

Appendix I
Table Indicating Relationships between Courses and Designated Subject Areas

<u>Course Title</u>	<u>Course Number</u>	<u>Credit Hours</u>	<u>Plant Science</u>	<u>Plant/Crop Production</u>	<u>Processing</u>	<u>Utilization</u>
1. Crop Improvement and Biotechnology	AGRON 630	3	XXX	XXX		
2. Cropping Systems	AGRON 640	3		XXX		
3. Crop Physiology	AGRON 840	3	XXX	XXX		
4. Forage Management and Utilization	AGRON 550	3		XXX		
5. Applications of Nutrient Management	AGRON 625	3		XXX		
6. Site Specific Agriculture	AGRON 655	3		XXX		
7. Physical Properties of Soils	AGRON 746	3		XXX		
8. Plant Physiology	BIOL 500	4	XXX			
9. Advanced Plant Physiology I	BIOL 800	3	XXX			
10. Advanced Plant Physiology II	BIOL 801	3	XXX			
11. Biotechnology	AGRON 610	3	XXX			
	PLPTH 610	3	XXX			
12. Plant Genetics	AGRON 770	3	XXX			
13. Recombinant DNA Laboratory I	BIOCH 766	2	XXX			
14. Recombinant DNA Laboratory II	BIOCH 767	2				
15. Molecular Genetics Laboratory	BIOL 676	3	XXX			
16. Plant Molecular Biology	PLPTH 880	3	XXX			
17. Introduction to Genomic Bioinformatics	PLPTH 890	4	XXX			
18. Physical Studies of Biomacromolecules	BIOCH 590	3	XXX			XXX

19. Biochemistry I	BIOCH 755	3 & 3	XXX			XXX
20. Biochemistry II	BIOCH 765		XXX			
21. Materials Chemistry	CHEM 820	3			XXX	XXX
22. Biological Process Engineering	BAE 545	3		XXX	XXX	
23. Fundamentals of Bioprocessing	GRSC 745	3			XXX	
24. Cereal Science	GRSC 602	3	XXX			XXX
25. Starch Chemistry and Technology	GRSC 901	2			XXX	XXX
26. Polymer Science and Engineering	CHE 656	3			XXX	XXX
27. Novel Uses of Renewable Biopolymers	GRSC 825	2			XXX	XXX
28. Processing of Composite Materials	CHE 648	3			XXX	XXX
29. Physical Properties of Cereal Polymers	GRSC 830	3				XXX
30. Surface Phenomena	CHE 682	2			XXX	XXX
31. Energy and Biofuel Engineering	BAE 650	3			XXX	XXX
32. Biomaterials Processing	BAE 740/GRSC 740				XXX	XXX
33. Bioseparations	CHE 626	2			XXX	
34. Biochemical Engineering	CHE 715	3			XXX	XXX
35. Extrusion Processing in the Food & Feed	GRSC 720	4			XXX	

