty, Spring 2015.
Tenure committee for Seth Carsten, Ag. Eng./Env. Science, MSC. Spring 2015.
Search committee: Agricultural Engineering Department ISA (Jarred Ford), MSC. Spring-Summer 2014.
Hosted/presented “Biomass Gasification and related thermochemical conversion processes,” lecture and campus tour of the CPC BioMax100/GEK gasifiers on March 5, 2014, for 30 SUNY-ESF students.
Hosted/presented “Biodiesel Overview” for MSC Auto Club 25 students and staff/faculty on February 18, 2014.
Anaerobic digester (SUNY 2020 Sustainability project) campus advisory committee member. Fall 2013-present.
Planning and implementation for 2013 MSC displays for NYS Fair, Empire Farm Days, Woodsman’s Field Days, National FFA Conference.
Lead faculty liaison for CPC BioMax gasification cogeneration system installation at Commons I. 2012-2014.
Search committee: Campus Grants Coordinator (Lisa Ianello), MSC. Spring 2013.
Tenure committee for Brendan Kelly, Environmental Science Department, MSC. Fall 2012.
College representative, Woodsman’s Field Days, Boonville, NY. August 2012.
Dairy Advisory Committee member, MSC. Spring 2012-present.
Search committee: Environmental Science Department Faculty (Rebecca Hargrave), MSC. Spring 2012.
Budget Information Group (B.I.G.) committee member, MSC (School of Ag. & Natural Resources representative). Fall 2012.
Faculty co-advisor, Renewable Energy Club, MSC. 2010-present (Club officially recognized by SGO Spring 2012).
Search committee: Ag. Engineering Department Faculty (Chip Ax), MSC. Summer 2009.
Tenure committee for Laurie Trotta, Environmental Science Department, MSC. Spring 2009
Search committee chair: Project Support Specialist, Renewable Energy Training Center, MSC. Spring-Summer 2009.
Search committee chair: Controlled Environmental Agriculture research scientist, School of Ag. And Natural Resources, MSC. Spring-Summer 2009.
Planning committee member for the 2nd Annual STS Symposium “Energy Alternatives,” April 2008, MSC.

College representative, Madison County Fair, Brookfield, NY. July 2009.

College representative, New York State Fair, Syracuse, NY. August 2008, 2009, 2010

**OTHER QUALIFICATIONS**

**Professional Development, Certificates and Training:**

- 2013 CERET Renewable Energy Train-the-Trainer Biofuels Academy, June 16-20, 2013, Golden, Colorado. (1 college credit, Colorado School of Mines)
- *Certified in Basic First Aid, Basic Life Support (adult/child/infant), and Adult CPR. Certificate#: AB355230-FA, AB355230-BLS, AB355230-ADL, issued 1/1/2014, valid through 1/1/2016.
- Solar Wood Drying Kiln Construction. June 14-18, 2010. RETC, Morrisville, NY. (5-day course, 30 PDH)
- Fortis wind energy training, Ithaca, NY. June 3 and July 9, 2010. (two 0.5 day personal training sessions for RETC staff)
- Fundamentals of Energy Transfer for Renewable Energy Systems. April, 20 2010. RETC and MVCC, Morrisville, NY. (0.5 day workshop, 3.5 PDH)
- Small Wind Energy Technician Training II: Site Assessment. April 1-2, 2010. RETC, Morrisville, NY. (2-day course, 13 PDH)
- Small Wind Energy Technician Training I: Safety. March 31, 2010. RETC, Morrisville, NY. (1-day course, 6.5 PDH)
- Southwest Wind Power Skystream Dealer and Service Training Program. March 22-26, 2010. RETC, Morrisville, NY. (5-day course)
- Small Wind Site Assessment and Proposals. February 5, 2010. RETC, Morrisville, NY. (1-day course, 6 PDH)
- Advanced Solar Thermal Design. October 23, 2009. RETC and MVCC, Utica, NY. (1-day course, 7 PDH)
- Solar Power as Renewable Energy - Photovoltaic Basic Installer Course. March 9-12, 2009. RETC and SUNY-ESF, Morrisville, New York. (NABCEP-approved, 4-day course)
- Herbicide Action Course. Purdue University. Fall 2000.
**RESEARCH STUDIES AND GRANTS**

*(Lifetime external support: $5,246,652; External support while at MSC*: $3,767,852)*


*Faculty Supervisor for “Bioenergy Research and Demonstration Plantings at Morrisville State College,” May-Sept 2014, supported by Research Foundation STEM Undergraduate Research Award—$5000.

*Co-Principal Investigator with Walid Shayya (MSC subcontract) for “Distributed On-Farm Bioenergy, Biofuels and Biochemicals (FarmBio³) Development and Production via Integrated Catalytic Thermolysis,” October 2012-September, 2015, supported by USDA-NIFA Biomass Research and Development Initiative (Funding Opportunity Number: USDA-NIFA-9008-003828; USDA-ARS award: $6,865,942)—$200,000 (MSC subcontract amount).

*Co-Principal Investigator with Chris Nowak (PI), SUNY ESF, and Phil Hofmeyer, (Co-PI), MSC, for “Right-of-Way Plant Community With/Without Attention to Controlling Invasive, Exotic Plants: A Long-Term Collaborative Research Project on the Cuyahoga Valley National Park,” Electric Power Research Institute. June 2013-present (expected 5 year duration).

*Principal Investigator for “Establishment of a Campus-Wide Biodiesel Cooperative and Addition of Methanol Recovery to Existing Campus Biodiesel Production Facilities,” January 2013-August, 2013, supported by SUNY Research Foundation Small Grant Sustainability Fund—$7500.

*Collaborator on “Carbon sequestration and gaseous emissions in perennial grass bioenergy cropping systems in the Northeastern US,” 2011-present, awarded to Cornell University, supported by NIFA, USDA (USDA/NIFA 2010-03869). $2500/year of funding is available for MSC student research aides assisting with field data collection.

*Principal Investigator for “Controlled Environmental Agriculture Greenhouse Lab and Test Center,” September 2010-June 30, 2012, supported by NYS Special Legislative Grant—$99,000.

*Partner on “Anaerobic Digestion Technology Training Programs,” 2009-2012, awarded to Cornell University, supported by New York State Energy Research and Development Authority (NYSERDA PON 1286).

*Program supervisor (and grant writer) for “Renewable Energy Training (TANF and WIA),” July 6, 2009 - August 13, 2009, as part of the Summer 2009 Temporary Assistance Needy Families (TANF) Youth Employment Program: Academic & Work Experiences, and Summer 2009 Workforce Investment Act Economic Stimulus for Youth Ages 14 - 24, Madison and Onondaga Counties—$64,143.

*Principal Investigator (MSC subcontract) for “Clean Tech Startup Institute”. May 2009-June 30, 2011, supported by the Kaufmann Foundation e-nitiative—$15,000 (MSC subcontract amount).

*Principal Investigator (in place of Dr. Shuhai Li) for “Controlled Environmental Agriculture and Energy Project,” May 1, 2009-April 30, 2012, supported by U.S. Department of Energy—$675,750.

*Principal Investigator for “Demonstration of an aquaponics controlled environment agriculture system for commercial production of locally grown fish and produce,” April 2009-June, 2012, supported by New York State Energy Research and Development Authority (Agreement#: 11112)—$400,000.


*Principal Investigator for “Morrisville State College Renewable Energy Training Center,” April 2008 – March 2011, supported by President’s Community Based Job Training Grant administered by the US DOL ETA (Grant #: CB-17331-08-60-A-36)—$1,999,639.

*Co-principal Investigator for “New York value-added vegetable and renewable fuel project at Morrisville State College,” awarded 2008, with Glenn Gaslin (Morrisville Auxiliary Corp.), supported by Empire State Development Corp—$250,000.

*Project Manager/Lead Scientist for “Production of on-farm lipid oil and meal supplement from algae,” July 1, 2007-December 31, 2008, with Principal Investigator Dr. Christopher Nyberg, supported by New York Farm Viability Institute, Eltrex Industries, and New York Center of Liquid Biofuels. [$176,706, of funding secured prior to Ben’s appointment; excluded from lifetime external support.]

