

# Innovation – An Experiential Precision Crop Management Course For Seniors

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The Challenge/Opportunity: Field crop management increasingly depends upon the wise analysis and interpretation of spatial data layers to inform input management decisions.



Undergraduate students often lack experience with the use of integrated data layer analysis, interpretation and the writing of zone management prescriptions.



# EXPERIENTIAL CAPSTONE CLASS STRUCTURE

**1. Fall semesters 2014, 2015 and 2016 and continuing.**

**2. Total of 69 students thus far.**

**3. One four - hour class period per week**

Field trips

Topic discussions on-site and in classrooms with Purdue faculty and industry professionals.

Student topic research, presentation planning, practice and final delivery.



# EXPERIENTIAL CAPSTONE CLASS STRUCTURE

## 4. Focus on students' active learning:

From remembering and understanding of key agronomic concepts to critical thinking and the analysis, evaluation, creation and communication of new ideas.

## 5. Proficiency basis for student assessment:

Confidence and competence standards were set high, comparable to the model used for mentoring students working on an M.S. degree.

Evaluated student contributions to discussions, their team's presentation and the overall quality of that presentation.

Students enabled to achieve at a high level through practice, peer support and professional feedback.



# IN-CLASS PROFESSIONAL TOPIC DISCUSSION SUPPORT IN 2016

## Example: Soil Drainage System Design and Installation:

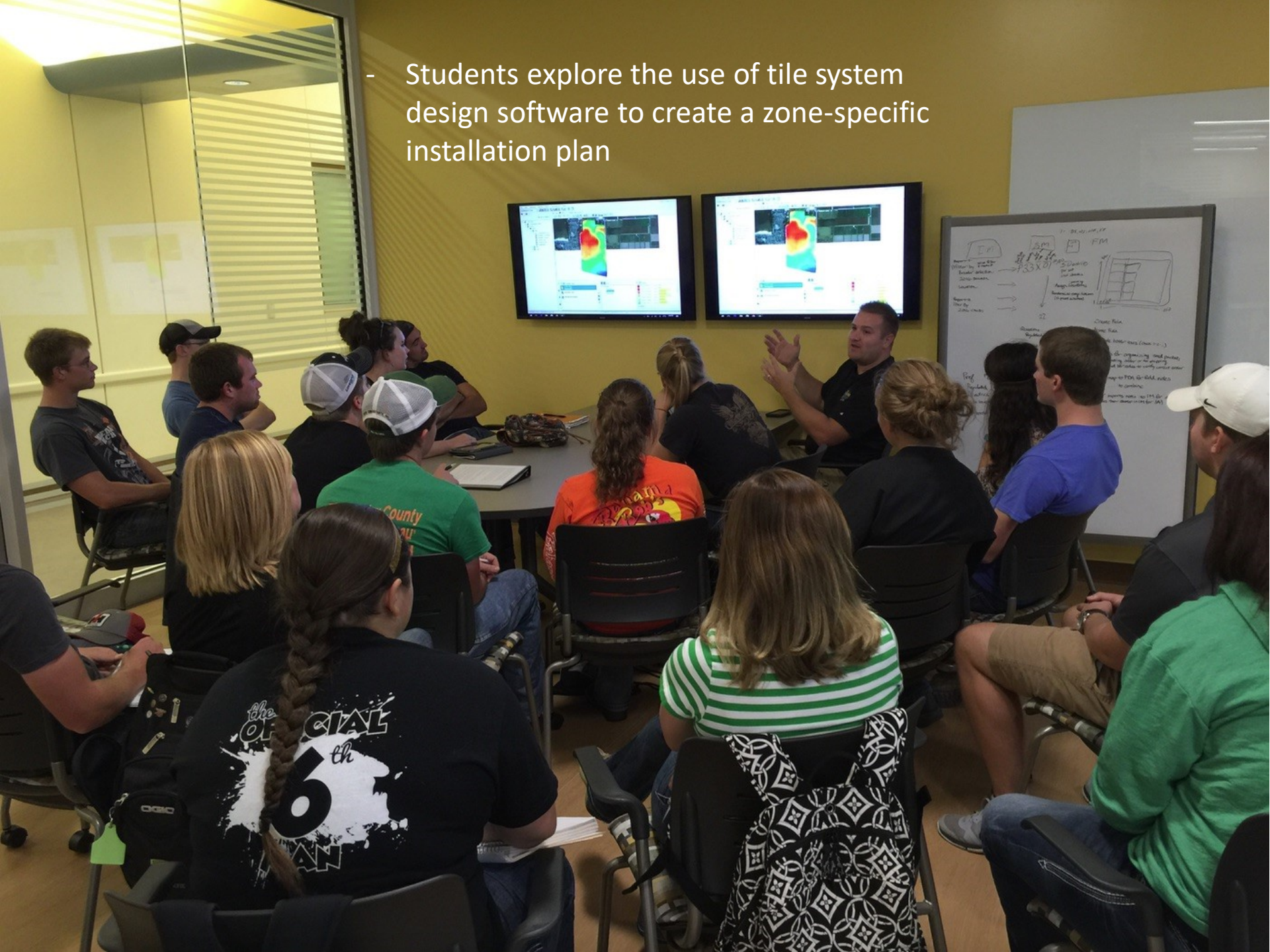
Two four-hour sessions in-field and in classroom with Joey Schlatter-Schlatter's Inc. and Trimble Representative - Francesville, IN