Appendix II

Titles and Course Descriptions of the Proposed Coursework

- AGRON 630. Crop Improvement and Biotechnology. (3) II. Techniques in basic plant breeding and biotechnology used to genetically improve crops and procedures to increase, distribute, and maintain breeding stocks and varieties. Two lec. and one two-hour lab a week. Rec. Pr.: AGRON 220 and ASI 500.
- AGRON 640. Cropping Systems. (3) I. Principles for developing and managing cropping systems in the Great Plains for the efficient use of natural resources, primarily water. Emphasis on dryland cropping systems, management of crop rotations, and the plant/soil/environment interaction. Includes the efficient use of natural resources via an understanding of yield limiting factors, impact of crop rotations and cultural practices, climate, plant growth, and development. Three hours rec. a week. Rec. Pr.: AGRON 375.
- AGRON 840 - Crop Physiology (3) II, in odd years. Principles of nitrogen metabolism, mineral nutrition, photosynthesis, growth substances, and hardiness applied to crop production. Three hours rec. a week. Rec. Pr.: BIOL 500.
- AGRON 550 - Forage Management and Utilization. (3) II. Production and utilization of forage crops. Development of forage programs for livestock production, including pasture and stored forages. Note Three hours rec. a week. Pr.: AGRON 220 and junior standing.
- AGRON 625 - Applications of Nutrient Management. (3) I. Principles for developing plant nutrient management programs in the Great Plains. Topics include assessing crop nutrient needs, making fertilizer recommendations, applying application technology and products to enhance nutrient use efficiency, using sensing technology to assess in-season nutrient needs, quality control functions, and the use of waste products as nutrient sources. Note Three hours lec. a week. Rec. Pr.: AGRON 375
- AGRON 655 - Site Specific Agriculture. (3) II. Introduction to spatial analysis and management of agricultural and environmental resources using Geographic Information Systems (GIS) technology. Emphasis on collecting, displaying, and analyzing spatial or georeferenced soil, crop, or other land surface data. Two hours lecture, two hours lab, and one hour by appointment per week. Rec. Pr.: AGRON 220 and 305 and GEOG 508.
- AGRON 746 - Physical Properties of Soils. (3) II. The properties of soils as affected by their physical environment, including water content, water potential, temperature, aeration, flocculation-dispersion, and soil compaction. Three hours of recitation a week. Rec. Pr.: AGRON 305.
- BIOL 500. Plant Physiology. (4) I. Detailed consideration of physiological processes of higher plants. Three hours lec. and three hours lab a week. Pr.: BIOL 201 or 210; and a course in organic chemistry.
- BIOL 800. Advanced Plant Physiology I. (3) II, in even years. Modern concepts and research in plant physiology. Respiration, photosynthesis, and water relations of plants. Pr.: An introductory plant physiology course or general biochemistry.

- BIOL 801. Advanced Plant Physiology II. (3) II, in odd years. Modern concepts and research in plant physiology. Mineral nutrition, translocation, growth, and development of plants. Pr.: An introductory plant physiology course or general biochemistry. Previous enrollment in BIOL 800 is not required.
- AGRON 610. Biotechnology. (3). II, in odd years. The use of biotechnology and molecular genetic approaches in plant and animal sciences. Emphasis is on the use of molecular techniques for plant and animal improvement. Three hours lec. a week. Pr.: ASI 500. Cross-referenced as PLPTH 610.
- PLPTH 610. Biotechnology. (3) II, in odd years. The use of biotechnology and molecular genetic approaches in plant and animal sciences. Emphasis is on the use of molecular techniques for plant and animal improvement. Two hr. lecture per week. Pr.: ASI 500. Cross referenced as AGRON 610.
- AGRON 770. Plant Genetics. (3) I. Concepts and application of basic genetic principles in higher plants. Probability, linkage, chromosome aberrations, aneuploidy analysis, gene transfer in wide crosses, tissue culture and crop improvement, and genetics of disease resistance. Three hours rec. a week. Pr.: ASI 500.
- BIOCH 766. Recombinant DNA Laboratory I. (1) II. Biochemical manipulation of nucleic acids. Isolation and restriction enzyme characterization of plasmid DNA, ligation of DNA fragments to vector DNA, polymerase chain reaction, Southern blot analysis, DNA sequencing and analysis. Two three-hour labs per week. Meets first half of semester. Pr.: BIOCH 522.
- BIOCH 767. Recombinant DNA Laboratory II. (1) II. Approaches to study RNA and proteins using recombinant DNA techniques. RNA extraction and affinity isolation of mRNA, Northern blot analysis, cDNA library construction and screening, bacterial or eukaryotic expression systems, purification and characterization of recombinant proteins, site-directed mutagenesis. Two three-hour labs per week. Meets second half of semester. Pr.: BIOCH 522.
- BIOL 676. Molecular Genetics Laboratory. (3) I. An advanced course in the techniques of molecular genetics and recombinant DNA technology. Emphasis will be placed on successful completion of a project that will involve several methods in modern molecular genetics. Some typical methods used in the course include mutagenesis, characterization of mutants, polymerase chain reaction, molecular cloning, and DNA sequencing. One-hour lec. And two three-hour labs. Pr.: BIOL 675 or concurrent enrollment.
- PLPTH 880. Plant Molecular Biology. (3) II, in even-numbered years. A study of plant genes and genome organization, plant gene expression and regulation, and functional analysis of plant genes. Three hrs lecture a week. Pr.: BIOCH 521, PLPTH 505, or BIOL 541.
- PLPTH 890. Introduction to Genomic Bioinformatics. (4) I, in odd years. Tools and methods for computational analysis of genomic and related data. Three hours lec. and two hours lab per week. Pr.: BIOCH 521 or equivalent, STAT 703 or equivalent, BIOL 450 or equivalent.
- BIOCH 590. Physical Studies of Biomacromolecules. (3) II. A lecture course providing an overview of the concepts and techniques of physical science as they are applied to study the structure and function of biomacromolecules, such as proteins and DNA.