Co-Principal Investigator for “A continued partnership for powerline vegetation management in New York: New York Power Authority and SUNY-ESF,” September 1, 2007-August 31, 2012, with Dr. Christopher A. Nowak, supported by the New York Power Authority—$250,000.
Co-Principal Investigator for “Designing, Developing, and Implementing a Living Snow Fence Program for New York State,” September 1, 2007-August 31, 2010, with Drs. T.A. Volk, L.P. Abrahamson, and L.B. Smart, supported by the New York State Department of Transportation—$280,254.

Co-Principal Investigator for “Partnerships for powerline vegetation management in New York,” January 1, 2005-December 31, 2007, with Dr. Christopher A. Nowak, supported by the New York Power Authority—$75,000.

Research Scientist for “Assessing New York State DOT’s alternatives to herbicides, Integrated Vegetation Management, and related research programs,” with Principal Investigator Dr. Christopher A. Nowak, November 2003—October 2004, supported by the New York State Department of Transportation—$91,398.

Co-Principal Investigator for “Partnerships for powerline vegetation management in New York,” December 1, 2002-November 31, 2007, with Dr. Christopher A. Nowak, supported by the New York Power Authority—$250,000.


Co-Principal Investigator for “Transferring knowledge of shrub ecology and management to promote Integrated Vegetation Management on powerline corridors,” with Dr. Christopher A. Nowak and Dr. Lawrence P. Abrahamson, August 1, 2002-December 31, 2003, supported by the Environmental Protection Agency and the Electric Power Research Institute—$39,885 from EPA, $10,013 from EPRI.

Project Manager of “BASF's support of investigation of Volney-Marcy Research Project,” January 1-December 31, 2002, supported by BASF Corporation—$5,000; and January 1-December 31, 2003, supported by BASF Corporation—$5,000.


Co-Principal Organizer of “Herbicide action course: The utility perspective,” with Dr. Christopher A. Nowak, Dr. Lawrence P. Abrahamson, and Horace Shaw, October 1, 2001-September 30, 2002, supported by Niagara Mohawk—$24,862.

Co-Principal Investigator of “Shrub community dynamics on a powerline corridor in Upstate New York” with Dr. Christopher A. Nowak, January 1, 2000-December 31, 2002, supported by the Electric Power Research Institute—$135,095.

Co-Principal Investigator of “A partnership for powerline vegetation management in New York: New York State Electric and Gas and SUNY-ESF,” with Dr. Christopher A. Nowak and Dr. Lawrence P. Abrahamson, June 1, 2001-May 31, 2004, supported by New York State Electric and Gas—$150,000.

Project Manager of “DuPont's support of investigation of Volney-Marcy Research Project,” January 31, 2001, supported by DuPont Crop Protection—$4,500, and $1,500 in 2004.

Project manager of “The Volney-Marcy electric transmission line vegetation management cycle: Third cycle treatments,” with Principal Investigators Dr. Christopher A. Nowak, Dr. Lawrence P. Abrahamson and Dr. Larry W. VanDuff, February 1, 1999-January 31, 2002, Niagara Mohawk Power Corporation—[$487,768 of funding secured prior to Ben’s appointment; excluded from lifetime external support].

**PUBLICATIONS**

(3 books, *6 refereed, **3 refereed proceedings, 33 non-refereed)


INVITED PAPERS/PRESENTATIONS

(Speaker)


*Ballard, B.D. 2014. Opportunities with the Latest Waste-to-Energy Technologies: understanding the fundamentals of thermochemical conversion. AU WMA’s “ENVIRO’14 – Pathways for better business,” in Adelaide, Australia, on September, 11-12, 2014.


**VOLUNTEERED PAPERS/PRESENTATIONS**

(**Speaker**)


Robert R. Cross III
256 North Street
West Winfield, NY 13491
Mobile: (315) 749-6964
Email: crossrr@morrisville.edu

Mastery of Subject Matter

Education
- M.A.T. in Agriculture Education, Cornell University, 2002
- B.T. in Agriculture, SUNY Cobleskill, 1995
- B.A. in English, SUNY Fredonia, 1993

Academic Rank
- Associate Professor, Morrisville State College, 2012-present
- Assistant Professor, Morrisville State College, 2002-2012

Professional Experience
- Mechanic/School Bus Driver, Cobleskill Richmondville Central School, 1995-1997
- Farmer, Cripplebush Creek Farms, 1983-present

Licenses
- New York State Commercial Driver’s License, Class B

Honorary Societies
- Phi Theta Kappa, SUNY Cobleskill, 1994

Awards
- Awarded as the Best Academic Advisor for the School of Agriculture and Natural Resources, 2010-2011
- Nominated by the Student Government Organization as Faculty/Staff Member of the Year, Morrisville State College, 2004-2005

Effectiveness in Teaching

Curriculum Development
- Assisted Chip Ax & Jared Ford in creating materials and a handbook for the DTEC 300 Diesel Equip Tech Internship 2 course, which provides students with a credit based internship opportunity, 2016
- Observed 4 interns in the role of faculty supervisor for the DTEC 300 summer internship course - 2016
- Developed and presented course materials and lab activities for the following classes
  - Equipment Care and Maintenance - AGEN 100, 2002 - present
  - Agricultural Equipment Operation - AGEN 102, 2003
  - Principles of Farm Machinery - AGEN 105, 2002 - present
  - Basic Hydraulics-AGEN 161, 2004-present
  - Powertrains I - DTEC 105, 2003 - present
  - Powertrains I - DTEC 110, 2003 – present
  - Diesel Electronics – DTEC 125, 2008-2009
- Facilitated Seminar Class
  - Agriculture Engineering Industry Overview - AGEN 115, 2002 - present
• Developed and presented a course proposal for Basic Hydraulics – 2004
  • The new course was created when the Agricultural Engineering department went from having one hydraulics class to splitting to a Basic Hydraulics class and an Advanced Hydraulics class. This decision was based on input from our Advisory Council and alumni.
• Developed a course proposal for an advanced powertrains class - 2003
  • The course was to be part of the proposed B.T. program in Diesel Technology.

**Academic advising**
• Provide and maintain sample study sheets and scheduling sheets that are utilized by the department, 2009-present
• Instruct all of the freshman enrolled in AGEN 100 about the academic scheduling process, 2009-present
• Formal academic advising for over 1/3 of the Agricultural Engineering (A.A.S.), Agricultural Mechanics (A.O.S.), Diesel Equipment Technology (A.A.S.) & Diesel Technology (A.O.S.) majors. Provided informal academic advising to many non-advisees who were not clear in what was expected of them, 2009-present

**Development of Teaching Aids or Techniques**
• Secured and moved to campus a transmission and wheel motor transmission stand that was donated by Milton Caterpillar. This unit will be an integral part of the new agricultural engineering building and future power transmission courses.
• Through the use of the computer based schematic drawing and simulation program (Automation Studio Version 5.1), developed teaching aids for Basic Hydraulics (AGEN 161), Diesel Powertrains I (DTEC 105) and Diesel Powertrains II (DTEC 110). The computer generated schematics furthered the student’s understanding of hydraulic and pneumatic systems which are important skills to have in order to be successful diagnosticians and technicians.
• Successfully applied for VATEA grant monies for the purchase of a skid steer loader and an agriculture tractor that are used as training aids in several of my classes as well as other departmental classes.
• Received CTEA grant funding for eight heavy truck transmissions including manual, automated manual and an electronic diagnostic training unit.

**Education Materials Developed**
• New lecture and laboratory activities were developed for AGEN 100, AGEN 105, AGEN 161, DTEC 105 & DTEC 110. New curricula include:
  • Worked with I.S.A. Jared Ford creating a multiple week laboratory in powershift transmission disassembly, inspection and reassembly was created for DTEC 110 students. This included the collection of transmissions, the creation of lecture materials and compiling technical materials for student use from a variety of sources. The laboratory included a student presentation.
  • Developed with the assistance of Jared Ford, a pressure testing lab for AGEN 161 focusing on pilot pressures based on a Takeuchi skidsteer loader.
  • Developed an electronic powershift transmission lab for DTEC 105 that developed understanding in the theory of operation, diagnostics, calibration and multiplexing as applied to a John Deere 7230R MFWD agriculture tractor.
• Developed a hydraulic flow testing lab with Jared Ford for AGEN 161 utilizing a pressure and flow compensated system.
• Worked with Chip Ax and Jared Ford to develop the DTEC 300 summer internship due to the primary instructor being out on sick leave.
• Facilitated AGEN 105 student field trip to Oxbo International in Byron, NY where the engineering, product development, manufacturing, sale and service of specialized vegetable harvesting equipment and forage merging machinery.
• Facilitated DTEC 110 student field trip to Utica General to perform heavy vehicle alignment, measurement and adjustment.

