Course Description: An experiential lecture, discussion and field laboratory course for graduating seniors and graduate students (may be used in combination with AGRY 498 to meet the Agronomy undergraduate capstone requirement). Primary focus is on sound agronomic decision-making. Includes a wide array of emerging technologies used in site-specific /precision crop management.

The topic coverage of this class will develop as the semester proceeds. By bringing industry representative in to speak with the class we’re attempting to familiarize students with current commercial state of the art uses of technology to support sound agronomic recommendations. Lee E. Schweitzer, Bruce Erickson, Jeff Bradford, Jim Camberato, Bob Nielsen, Shaun Casteel, Tony Vyn, Darrell Schulze, Corey Gerber and staff. Sem. 1 Cr. 3. Tuesdays at 1:30 to 5:20 p.m. Initial class meeting in 2-425 Lilly Hall. Please see class schedule for the meeting location of subsequent classes. Some require bus travel which departs from the curb on Russell Street west of Lilly Hall.

Precision Crop Management – AGRY 598 – Fall 2015 – Targeted Topics

1. Precision Management Technologies
   Yield maps
   Soil Sampling locations/zones and interpretation for prescriptions (N, P, K, Ag. Lime)
   Tile maps
   Field boundaries
   GPS/RTK terms, equipment and software
   Satellite constellations
   Signal correction
   Base and rover systems
   Advantages/uses/economics of technology adoption (operator fatigue, overlap avoidance-
   precision application, precision operation with regard to end rows, point rows, time to
   cover fields, variable rate cost savings/increased return, number of employees, size and
   number of pieces of equipment, logistical efficiency of trucks, drivers, grain handling and
   drying, nursing planter with seed and starter fertilizer, nursing sprayer with water and
   active ingredient, equipment costs/maintenance/operating vs. down time)
   Costs
   Functionality (e.g. restrictions on function in remote or hilly areas)
   Industry leader software e.g. Farmworks, AgLeader SMS, Scout Pro, SST Toolbox,
   Apex, Case IH AFS, AgCO Fuse, Trimble, Raven
   Auto steer
   Variable rate zone management prescriptions (e.g. zone identification for applied
   variables such as seeding rate, irrigation, herbicide timing, rate and mode of action, corn
   hybrid, soybean variety, soil sample location, NPK and Ag lime zone application), check
   zones, deep tillage
   Seed drop functions (row control)
   Machine synchrony (planters, combines, grain carts, semi trailers)
Active steering on implements (e.g. planters)
Crop scouting (software, scouting patterns as informed by remote sensing or other spatial data such as prior year yield maps, weed maps, soil type, etc.
Crop input record keeping and unit cost accounting (e.g. variable rate inputs, fixed costs and yield map to produce site specific unit cost of production)
UMS remote sensing operations and data management
Satellite and fixed wing remote-sensing services and data management
Big data and data mining (e.g. Field Scripts, Monsanto Cloud, Climate Corporation, JD Link, Pioneer Encicra, Pioneer Field 360)
Data property rights
Commercial data providers
Data analysis and interpretation, integrated assessment/identification of most limiting factor(s) (e.g. in drier than normal year, wetter than normal year).
On-farm research including input response testing (e.g. by dominant soil type X drainage improvement) for inputs such as N rate and timing, P and K soil test level goals, corn population, etc. Experiment design including replication and checks.
Field portable devices (handheld e.g. smart phone apps and iPad apps tablet apps and wearable technology e.g. GoogleGlass)
Intercom – data acquisition and storage / cross platform compatibility ISO can AgGateway / plug and play
Raven Slingshot - Wireless connectivity platform

2. Corn Planting and Soybean Seeding
Zone precision management aspects (i.e. seeding rate and variable hybrid) and mapping
Auto steer/seed drop functions (row control)
Machine synchrony
High speed planting
Depth and down pressure/goals, uniformity, adjustments with changing conditions
Planter and drill calibration (rate and precision)
Seeding monitors (rate and precision)
Row spacing (corn and soybeans). Wide, close, narrow, twin.
Row residue management
Starter fertilizer and placement
Seed delivery systems (bulk seed to planter in field)

Related Topics
Corn hybrid and soybean variety selection, marketing system, pricing and purchasing
(discounts, credit, replant guarantees)
Prescription seeding rates for corn and soybean
Stand assessment
Replant decision-making
Last profitable/last safe date for planting

3. Spray Systems / Weed Control / Fungicide
Prescription zones / variable rate/variable active ingredient/variable blend
Spray controllers/monitors
Calibration
Nozzle and boom controls
Direct injection systems (multiple) - Raven Sidekick Pro w/Rinse Assist
Pulse width modulation (Capstan/AIM) systems – Case IH
Nozzle selection
Auto steer
Aerial applicator operations
Pesticide handling and safety
Norac spray height control systems