The applications discussed will range from those utilizing classical equilibrium thermodynamics to spectroscopic methods such as mass spectrometry, circular dichroism (CD), and nuclear magnetic resonance (NMR). Pr.: CHM 500 or equiv., and MATH 220 and 221, or equiv., and PHYS 113 and 114, or equiv.

- BIOCH 755. Biochemistry I. (3) I. An introduction to physical methods, kinetics, and thermodynamics of biochemical reactions and bioenergetics, chemistry of proteins and amino acids, carbohydrate chemistry, and metabolism. BIOCH 755 and 765 are for students interested in a two-semester comprehensive coverage of biochemistry. For a one-semester course, enroll in BIOCH 521. Pr.: *Chemical analysis, one year of organic chemistry, differential and integral calculus.
- BIOCH 765. Biochemistry II. (3) II. Continuation of BIOCH 755; lipid chemistry and metabolism, amino acid metabolism, nutrition, nucleic acid chemistry and metabolism, integration of biochemical pathways and metabolic control mechanisms. Pr.: *BIOCH 755.
- CHM 820. Materials Chemistry. (3) II. Concepts of materials chemistry developed from an understanding of the chemical composition and structure of materials, and their relationship to the properties of matter. Students will be introduced to the structures and composition of materials and the diverse range of materials, including metals, metal clusters, semiconductors, nanomaterials, supramolecular materials, sol-gel materials, liquid crystals, glasses, polymers and composites. Pr.: Consent of instructor.
- BAE 545. Biological Process Engineering. (3) I. Analysis and design of biological and agricultural processes. Three hours rec. a week. Pr. or conc.: CHE 320 or ME 571.
- GRSC 745. Fundamentals of Bioprocessing. (3) II. This course is designed for students who desire a clear understanding of bioprocessing principles as applied to the emerging bio-based industry. This course covers the fundamentals of mass and energy balances, fluid dynamics, heat and mass transfer, as applied to bioprocessing. The microbial growth, kinetics and fermenter operation will be covered in detail. Fundamentals of downstream operation as applicable to bioprocessing will be covered in this course. Industrial bioprocessing case studies that involve the integration of the course contents will be discussed. Three hours lec. per week. Rec. Pr. MATH 205 or 220, PHYS 113 or 115, and BIOCH 265 or CHM 210.
- GRSC 602. Cereal Science. (3) I, II. The characteristics of cereals, legumes, their components, and their processing to foods. Three hours lec. a week. Pr.: BIOCH 265.
- GRSC 901. Starch Chemistry and Technology. (2) II, in even years. Chemical and physical properties of cereal and legume starches. Isolation, structure, assay methods, and properties in solution. Methods of modifying starches for industrial use, including chemical, physical, and enzymatic modification. Pr.: BIOCH 521, GRSC 602.
- CHE 656. Polymer Science and Engineering. (3) I, in even numbered years. An introduction to polymeric materials, including chemistry, structure and formation; physical states and transitions; and, basic physical and mechanical properties. Three hours rec. a week. Pr.: CHM 531.
- GRSC 825. Novel Uses of Renewable Biopolymers. (2) I. Teach existing value-added technology of cereal polymers, and explore new processes and utilization in non-