Scholarly Ability

Publications
• Presented a poster at the NACTA national conference at the University of Illinois at Urbana-Champaign, 2007 “Drawing ISO Hydraulic Schematics as an Effective Strategy for Students to Learn How to Become Proficient Diagnosticians.” The abstract was published in the June 2007 NACTA Journal.
• Wrote a proposal for a power trains textbook for Delmar Thomson Learning, 2005

Participation in Learned Societies
• Member of the New York State Association of Agriculture Educators (NYAAE), 2001 – 2002, 2003 – 2004 and 2006 - 2010
• Presented a workshop at the Professional Development Conference for Agricultural Educators (NYAAE), 2010
  • The workshop focused on developing an understanding of basic electrical concepts by constructing simple lighting circuits. Participants learned how to measure volts, amps and ohms using a multimeter on the circuits that were constructed. I constructed boards and developed a hands-on activity for all of the conference participants.
• Member of the North American Colleges and Teachers of Agriculture (NACTA). 2006 - 2008
• Member of the American Trucking Association’s Technology and Maintenance Council (TMC), 2007 - present

Effectiveness in University Service

Work with Student Organizations
• Chair of the Equipment Operation competition for the SkillsUSA regional event, 2014 - 2017
• Co-advisor of the Morrisville Collegiate FFA chapter, 2006 - 2013
• Helped with several fund raising activities in which the students made and sold cheese curds
• Chaperoned trip to the New York State FFA convention in Albion, NY and Canton, NY where Morrisville students provided entertainment prior to each of the convention’s sessions, 2007 - 2008
• Chaperoned trip to the National FFA convention in Indianapolis, IN, 2008 – 2010
• Students performed leadership activities, attended an agricultural career fair and all worked at the career fair which is one of the more popular events at National Convention.
• Co-advisor of Agricultural Engineering Club, 2002 - 2005
• Stall set up for the Equine Department’s annual auction, 2002 - present
• Helped with the installation of an underground feed from the power house to Crane Lodge, 2004
• Worked with students on the Agricultural Engineering float for the Mustang Weekend parade, 2006 - 2008
• Chaperoned field trip to the Cummins Engine Factory in Jamestown, NY and the Corning Glass Museum in Corning, NY, 2005

College and University Public Service
• Assisted Jared Ford at the Empire Farm Days FFA welding competition.
• Started to build a relationship with Cazenovia Equipment, a John Deere Dealership that serves central New York with several stores to provide recruitment and training opportunities.
• Worked at the Morrisville State College booth at the annual meeting of the New York State Agricultural Society in Syracuse, NY.
• Member of the College Judicial Board where I was a board member of over 10 hearings during this academic year.
• Represented the department at a variety of open houses, accepted student days, and department tours for high school groups and perspective students.
• Worked various times at the Morrisville booth at Empire Farm Days in Seneca Falls, NY, the New York State Winter Farm Show in Syracuse, NY and Farm Progress Days in Richfield Springs, NY.
• Instrumental in making Morrisville State College a training facility for Eaton Fuller/Road Ranger. The corporation is a major manufacturer of heavy truck driveline components including transmissions, rear axles, suspension and steering systems.
• Participated in overseeing the student’s work with Cooperative Extension’s 4H Machinery Operation class for high school students, 2002 - 2016
• Commencement liner upper, 2003 - 2004, 2006 - present
• Secured a donation from Walmart of a used yard spotter truck that will be utilized by the Diesel Technology students and Renewable Energy students, 2011
• Nominated a student, who received the SUNY Chancellor’s Award, 2005
• Participated in Cooperative Extension’s Agricultural Safety Day for Madison, Oneida and Chenango Counties, 2004

Faculty Committees
• Continued service as the Department Chair of the Agricultural Engineering Department,
• Elected as an ASBE member of the campus’s new continuing appointment process, 2017.
• Chairman of Steve Mooney’s Continuing Appointment committee. 2014-2015
• Chairman of Chip Ax’s Continuing Appointment committee, 2015-2017
• Began work with the department on planning the new Agricultural Engineering building.
• Was part of the multi-school discussions about what makes a general education class a general education class so a contingent of faculty members can maintain complete control of general education classes.
• Member of the campus wide Applied Learning Committee where we worked on applied learning definitions inside the structure of a SUNY framework. Worked to collect information from instructors in regards to their classes that should be considered Applied Learning classes, 2015-2017.
• Member of Cole Wimmer’s continuing appointment committee, 2015-2016
• Member of Ronald Alexander’s continuing appointment committee, 2015-2016
• Member of hiring committee for an instructor in the Dairy department, 2012, 2014, 2015
• Chair of hiring committee for an ISA for the Agricultural Engineering department, 2014
• Member of Judicial Board, 2006-present
• Member of search committee for the Admissions Director, 2011
• Member of search committee for an instructor in the Automotive department, 2011
• Chair of hiring committee for Agricultural Engineering department, 2010
• Member of search committee for an ISA for the Equine department, 2010
• Member of Faculty Congress, 2004 - 2008
• Member of ISA’s continuing appointment committee, 2008
• Member of the campus’s General Education Assessment Committee, 2003 - 2006
• Member of the search committee for three equine instructor positions in nutrition, reproduction and racing, 2006
• Member of Equine Professor’s tenure committee, 2006
• Member of ISA’s continuing appointment committee, 2005
• Member of search committee for an Instructional Support Assistant (ISA) for the Equine Department, 2003

Administrative Work
• Chair of the Agricultural Engineering Technology department, 2007-present
• Primary writer for the Agricultural Engineering department’s responses to the Academic Campus Prioritization Task Force process, 2014-2015

Community Service
• Set-up and judged the Transmission Section of the SkillsUSA Diesel Technology Vocational Competition in Syracuse, (timekeeper and scorekeeper since 2007). 2002-2015
• Created a station and judged at the FFA State Agricultural Engineering Competition
• Tri Valley Central School in Grahamsville, NY, 2009
• Canton Central School in Canton, NY, 2008
• Albion Central School in Albion, NY, 2007
• Member of the Agricultural Education Advisory Committee at Hamilton Central School, 2005 -2008
• Member of the Agriculture Education Secondary Assessment Committee, 2006-2007
• Helped collect items and food left behind by Colgate students for the Don’t Throw it Away Colgate salvage project, 2005-2007
• Judged the Prepared Speaking Contest at the FFA Substate Competition at Hamilton High School, 2007
• Volunteered at the 2007 HomeRun 5K and half marathon for Habitat for Humanity, Hamilton, NY, 2007
• Member of the Postsecondary Agricultural Education Professional Development Committee, 2005 - 2006
• Judged the Senior Extemporaneous Speaking Contest at the FFA Substate Competition at Madison-Bouckville Central School, 2006
• Judged at the FFA State Agricultural Engineering Competition at VVS Central School in Verona, NY, 2006
• Organized two stops at Morrisville State College viewing the dairy and equine areas for a community exploration tour of the area for first year Colgate students, 2006
• Volunteered with the course set up for the 2006 HomeRun 5K for Habitat for Humanity, Hamilton, NY, 2006
• Attended the FFA State Convention in Lowville, NY representing Morrisville State College, 2005
• Spoke at Stockbridge Valley High School on agricultural safety, 2005
• Helped with the 2005 5K Run and Walk for Project Nicole’s Home, Hamilton, NY. (Benefit for a Diesel Technology student’s sister), 2005