Students on-board while creating topographic maps using vehicle-mounted RTK unit in field.

- Students explore the use of tile system design software to create a zone-specific installation plan





Students at tile sub-main installation site.



Monitoring tile system installation progress on the GIS design map real-time.



# ADDITIONAL PROFESSIONAL IN-CLASS TOPIC DISCUSSION SUPPORT IN 2016

**Soil Productivity Attributes and Cover Crops: Dan DeSutter-  
DeSutter Farms, Dr. Eileen Kladviko and Dr. Darrell Schulze-  
Purdue University Agronomy**



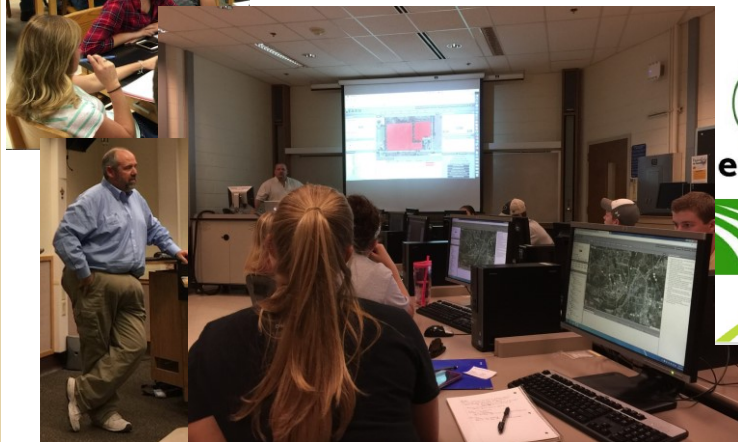
# ADDITIONAL PROFESSIONAL IN-CLASS TOPIC DISCUSSION SUPPORT IN 2016

**Remote and In-Field Crop Sensor Data Acquisition and Utilization:** Christopher Boomsa-Purdue Automated Field Phenotyping, Brett Haas-Crop Copter

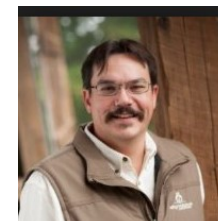


# ADDITIONAL PROFESSIONAL IN-CLASS TOPIC DISCUSSION SUPPORT IN 2016

**GPS/GIS/VRT Concepts, Hardware and Software and Technologies.** Dr. Bruce Erickson-Purdue University Agronomy, Brian Duffy-Castognia John Deere.



**Field Data Management Software and Zone Prescriptions:** Jeff Hinen-Monsanto/Climate Corporation, Jeff Bradford-United Soils, Tyler Downing-Becks Hybrids, Jamie Bultemeier-A & L Great Lakes Laboratories



# STUDENT PRESENTATIONS - 2016

## Assignment:

Compose and deliver a professional caliber (university extension or industry agronomist setting) 30 to 40 minute precision crop management PowerPoint presentation

- **Target Audience:** Crop producers, farm managers, farm owners.

- **Goals:**

Research and persuasively deliver sound, actionable agronomic and economic crop management recommendations on selected topic.

Support delivery of technical content with visually-excellent slides.

Effectively answer technical questions asked by the audience.



# STUDENT PRESENTATIONS - 2016

## Teams Of 3 - 4 Students Selected Topic Preferences Early In The Semester

1. Zone definition and the agronomics of variable seeding rate and genetics by zone (high population and responsive hybrids on most productive land).
2. Agronomic considerations of new zone prescription seeding equipment technologies (e.g. active hydraulic depth control by row, fast-planter independently-variable electric drive seed meters and seed delivery belt row units).