Related Topics
Weed control strategies – cultural, mechanical/tillage, chemical
Herbicide resistant weeds (management to lessen incidence and eliminate)
Modes and sites of action
Controlling problem weeds – current and upcoming
Fall application
Pre-plant burn down
Post emergence and pre emergence with residual application specifics
Adjuvants
Drift management
Pesticide handling safety and environmental protection
*Certification (core and commercial agricultural applicator)

4. Harvest and Grain Handling
Yield maps
Yield monitor hardware and software
Yield monitor calibration/weigh wagons
Auto steer
Machine synchrony (combines, grain carts, manpower and equipment efficiencies, fuel delivery, field service, semi trailer to grain dryer/bin logistics)
Combine setup and operation for optimum efficiency, least loss and preservation of grain quality
Go/no go decision regarding harvest conditions (grain moisture, field loss potential, weather conditions)
Field monitoring of dry-down
Pre-harvest yield estimation (could go with growth, development and diagnostics discussion)
Pre and harvest loss assessment
On-farm grain handling, drying and storage (include farm visit during harvest if possible)
Crop residue management at harvest

Related Topics
Safety (bins, dryers, augers, electrical service, semis, grain trucks, grain carts, combines – fire prevention).
Grain quality in storage
Market channels
5. Water Management, Irrigation / Soil Fertility / Soil Physical and Chemical Properties and Productivity/Zone Management
Site-specific needs assessment (based upon management zones, grids, soil type, yield map, measurable soil physical properties, Veris EC)
Subsurface drainage management, zone water level control for sub irrigation (tile installation demonstration in farm field)
Surface drainage management – waterway installation, drainage ditch maintenance
Soil compaction – measuring, locating, preventing, resolving
Cover crops
Tillage and crop rotation choices (no-till, zone or strip till, full width tillage, deep tillage)
Field demonstrations where possible.
P and K management and variable rate application
N management and variable rate application
pH management and variable rate application
Soil sampling strategies including automatic sampling tools
Soil Sampling (Auto Technology)
Soil and water conservation/erosion control
Crop residue management post-harvest
Commercial applicator equipment demonstration
Robotics
Crop residue management
Soil type mapping

Grading Policy and Performance Evaluation

This class is structured to provide students with opportunities to gain practical experience with a wide array of emerging agronomic management technologies and to interact with industry leaders who are utilizing these technologies in commercial enterprise. Each student initially has an A in the course. Unsatisfactory participation or incompletion of the requirements listed below will result in a one-letter grade reduction for each requirement not met.

1. Attendance: Attendance is required. Unexcused absence will result in grade deductions as follows (with the exception of the first week’s class meeting). Late arrival equates to absence since the bus will depart from west of Lilly Hall promptly at 1:30 p.m. each day.
   1 letter grade with 2 unexcused class absences
   2 letter grades with 3 unexcused class absences
   3 letter grades with 4 unexcused class absences
   4 letter grades with 5 unexcused class absences

   On days scheduled for transport off campus (see class schedule) the class bus will leave promptly at 1:30 p.m. from the west curb of Lilly Hall. Please plan to arrive a bit early so you’ll be able to assemble with your class colleagues on the bus by 1:30 p.m. If an emergency arises so you can not attend please notify Dr. Schweitzer prior to class if possible (cell phone 765 413 5994) email lschweit@purdue.edu.
2. **Participation**: As a capstone course active participation by all students is expected in each class meeting. Ask questions which exercise critical and analytical thinking and communicate as a professional in interactions with industry representatives, farmers, fellow students and the faculty.

3. **Daily Class Notes**: Each student is expected to journal the *key points and observations made / lessons learned during* each day’s presentation. Your notes will serve as a valuable reference for use as you prepare your key topic presentation as part of a team at the end of the semester and in the class wrap-up review question discussions also at the end of the semester.

4. **PowerPoint Presentation**: Working as a team member with other students (who share your priority interest in a precision crop management topic) compose 15 to 20 minute informative PowerPoint presentation with photos, text and graphics targeted to present your topic professionally to an extension (producer) audience.

**September 1** - Receive topic-ranking forms to complete.

**September 8** - Return forms in class with top four topics prioritized from within Target Topic groups 1 through 5 in the course syllabus.

**During The Semester** - Meet with your team to plan and compose a 15 to 20 minute PowerPoint presentation, which will be delivered in class by your team during wrap-up discussions on December 1 and December 8.

Photos, video and graphics used in your presentation can come from a variety of sources, including photos and video you may shoot in class during the semester, the Internet and farm publications. **Sources other than your own original work must be properly cited.** Your target audience is a corn and soybean grower winter meeting (or distance education delivery to the same or similar audience).

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**Course Resource Website**

Under Construction – Coming Soon To The Purdue Agronomy Course List Web Page  
https://ag.purdue.edu/agry/courses/Pages/default.aspx

Please let Dr. Schweitzer or other participating faculty know if they may be of assistance.  

**HAVE A GREAT SEMESTER!**