Continuing Growth
Industry Training Courses
• Completed Komatsu technician training on articulated off-road dump trucks, 2013
• Completed the following Road Ranger heavy duty truck training certifications:
  • Heavy Duty Hybrid Truck Class, 2010
  • Autoshift & Ultrashift Generation III Transmission, 2009
  • Performance Series Transmission and Heavy Duty Drive Axle Class, 2007
  • Vehicle Vibration Service Training, 2007
  • Autoshift Generation II Transmission, 2003
  • FR Series 10 Speed Transmission Service, 2003
  • RTLO 13/18 Speed Transmission Service, 2003
  • FS Series Transmission Service, 2003
• Completed the following Milton Caterpillar service schools:
  • Challenger Agriculture Tractor MT 400, 500 and 600 Series, 2006
  • Graphic Fluid Power Symbols, 2004
  • Electro-Hydraulic Controls, 2005
  • Electronic Technician (ET) Review and Update, 2005
  • Basic Power Train, 2005
  • Basic Hydraulics, 2004
• Completed three credit Statics course (MECH 211) at Morrisville State College, 2004

Seminars and Lectures
• Attended Accepted Student Days training session, 2016
• Attended Morrisville State College Professional Development sessions: August 2015 & January 2016
• Participated in a John Deere technician planter clinic on Max Emerge 5 planters, 2016
• Participated in Eaton RoadRanger technician training for automated manual transmissions, diagnostic software and multiplexing. 2015
• Participating in Class 15 of Lead NY, 2013-2015
• Attended Milton Caterpillar’s Vocational-Technology Instructors Seminar; Milton Caterpillar; Milford, MA, 2006
• Attended Milton Caterpillar’s Vocational-Technology Instructors Seminar at New Hampshire Community College-Berlin, Berlin, NH, 2004
• Attended the following New York State Association of Agriculture Educators (NYAAE) conferences.
  • Oswegatchie, 2010
  • Oswegatchie, 2009
  • Canandaigua, 2008
  • Cobleskill, 2004
  • Lake Placid, 2002
• Attended American Trucking Association’s Technology and Maintenance Council’s (TMC) SuperTech Convention in Nashville, TN, February 2013
• Attended American Trucking Association’s Technology and Maintenance Council’s (TMC) Convention in Tampa, FL, February 2012
• Attended American Trucking Association’s Technology and Maintenance Council’s (TMC) SuperTech Convention in Raleigh, NC, September 2009, September 2010 and September 2011
• Attended American Trucking Association’s Technology and Maintenance Council’s (TMC) Convention in Orlando, FL, February 2010
• Attended American Trucking Association’s Technology and Maintenance Council’s (TMC) Convention in Orlando, FL, February 2008 & February 2009
• Attended American Trucking Association’s Technology and Maintenance Council’s (TMC) SuperTech Convention in Nashville, TN, September 2007 & September 2008
• TMC Heavy Truck Trailer Suspension Maintenance Training Class
• TMC Basic Electrical/Electronics Class

Editorial Service
• Edited “Diesel Engine Technology for Automotive Technicians” for Pearson Education, 2009
• Edited “Brakes, Steering and Suspension, and Hydraulics Job Sheets” by Dale McPherson. Publication is part of Delmar Thomson Learning’s Modern Diesel Technology series, 2006
Jared T. Ford
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Clinton, NY 13323
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Jaredford17@gmail.com

OBJECTIVE
Obtain a position as an Instructional Support Assistant in the Agricultural Engineering Department at Morrisville State College

EDUCATION
State University of New York at Cobleskill, Cobleskill, NY
Agricultural Equipment Technology May 2009
GPA: 3.74
Morrising State College, Morrisville, NY
Agricultural Engineering May 2007
GPA: 3.15

RELEVENT COURSES

EXPERIENCE
Morrising State College
Instructional Support Assistant, August 2014 – present
- Instructor of DTEC 105 Powertrains I, DTEC 150 Diesel Systems, AGEN 131 Fundamentals of Hydraulics, and AGEN 270 Tractor Overhaul and Repair laboratory sections
- Assistance in coordinating events such as FFA Ag Mechanics State competition, FFA Welding Competition at the Empire Farm Days Show, Skills USA reginal and state level competitions
- Interdepartmental cooperation with Natural Resources, Dairy, Horticulture, Renewable Resources, Automotive to use college equipment as training aids and maintaining equipment to meet safe operating conditions
- General maintenance of lab equipment as needed and set up of multiple lab activities
- Participation in local Cornell Cooperative Extension production of annual Crop Congress presentation focusing on sprayer maintenance, repair and calibration
- Involvement in organizing agreements with local dealerships to bring in equipment for use in laboratory activities and creating and obtaining material for educational experiences, i.e.: John Deere IVT, Takeuchi Track Loader, Case IH Big Square Baler
- Continuing Education in Komatsu D Series Bull Dozer service training and Eaton RoadRanger AutoShift transmission training

Adjunct Instructor, January 2012 – August 2014
- Instructor of DTEC 150 Diesel Systems, AGEN 270 Tractor Overhaul and Repair and DTEC 105 Diesel Powertrains I
- Experience in setting up laboratory activities and instructing laboratory sections
- Ability to work with students individually and in groups

Empire Tractor, Inc., Cazenovia, NY
Service Technician, May 25, 2009 - present
- Perform service and repair work for customer’s agricultural equipment
- Specialize in planters, tillage equipment, and forage harvesting equipment including balers, choppers, and mowers
Set up new equipment and adjust them to be ready for service once they leave the dealership
Completed and passed service schools for Case IH Maxxum series tractors, Kinze planters, and Great Plains twin-row planter monitors and other relevant courses
Involvement in all aspects of the service department at Empire Tractor

Kuhn North America, Vernon, NY
- Performed equipment operation, testing, and analysis to use in writing test reports
- Composed research projects to be used by other departments in the company for supplementary information and analysis
- Assisted other Product Support Representatives with Kuhn machinery set-up, assembly, and repair of various implements
- Spent time in the Sales and Parts Department and gained experience working in those areas of the company
- Assisted in set-up and worked two farm shows gaining experience with customer interaction

Ferris Industries, Munnsville, NY
Engineering Intern, February 2006 to June 2006
- Performed product testing under supervision of engineering staff
- Assembled prototypes and fabricated components using engineering drawing
- Used CAD systems for developing drawings

Skyline Hill Farm, Clinton, NY
Farm Hand, May 1998 to present
- Aided father and brother in all aspects of dairy farm operations
- Assisted in feeding and milking the entire herd
- Operated, maintained, and repaired as needed tillage, planting, cultivating, as well as, forage and grain harvesting equipment

ACTIVITIES
Agricultural Engineering Club at Morrisville State College
Secretary, Fall 2005 to Spring 2007
Postsecondary Agricultural Students (PAS) at SUNY Cobleskill

RELATED SKILLS
Experience with computer programs including Microsoft Word, Microsoft Excel, Microsoft PowerPoint, and Metal Works Solid

HONORS
Phi Theta Kappa Honor Society Fall 2006 to Spring 2007
Morrisville State College Presidential Scholarship
Dean’s list every semester at Morrisville State College
SUNY Cobleskill Transfer Student Scholarship

References available upon request
CURRICULUM VITAE

Philip V. Hofmeyer
Morrisville State College
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104 Shannon Hall
Morrisville, NY 13408
315-684-6515
E-mail: hofmeypv@morrisville.edu

Educational Background
Doctor of Philosophy, University of Maine, 2008, Forest Resources.
Dissertation: Ecology and Silviculture of *Thuja occidentalis* L.

Master of Science, State University of New York College of Environmental Science and Forestry, 2004

Bachelor of Science, State University of New York College of Environmental Science and Forestry, 2001


Professional Experience
2011 – present: Assistant Professor of Renewable Energy, Morrisville State College
2008 – present: Instructor, Morrisville State College’s Renewable Energy Training Center
2006 – 2008: Graduate Research Assistant, University of Maine, School of Forest Resources, Orono, Maine.
2004-2006: Graduate Teaching Assistant (Forest Vegetation, Timber Harvesting, Photogrammetry and Remote Sensing, Field Practice in Forest Management), University of Maine, School of Forest Resources, Orono, Maine.
2003: Graduate Teaching Assistant (Introduction to Forest Soils), State University of New York College of Environmental Science and Forestry, Syracuse, New York.
2003: Research Aide, State University of New York College of Environmental Science and Forestry, Syracuse New York.