# STUDENT PRESENTATIONS - 2016

## 3. Agronomics of crop nutrient management by zone.



## 4. Economic impact of crop management technologies – return on investment.





# STUDENT PRESENTATIONS - 2016

**5. Choosing among integrated data crop management software alternatives.**



**6. Yield monitor and mapping set-up, calibration and troubleshooting as keys for sound zone crop management strategies.**



# STUDENT PRESENTATIONS

## Process For Students To Achieve Presentation Goals:

- 1. Contact university faculty (including but not limited to Purdue University) and industry professional agronomists as mentors who could;**
  - Share data and slides.
  - Direct reading and slide composition.
  - Serve as technical reviewers of content and slides.
  - Attend and critique practice presentations.
- 2. Start early with literature review, on-line searches supporting topic and critique by faculty and industry mentors.**



# STUDENT PRESENTATIONS

## Process For Students To Achieve Presentation Goals:

- 3. Student teams presented drafts of their outlines and slides in class 3 to 4 weeks prior to their final presentation date.**

Enabled a formative written and verbal critique in-progress by student peers, faculty and industry professionals:

Provided for presentation knowledge transfer among teams.

Raised the standards set by students for their presentations.

Motivated preparation in time to add improvements.

Gain formative written and verbal critique from peers and faculty.

Overcome concerns about inadequacy and stage fright!

Pizza provided to keep things relaxed, cordial and mutually-supportive!



# STUDENT PRESENTATIONS

## Process For Students To Achieve Presentation Goals:

4. **Formal dry run presented by student teams in class 2 to 3 weeks prior to their final presentation date.**

Final formative written and verbal critique.

Reinforced presentation knowledge transfer among teams.

Further raised the standards set by students for their presentations.

Motivated preparation in time to add further improvements and refinements.

Additional pizza reinforcement of friendly, constructive atmosphere.



# STUDENT PRESENTATIONS

## Process For Students To Achieve Presentation Goals:

### 5. Students' professional presentations made during the last two class periods of the semester.

Students' slides were of high quality and their narrative delivered technically-solid information at a professional level.

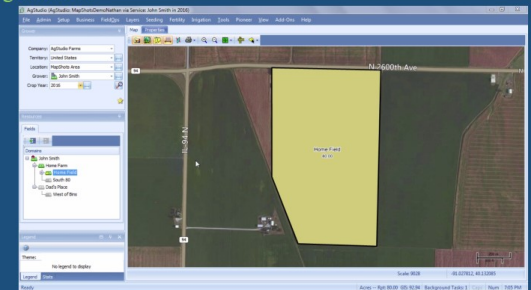
Excellent interaction and dialogue among members of each team and the audience.

Slide from Clark, Sigman, Corning and Miller Presentation in 2017

### AgStudio



- Agronomic data management in one location



# CAPSTONE COURSE EVALUATION



<u>Year</u>	<u>Course Rating</u>	<u>Instructor Rating</u>
2014	3.9/5.0	4.8/5.0
2015	4.5/5.0	4.7/5.0
2016	5.0/5.0	4.9/5.0

# CAPSTONE COURSE EVALUATION

## Observation & Improvement:

1. Replaced comprehensive content questions (2014) with team topic research and peer teaching presentations (2015 and 2016).

Good move!

Howe and Durr, 1982. J. Res. Sci. Teach.19(3):225-232.



2. Deliver content in discrete bundles and Include breaks at intervals during 4-hour class meetings.
3. Engage the students as much as possible in learning activity and nurture discussion.
4. 2017 planned expansion of the integrated crop data management section of the class (case study homework assignments and role playing with industry professionals).



# CAPSTONE COURSE EVALUATION

5. Field trips and on-site discussions are well worth the investment.





# CAPSTONE COURSE EVALUATION

... Even in sub-zero wind chill when Carharts and a good supply of hot chocolate are the stuff of memories and bragging rights for students!



# CAPSTONE COURSE EVALUATION

## Observations:

5. Accountability, practice and formative feedback (peer, faculty and professional) produce refinement for student performance on presentations.
6. Students appreciated working with faculty and industry mentors, learned actively from them and established professional working relationships with them.





John Hettinga and Proud Family – Precision Capstone Class - Fall 2014  
Agronomy M.S. May, 2017. Thesis work – Variable rate seeding for corn.  
Major Professors - Dr. Robert Nielsen and James Camberato

**An important measure of success!**



Thank You!