Courses Instructed (Morrisville State College)
1. Electrical Theory for Renewable Energy (RENG 101, 4 credits)
2. Renewable Energy Resources (RENG 102), including RENG 102 online (3 credits)
3. Renewable Energy Seminar (RENG 103, 1 credit)
4. Introduction to Small Wind Systems (RENG 221, 3 credits)
5. Introduction to Solar Photovoltaics (RENG 231, 3 credits, NABCEP-approved)
6. Tower Climbing and Rescue (RENG 225, 2 credits)
7. Wind and Hydro Energy Systems (RENG 320, 3 credits)
8. Introduction to Micro Hydroelectricity (RENG 321, 3 credits)
10. Introduction to Solar Thermal Systems (RENG 331, 3 credits, NABCEP-approved)
11. Renewable Energy Systems (RENG 305, 3 credits)
12. Residential Wind Systems (RENG 420, 3 credits)
14. Systems Integration (RENG 460, 1 credit)
15. Instructional Assistance Experience (AGNR 400, variable 1 to 4 credits)

**Courses Developed (Morrisville State College)**
1. Electrical Theory for Renewable Energy (RENG 101, 4 credits)
2. Renewable Energy Resources online (RENG 102LN, 3 credits)
3. Introduction to Small Wind Systems (RENG 221, 3 credits)
4. Introduction to Solar Photovoltaics (RENG 231, 3 credits)
5. Tower Climbing and Rescue (RENG 225, 2 credits)
6. Wind and Hydro Energy Systems (RENG 320, 3 credits)
7. Introduction to Micro Hydroelectricity (RENG 321, 3 credits)
8. Solar and Geothermal Energy Systems (RENG 330, 3 credits)
9. Introduction to Solar Thermal Systems (RENG 331, 3 credits)
10. Residential Wind Systems (RENG 420, 3 credits)
11. Solar Photovoltaic Systems (RENG 430, 3 credits)
12. Systems Integration (RENG 460, 1 credit)

**Student and University Service**
3. Tenure review committee member for Charles “Chip” Ax. Fall 2015.
4. Professional Development Committee member. Fall 2013 – present.
5. SUNY 20/20 Anaerobic Methane Digester Steering Committee member. Fall 2013 - present.
11. Middle States Self-Study committee member. Spring-Fall 2010.

**Publications (peer reviewed, conference proceedings, and theses)**
3. Nowak, C.A., B.D. Ballard, and P.V. Hofmeyer. 2014. Plant community development on electric transmission line rights-of-way with/without attention to controlling invasive, exotic plants: A long-


Funded Grants (principal or co-principal investigator only)


2. Research Foundation STEM grant - Sustainability of micro hydroelectricity in residential grid-interactive systems: A study of ecological, economical, and social factors. Fall 2013. $5,000 award.


6. Herkimer-Madison-Oneida Consortium 13N Environmental & Energy Grant. 2010. Madison County Micro Hydroelectric Project. $1,000 Award.

Professional Workshops Instructed
12. SUNY IT Air Breeze wind turbine installation. April 19, 2014. Installation as part of IITG grant. Utica, NY.
Presentations

Invited presentations


Offered presentations

Poster Presentations

Professional Development
2. Certified in Basic First Aid, Basic Life Support (adult/child/infant), and Adult CPR.

External Committees
2. Cornell Cooperative Extension of Madison County President (2015-present)
3. Cornell Cooperative Extension of Madison County Vice President (2013-2014)
4. Cornell Cooperative Extension of Madison County advisory board member (2011-2012)
5. Solarize Madison selection committee (2012 and 2013)
6. Central NY Regional Sustainability Plan Expert Advisory Committee member (2012)
7. Madison County Committee on Energy board member (2011-present)

Honors and Awards
1. SUNY Chancellor’s Award for Excellence in Teaching, Morrisville State College, 2015.
2. George F. Dow, Fred Griffiee, and Norris C. Clements Graduate Student Award, University of Maine, Maine Agriculture and Forest Experiment Station, 2007.
3. Ralph H. Griffin Memorial Scholarship, University of Maine, School of Forest Resources, 2006.

Professional Associations
1. American Solar Energy Society member since 2008
2. American Wind Energy Association member since 2008
3. Forest Guild member since 2007
4. Society of American Foresters member since 2000
CURRICULUM VITA

Walid H. Shayya, Ph.D.

CONTACT INFORMATION

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Web: people.morrisville.edu/~shayyaw/

EDUCATION

Ph.D. in Agricultural Engineering, Michigan State University, 1991
M.Sc. in Irrigation, American University of Beirut, 1986
Diploma of Ingenieur Agricole (Agricultural Engineering), American University of Beirut, 1984
B.Sc. in Agriculture, American University of Beirut, 1984

PROFESSIONAL EXPERIENCE

Professor, Department of Agricultural Engineering (Joint Appointment in the Departments of Agricultural Sciences and Environmental Sciences), State University of New York College of Agriculture and Technology at Morrisville (Morrisville State College), August 2007 - present

Responsible for teaching and program development in natural resources engineering, conducting applied research in related areas including geospatial technology and animal waste management, and advising the Bachelor of Technology students in Renewable Resources. Major activities focus on geospatial technologies, precision agriculture, surveying, and animal waste management.

Associate Professor, Department of Agricultural Engineering (with a Joint Appointment in the Departments of Agricultural Sciences and Environmental Sciences), Morrisville State College, August 2000 - August 2007

Responsible for teaching and program development in natural resources engineering, conducting applied research in related areas including animal waste
management, and advising the Bachelor of Technology students in Renewable Resources. Major activities focus on geographic information systems (GIS), global positioning systems (GPS), precision farming, surveying, soil and water conservation, water supply and sanitation, agricultural statistics, photogrammetric mapping, and animal waste management.

Head, Department of Bioresource and Agricultural Engineering, Sultan Qaboos University (SQU), June 1999 - August 2000 (Interim Head: August 1998 - June 1999)

Responsible for leading the overall programs of the Department in teaching, research, and service. Also, responsible for recommending the hiring, promotion, and termination of staff; planning and budgeting for facilities and equipment; and directing and overseeing the work of seven academic, seven technical, and one support staff. Other administrative activities included chairing the Department's Board and other standing and ad-hoc committees, and representing the Department on several committees within the College of Agriculture at SQU.

Associate Professor, Department of Bioresource and Agricultural Engineering, Sultan Qaboos University, March 1998 - August 2000

Responsible for research and teaching in bioresource and agricultural engineering. Research activities focused on geographic information systems (GIS), crop water requirements, water management, irrigation system design and management, soil and water conservation, and numerical modeling in natural resources engineering. Teaching activities focused on undergraduate and graduate courses in soil and water engineering, watershed hydrology, hydraulics of pipe networks, numerical analysis, and engineering mechanics. Other academic activities included advising undergraduate and graduate students as well as supervising students' special and design projects and M.Sc. theses.


Responsible for administrative duties related to degree programs, registration, student advising, orientation programs, course evaluations, maintenance of student records, and assignment of students to majors within the College of Agriculture with approximately 450 full-time undergraduate students. The students were enrolled in ten degree programs offered by seven academic departments leading to B.Sc. degrees in agronomy and horticulture, animal science, bioresource and agricultural engineering, entomology and plant pathology, fisheries science, fisheries technology, food science, nutrition and dietetics, soil and water management, and water technology. Acted as a liaison regarding academic and timetabling matters with the University Administration, Deanship of Admissions and Registration, Language Center, and other Colleges on campus. Represented the College on several University-wide committees. Served on several committees within the College such as the Executive Committee, College Board, Resident Instruction
Committee, Graduate Studies Committee, and Student Recruitment Committee. Coordinated efforts within the College on advertising academic programs through expositions, brochures, and taped presentations. Served, on occasion, as the Acting Dean of the College of Agriculture.

Assistant Professor, Department of Bioresource and Agricultural Engineering, Sultan Qaboos University, September 1994 - March 1998

Responsible for research and teaching in bioresource and agricultural engineering. Research activities focused on irrigation system design and management, irrigation scheduling, soil and water conservation, and water management. Teaching activities focused on undergraduate-level courses in soil and water engineering, microcomputer applications in agriculture, and engineering mechanics. Other academic activities included advising final year students, supervising students' special projects, developing new undergraduate and graduate programs in bioresource and agricultural engineering, and supervising technicians.

Adjunct Assistant Professor, Department of Agricultural Engineering, Michigan State University, August 1994 - September 1996

Responsible for providing technical support on several computer models developed in the Department of Agricultural Engineering. Additional responsibilities included joint research projects with the faculty in the Department. Further responsibilities included updating computer software and serving on advisory committees of graduate students.

Visiting Assistant Professor, Department of Agricultural Engineering, Michigan State University, December 1991 - July 1994

Responsible for research in animal waste management, composting system design, irrigation water management, nitrogen scheduling, and subirrigation system design. Research activities included developing computer models for overland application of animal manure and composting system design and planning. Other responsibilities included updating and supporting the users of SCS-Scheduler (an irrigation scheduling package for microcomputers) and SI-DESIGN (a computer package for the analysis of subsurface drainage and subirrigation systems).

Research Assistant, Department of Agricultural Engineering, Michigan State University, December 1986 - December 1991

Responsible for research and teaching in soil and water engineering. Research activities included developing two software packages: an irrigation scheduling package for microcomputers (SCS-Scheduler) and a computer model to assist with the design of subsurface drainage and subirrigation systems (SI-Design). Additional responsibilities included conducting training sessions and providing technical support for using the SCS-Scheduler. Other academic activities included the development of several computer models in soil and water engineering and...
teaching an undergraduate course on irrigation, drainage, and erosion control systems.

Research Assistant, Department of Soils, Irrigation, and Mechanization, American University of Beirut, September 1984 - August 1986

Research responsibilities included the development of a computer model for the simulation of groundwater aquifers in Lebanon. Additional responsibilities included the collection of field data for the verification and validation of the developed computer model.

SERVICE AND ADMINISTRATIVE ACTIVITIES

Morrisville State College (MSC):

Academic Prioritization Taskforce (Chair: August 2014 to June 2015): Taskforce evaluated the 84 academic program/areas at MSC and produced a final report that was shared with the college administration and community.

College Promotion Committee (Chair: August 2009 to May 2010, Member: August 2007 to May 2009): Representative of the School of Agriculture and Natural Resources on this standing subcommittee of Faculty Congress.

College Committee on Academic Affairs (Member - September 2001 to May 2003): Representative of the School of Agriculture and Natural Resources on this standing subcommittee of Faculty Congress.

College Committee on Faculty/Staff Handbook (Member - 2000-2001 academic year): Representative of the School of Agriculture and Natural Resources on this ad-hoc subcommittee of Faculty Congress.

College Committee on General Education Assessment (Member - September 2001 to May 2003): Representative of the School of Agriculture and Natural Resources on this standing subcommittee of Faculty Congress.

College Diversity Speakers/Activities Review Board (Member - September 2002 to May 2010): Board is responsible for reviewing proposals and activities on diversity initiatives for consideration by Dr. Sheila Crump-Johnson Institute at MSC.

College Institutional Review Board (Voting member - December 2002 to May 2011): Board responsible for reviewing proposals to assure the safety, privacy, and confidentiality of human subjects in research conducted at MSC.

College Research Support Committee (Member - September 2001 to May 2003): Committee appointed by the President to assist the College in research efforts
done by students and professionals and to publicize and promote the on-going research efforts by the campus.

School of Agriculture and Natural Resources Computer Planning and Management Committee (September 2000 to May 2009): Served as a member of this Committee.

Search Committees: Served as the chair of the search committee for the renewable energy faculty position in the School of Agriculture and Natural Resources (ANR). Also, served as a member of numerous search committees, including the Executive Director of Institutional Advancement position; the Agricultural Engineering/Diesel Technology faculty position; non-tenure track renewable energy faculty and technician positions under a Research Foundation Grant; an entrepreneurship and technology management faculty positions, School of Business and Hospitality; two renewable resources faculty positions, School of ANR; Provost and Vice President for Academic Affairs (three different searches); the chair, an academic staff, and an instructional support associate in the Department of Equine Sciences, School of ANR; an academic staff position in the Department of Agricultural Engineering, School of ANR; and a Development Associate, Office of the Vice President for Institutional Advancement & Development.

Continuing Appointment Committees: Served as a member of (or chaired) numerous continuing appointment (tenure) committees for faculty in the School of Agriculture and Natural Resources, the School of Business and Hospitality, and the School of Liberal Arts.

Plastics Technology Academic Program Review (Fall 2003): Served on the evaluation panel of the Plastics Technology A.A.S. program offered within the Department of Mechanical Technology in the School of Science and Technology (academic program reviews are conducted every five-years).

Sultan Qaboos University (SQU):

Advisory Board, *Journal of Agricultural and Marine Sciences* (Member from August 2000 to present).

SQU Academic Publications Governing Board (September 1999 to August 2000): Served as a member of this Board which was responsible for supervising academic publications at SQU including the following three refereed journals: *Agricultural Sciences, Science and Technology, and Medical Sciences*.

SQU Remote Sensing and GIS Center (College Representative - November 1999 to August 2000): Represented the College of Agriculture on the committee overseeing this Center which is a University central-facility charged with coordinating research activities, providing training courses, and overseeing the teaching of courses in remote sensing and geographic information systems (GIS)
within the University. The Center was also charged with promoting collaboration with private and public institutions outside the University.

University Committee on Academic Policies (Member - September 1995 to August 2000): Represented the College of Agriculture on this standing subcommittee of the University's Academic Council that acts on all academic matters and regulations referred to it by the University's governing body. One of the key activities of the committee involved the development of rules and regulations that govern the graduate programs offered at SQU as well as reviewing academic regulations that govern all undergraduate programs.

University Advising and Counseling Committee (January 1996 to September 1998): Represented the College of Agriculture on this ad-hoc committee. The committee was formed in 1996 to analyze the existing system of academic advising at SQU and assess its shortcomings. The committee developed faculty and student handbooks for academic advising and prepared a proposal for establishing a counseling center at SQU. The Counseling and Guidance Center was inaugurated in 1999.

University Committee on Course and Instructor Evaluations (Member from September 1996 to September 1998): A course and teaching survey was developed by this ad-hoc committee. The survey was administered by all academic units on campus starting from the 1996 Fall semester.

University Committee on Timetabling (September 1995 to June 1999): Represented the College of Agriculture on this standing committee that deals with timetabling issues of courses and teaching schedules for faculty at SQU.

University Prospectus Committee (September 1996 to September 1998): Represented the College of Agriculture on this ad-hoc committee that developed the University Prospectus and University Catalogue with the first issue being published in 1997.

University Committee on Grading Issues: Represented the College of Agriculture on this ad-hoc committee. The committee was formed during the 1996 Fall semester to address the grade reporting issues at SQU and develop uniform guidelines. A general procedure for reporting grades to the Deanship of Admissions and Registration was developed and implemented by all colleges and centers.

College of Agriculture Board (September 1995 to August 2000): Served as a member of the College Board which is responsible for major policy issues regarding academic and training matters.

College of Agriculture Executive Committee (June 1996 to August 2000): Served as a member of the Executive Committee which is responsible for addressing administrative issues in the College. Members of the Executive Committee
include the Dean, Assistant Deans, Heads of Departments, Director of the Agricultural Experiment Station, and Director of Administration.

Editor-in-Chief, *SQU Journal for Scientific Research - Agricultural Sciences* (June 1999 to August 2000): *Agricultural Sciences* is a peer-reviewed journal that publishes basic and applied research articles in the fields of agricultural, food, and marine sciences.


Editorial Board of the *SQU Journal for Scientific Research - Agricultural Sciences* (Member from May 1995 to August 1998): Was instrumental in the startup of the journal, the development of "Guidelines to Authors," and the publication of the first issue in May 1996.

College of Agriculture Graduate Studies Committee (September 1996 to August 2000): Served as a member of this committee that has the responsibilities of reviewing the implementation of academic rules and regulations of the graduate programs (eight M.Sc. programs) within the College of Agriculture, assessing the qualifications of faculty for membership in graduate faculty, reviewing qualifications of thesis committee members, and reviewing the suitability of students for graduate studies.

College of Agriculture Extension Committee (September 1999 to August 2000): Served as a member of this committee that has the overall responsibilities of monitoring, assessing, and coordinating the extension activities within the College and their impacts on the agricultural and fisheries communities. The committee was also charged with the responsibility of liaising with the public and private sectors in the area of agribusiness extension.

College of Agriculture Resident Instruction Committee (Member: September 1995 to June 1996, Chair: June 1996 to June 1999): This standing committee was responsible for evaluating the standard and relevancy of all undergraduate curricula in the College. Also, the committee was delegated the responsibility of preparing academic policies and procedures for the College, organizing teaching and advising workshops, and dealing with academic matters referred by the Dean and College Board.

College of Agriculture Student Recruitment Committee (December 1997 to September 1998): Chaired this committee that was charged with recruiting students to join the ten undergraduate programs within the College of Agriculture. The committee’s mandate was to bolster student numbers through visits to secondary schools and media campaigns.

College of Agriculture Computer Planning and Management Committee (September 1994 to September 1996): Chaired this committee that was responsible for
evaluating the computer needs of the College and the acquisition, distribution, and support of computer hardware and software. Was also responsible for supervising the computer laboratories in the College, the coordination of the College’s computer course, and liaising with the Computer Center on computer and network matters.

College of Agriculture Evaluation Officer (September 1996 to June 1999): Served as the evaluation officer for the College of Agriculture with the primary responsibility of coordinating course and teacher evaluation surveys developed by the University (was also responsible for conducting the analysis of the completed surveys within the College during the 1998 Fall and 1999 Spring semesters).

Search Committees: Chaired search committees in the College of Agriculture for the positions of Food/Power & Machinery Engineer, Food Engineer, Soil and Water Engineer, and Head in the Department of Bioresource and Agricultural Engineering; Food Microbiologist and Food Chemist in the Department of Food Science and Nutrition; Assistant Dean for Extension in the College of Agriculture; and several support and technical staff. Also, served as a member of numerous search committees for faculty and staff positions.

CURRENT PROFESSIONAL SOCIETIES

American Society of Agricultural and Biological Engineers, Member - Engineer

HONORARY SOCIETIES AND AWARDS

Morrisville State College Distinguished Faculty Award, 2016
MSC Faculty/Staff Philanthropy Award, SUNY Morrisville State College, 2008
State University of New York Chancellor's Award for Excellence in Teaching, 2007
College Technology Educator of the Year, the Technology Alliance of Central New York (TACNY), 2005
Teaching Award of Merit, National Association of Colleges and Teachers of Agriculture, 2003
Teaching Award of Merit, National Association of Colleges and Teachers of Agriculture, 2001
Distinguished Service Award, College of Agriculture, Sultan Qaboos University, 1999

Outstanding Graduate Student Award, Department of Agricultural Engineering, College of Engineering, Michigan State University, 1991

Graduate Student Award, Sigma Xi, Michigan State University, 1991

Alpha Epsilon, The Honor Society of Agricultural Engineering, 1991

Phi Beta Delta, The Honor Society for International Scholars, 1989

Gamma Sigma Delta, The Honor Society of Agriculture, 1988

The Honor Society of Phi Kappa Phi, 1988

Graduate Scholarship, United States Agency for International Development, 1984-1986

Dean’s Honor List, Faculty of Agricultural and Food Sciences, American University of Beirut, 1984

PROGRAM INTERESTS

Geospatial Technology Applications in Agriculture and Natural Resources

Precision Agriculture

Renewable Energy Systems

Surveying

Animal Waste Management and Composting

Irrigation System Design and Management

Irrigation Water Management and Scheduling

Numerical Modeling and Analysis

EDUCATIONAL MATERIAL DEVELOPMENT

Course Development at MSC:

AGEN 151 – Applied Hydraulics for Hydropower Generation (originally offered as a 2-credit course and recently revised to become a 3-credit course). Course offered for students in the Renewable Resources curricula.
AGSC 132 – Introduction to Computer Applications in Precision Farming (2 credits). Course required by several majors in the School of Agriculture, Sustainability, Business, and Entrepreneurship (ASBE).

AGSC 137 – Analysis and Interpretation of Agricultural Data (2 credits). Course required by several majors in the School of ASBE.

NATR 213 – Basics of Geospatial Technology (1 credit). Course required by several majors in the Environmental Sciences Department.

NATR 216 – Basics of Geospatial Analysis (1 credit).

RREN 303 – Fundamentals of GPS/GIS (3 credits). The course was revised in 2014 to become 4 credits with the following title: Fundamentals of Geospatial Systems. Course required in the Renewable Resources Technology program.

RREN 420 – Applications of Geospatial Systems I (1 credit). Course required in the Renewable Resources Technology program (co-developed with W. Snyder and B. Kelly).

RREN 421 – Applications of Geospatial Systems II (2 credits). Course required in the Renewable Resources Technology program (co-developed with W. Snyder and B. Kelly).

Course Development at Sultan Qaboos University (SQU):


BIOR 3004 – Agricultural Watershed Hydrology (3 credits). A junior-level course offered in the BAE Department.

BIOR 4004 – Design of Irrigation Systems (3 credits). A senior-level course offered in the BAE Department.

BIOR 6004 – Design Concepts and Computer Applications in Irrigation Engineering (3 credits). A graduate-level course offered in the BAE Department.

BIOR 6005 – Hydraulics of Pipe Networks (3 credits). A graduate-level course offered in the BAE Department.

Developed Course Manuals at MSC:


QGIS Desktop Training Manual. 2015 and 2016. (manual was used to conduct 2-day GIS training based on QGIS).


TEACHING EXPERIENCE

Morrisville State College:

Water Supply and Sanitation, AGEN 120 (2 credits): Course offered annually (Spring 2002 to Spring 2010) in the Agricultural Engineering Department (at least one hour lecture section and two 2-hour laboratory sections were usually offered).

Construction Surveying, AGEN 135 (3 credits): Course offered annually (Fall 2001 to Fall 2016) in the Agricultural Engineering Department (one 2-hour lecture section and two 3-hour laboratory sections were usually offered each fall).
Applied Hydraulics for Hydropower Generation, **AGEN 151** (3 credits): Course offered annually (Spring 2010 to Spring 2016) in the Agricultural Engineering Department (one 2-hour lecture section and one 2-hour laboratory section were usually offered each spring).

Soil and Water Conservation, **AGRO 105** (2 credits): Course offered annually (Spring 2001 to Spring 2003) in the Department of Agricultural Science, Business, and Dairy (one 1-hour lecture section and one 2-hour laboratory sections were offered each spring).

Computer Applications in Precision Farming I, **AGSC 130** (1 credit): Course offered during the 2001 Fall semester in the Department of Agricultural Science, Business, and Dairy (one 1-hour lecture section was offered).

Introduction to Computer Applications in Precision Farming, **AGSC 132** (2 credits): Course offered annually (Fall 2001 to Fall 2016) in the Department of Agricultural Science, Business, and Dairy (at least one 1-hour lecture section and three 2-hour laboratory sections were offered each fall).

Computer Applications in Research I, **AGSC 135** (1 credit): Course offered during the 2001 and 2002 Spring semesters in the Department of Agricultural Science, Business, and Dairy (one 1-hour lecture section was offered).

Computer Applications in Precision Farming II, **AGSC 140** (1 credit): Course offered during the 2000 Fall and 2001 Spring semesters in the Department of Agricultural Science, Business, and Dairy (one 1-hour lecture section was offered).

Analysis and Interpretation of Agricultural Data, **AGSC 137** (2 credits): Course offered annually (Spring 2003 to Spring 2016) in the Department of Agricultural Science, Business, and Dairy (at least one 2-hour lecture section was offered each spring).

Computer Applications in Research II, **AGSC 145** (1 credit): Course offered during the 2001 and 2002 Fall semesters in the Department of Agricultural Science, Business, and Dairy (one 1-hour lecture section was offered).

Plane Surveying, **NATR 142** (3 credits): Course offered annually (Fall 2003 to Fall 2016) in the Environmental Sciences Department (one 2-hour lecture section and two 3-hour laboratory sections were usually offered each fall).

Basics of Geospatial Technology, **NATR 213** (1 credit): Course offered annually (Spring 2014 to Spring 2016) in the Environmental Sciences Department (one hour lecture section and two 2-hour laboratory sections were offered during the first half of the semester).

Computer Assisted and Photogrammetric Mapping, **NATR 213** (1 credit): Course offered annually (Spring 2001 to Spring 2013) in the Environmental Sciences
Department (at least two 2-hour lecture/laboratory sections of the course were offered during the first ten weeks of the spring semester).

Fundamentals of Geospatial Systems, **RREN 303** (4 credits): Course offered annually (Spring 2015 to Spring 2016) in the Environmental Sciences Department (one two-hour lecture section and one 4-hour laboratory section were offered).

Fundamentals of GPS/GIS, RREN 303 (3 credits): Course offered annually (Spring 2003 to Spring 2014) in the Environmental Sciences Department (one two-hour lecture section and one 2-hour laboratory section were offered).

Geospatial Technology Applications I, **RREN 420** (1 credit): Course offered annually (Spring 2010 to Spring 2016) in the Environmental Sciences Department (one section with two-three hours of lecture/laboratory was offered during the last ten weeks of the spring semester). Course co-taught with W. Snyder and B. Kelly.

Geospatial Technology Applications II, **RREN 421** (2 credit): Course offered annually (Fall 2010 to Fall 2016) in the Environmental Sciences Department (one section with one hour of lecture/discussion and 5 hours of field work was offered during the first ten weeks of the fall semester). Course co-taught with W. Snyder and B. Kelly.

Internship in Renewable Resources Technology, RREN 470 (15 credits): Capstone course offered in the Renewable Resources Technology program (was the faculty advisor for many students enrolled in the course over the years).

**Sultan Qaboos University (SQU):**

Soil and Water Concepts in Irrigation Engineering, BIOR 3003 (3 credits): Course offered during the 1998 Fall and 2000 Spring semesters in the Bioresource and Agricultural Engineering (BAE) Department (one 2-hour lecture section and one 2-hour laboratory section were offered each semester).

Agricultural Watershed Hydrology, BIOR 3004 (3 credits): Course offered annually (Spring 1995 to Spring 1998) in the BAE Department (one 2-hour lecture section and one 2-hour laboratory section were offered each semester).

Design of Irrigation Systems, BIOR 4004 (3 credits): Course offered during the 1999 Spring semester in the BAE Department (one 2-hour lecture section and one 2-hour laboratory section were offered each semester).

Design Concepts and Computer Applications in Irrigation Engineering, BIOR 6004 (3 credits): A graduate-level course offered during the 1999 Spring semester in the BAE Department (one 2-hour lecture section and one 2-hour laboratory section were offered each semester).
Hydraulics of Pipe Networks, BIOR 6005 (3 credits): A graduate-level course offered during the 1999 Fall semester in the BAE Department (one 2-hour lecture section and one 2-hour laboratory section were offered each semester).

Microcomputers in Agriculture, COMP 2001 (3 credits): Course offered during the 1995 Spring, 1995 Fall, and 1996 Spring semesters in the College of Agriculture (several sections of the course were offered each semester). Course co-taught with two-three additional faculty members).

Impacts of Agriculture on Arid Environments, ENVR 6071 (3 credits): A graduate-level course offered during the 1996 Spring semester in the Environmental Science program (one 2-hour lecture section and one 2-hour laboratory section were offered each semester). Taught one weekly module in the course.

Mechanics I – Statics, MECH 2301 (3 credits): Course offered annually (Fall 1996 and Fall 1997) in the BAE Department (one 3-hour lecture section was offered each semester).

Mechanics III – Statics, MECH 3401 (3 credits): Course offered annually (Fall 1994 and Fall 1995) in the BAE Department (one 3-hour lecture section was offered each semester).

Advances in Irrigation and Water Technology, WATR 6402 (3 credits): A graduate-level course offered during the 1997 Fall semester in the Soil and Water Management Department (one 2-hour lecture section and one 2-hour laboratory section were offered each semester). Taught one component of the course.

Supervised the thesis of one M.Sc. Student and the research program of four additional M.Sc. students in Bioresource and Agricultural Engineering.

Michigan State University (MSU):

Irrigation, Drainage, and Erosion Control Systems, ATM 431 (4 credits): A senior level course offered in the Department of Agricultural Engineering (course taught during the 1988 and 1989 Fall semesters).

Trained USDA-Soil Conservation Service Irrigation Engineers on the use of SCS-Scheduler. Seven 3-day training sessions were conducted across the United States in 1988 and 1989. An 8th session was conducted in Minnesota in 1990. Three instructors were involved in the 1988 and 1989 sessions while the 1989 session involved two instructors.

Trained the Michigan Energy Conservation Program Irrigation Technicians on the use of the Microcomputer Irrigation Scheduler. These training sessions were conducted annually at MSU for three years beginning in 1988 (each training session involved three instructors).
Served as a co-supervisor of one M.Sc. student and on the graduate advisory committee of another Ph.D. student in the Department of Agricultural Engineering.

PUBLICATIONS

Articles in Refereed Journals:


Books and Book Chapters:


Articles Published in Refereed Proceedings of Symposia:


**Papers Delivered at Professional Meetings:**


Abstracts Presented at Professional Meetings:


Significant Technical Reports:


Shayya, W.H. 1996. 1996 weather data at the Agricultural Experiment Station: Summary of daily weather data. College of Agriculture, Sultan Qaboos University.


Significant Computer Software:


On-line Resources:

Developed a number of academic and informational websites at Morrisville State College starting from 2000 and maintained most of these sites until 2011 when a number a new websites were devised by the College Webmaster. These included academic websites for the School of Agriculture and Natural Resources (2001), Department of Environmental Sciences (2003); Department of Agricultural Engineering Technology (2000); Department of Agricultural Science, Business, and Dairy (2000); and College Committee on General Education Assessment (2001). Other websites included one for the "Agricultural and Food Ventures Conference 2001" held on campus in April, 2001; a technical website on the plug-flow, hard-top anaerobic digester located at the Dairy Complex (first developed in 2007 and then updated by the College Webmaster in 2008 to include all renewable energy projects developed on campus).

Developed (in 2000) and continue to maintain a professional website available at the following address: people.morrisville.edu/~shayyaw/index.htm. This website provides access to the web pages of the college courses I taught to date at MSC along with links with controlled access (intended for students registered in the
offered courses) to course material available under WebCT and, more recently, Blackboard; a summary of academic and professional experiences; and a webpage (people.morrisville.edu/~shayyaw/html/MSCWeather.htm) to access real-time weather data from the two automated weather stations located on campus (one installed at the Dairy Complex in 2003 and another installed at the Academic Quad in 2011), including hourly, daily, monthly, and annual tabular and graphical summary weather reports.

FUNDED RESEARCH PROJECTS


Ballard, B. and W.H. Shayya (Co-investigators). 2012 to 2017. Distributed On-farm Bioenergy, Biofuels and Biochemicals (FarmBio3): Development and Production via Integrated Catalytic Thermolysis (a 3-year – 2012 to 2015, $6,865,942 project which was extended until August 2017). Project funded in cooperation with the United States Department of Agriculture, Agricultural Research Service ($200,000 annually for three years).


Davis, R. 2007. Morrisville State College Renewable Energy Training Center. (Grant was written by Russ Davis based on ideas and material provided by W.H. Shayya and C. Nyberg). Project was funded by the U.S. Department of Labor (USDOL), Washington D.C. ($1,999,639). The project started on 1 April 2008 and was completed in August 2011. It was directed by Dr. Ben Ballard.


Shayya, W.H. 2001. Developing site-specific crop management data for fields at the Agricultural Station. Project funded through the Graduate Research Initiative for non-Doctoral Campuses, State University of New York ($3,000).


Shayya, W.H., B. Ballard, R. Alexander, and W. Galusky. 2008 to 2011. Developing educational material for renewable energy projects. A DOE-funded "Energy Partnership" project that will focus on the development of educational material on the operation of the anaerobic digester and wind turbine, training modules that teach the various technologies of alternative fueled vehicles, and educational material that helps elucidate the various socio-technical networks associated with alternative energy technologies ($50,000).


Shayya, W.H. and R. Cross. 2001 to 2007. Systems approach to studying and demonstrating anaerobic digestion at SUNY Morrisville. Project funded by the New York State Energy Research and Development Authority (NYSERDA) and the NYS Department of Agriculture and Markets ($455,184).