- traditional food/feed and in non-food/feed. Two hours lec. a week. Pr.: BIOCH 521 and PHYS 115.
- CHE 648. Processing of Composite Materials. (3) I, II. Principles of composite materials, including ceramic, metal, and polymer matrix composites; properties and processing of fibers; role of interfaces in composites; basic concepts in mechanics, failure, and testing of composite materials. Three hours lec. a week. Pr.: CHE 350 or 352.
- GRSC 830. Physical Properties of Cereal Polymers. (3) II, in even years. Physical properties of cereal polymers include physical attributes, rheological, mechanical, thermal, electrical, and optical properties. Thermal analysis methods will be taught. Thermal analysis include glass transition, gelatinization, denaturation, and thermal softening and settings of cereal polymers. Rheological properties associated with these thermal transitions will be discussed. Applications of thermal analysis in cereal chemistry, processing, and product quality control will be discussed. Two hours lecture and discussion, and two hour lab. PR.: GRSC 602.
- CHE 682. Surface Phenomena. (2) I, II, S. Principles and applications of interfacial phenomena, including capillarity, colloids, porosity, adsorption, and catalysis. Two hours rec. a week. Pr.: CHE 520.
- BAE 545. Biological Process Engineering. (3) I, Application of basic science and engineering fundamentals for the analysis and design of biological and agricultural processes. Three hours rec. a week. Pr. or conc.: CHE 530 or ME 571.
- BAE 650. Energy & Biofuel Engineering. (3) II. Energy use and production in agriculture and related industries. Energetics of primary production, including crop energy conversion. Energy and material balances of biomass energy production and processing systems, including energy embodied in fertilizers and pesticides. Review of the role of fossil fuels in agricultural and forestry operations, including opportunities for energy conservation. Impact of alternative fuels on internal combustion engine emissions. Three hours lecture a week. Pr. or conc.: ME 513.
- BAE 740. Biomaterials Processing. (3) I, in even years. Technologies of bio-based material processing including starch extraction (wet milling), plant oil extraction and refining, plant protein extraction and processing, cellulose processing, biofuel production, chemicals bioconversion, and drying technologies or biomaterials. Course is cross-listed with GRSC 740. Three hours rec. a week. Pr.: BAE 500 or BAE 575 or GRSC 602.
- GRSC 740 - Biomaterials Processing. (3) I, in even years. This course is designed for students who are interested in plant biomaterials processing. This course will teach technologies of biobased materials processing including starch extraction (wet milling), plant oil extraction and refining, plant protein extraction and processing, cellulose processing, biofuel production, chemicals bioconversion, and drying technologies of biomaterials. Three hrs. lec. a week. Pr.: BAE 575 or GRSC 602. Cross-listed with BAE 740
- CHE 626. Bioseparations. (2) II, in even years. Study of separations important in food and biochemical engineering such as leaching, extraction, expression, absorption, ion exchange, filtration, centrifugation, membrane separation, and chromatographic separations. Two hours rec. a week. Pr.: CHE 531 or AGE 575.

CHE 715. Biochemical Engineering. (3) I. The analysis and design of biochemical processing systems with emphasis on fermentation kinetics, continuous fermentations, aeration, agitation, scale up, sterilization, and control. Three hours rec. a week. Pr. or conc.: CHE 550.

GRSC 720. Extrusion Processing in the Food and Feed Industries. (4) I. The course is designed to provide the student with an understanding of extrusion technology and the ability to apply it to product development and production through a "hands-on" approach. Major emphasis is on laboratory exercises in which students will operate pilot scale extrusion equipment to produce readily-recognizable commercial products such as cheese curls, breakfast cereals, pasta, pet food, etc. Emphasis will also be placed on process and product development, analysis, and problem-solving techniques. Three hours lec. and three hours lab a week. Pr.: STAT 320 and GRSC 602.

Appendix III
Abbreviated Resumes for Faculty Associated with or Contributing to
the Graduate Certificate Program

JOHN R. SCHLUP, PHD

Professor, Department of Chemical Engineering
Kansas State University
1037 Durland Hall, Manhattan, Kansas, 66506-5102
Telephone 785 532-4319
Email: jrsch@ksu.edu

Education

Kansas State University	BS	Chemistry	1974
Kansas State University	BS	Chemical Engineering	1975
California Institute of Technology	PhD	Chemical Engineering	1981

Appointments

1995 – Present	Professor, Chemical Engineering, Kansas State University
2006 – Present	Director, Undergraduate Programs, Chemical Engineering, Kansas State
1989 - 1995	Associate Professor of Chemical Engineering, Kansas State University
1983 – 1989	Assistant Professor of Chemical Engineering, Kansas State University
1981 – 1983	Senior Chemical Engineer, Corning Glass Works, R&D Division, Corning, NY

Selected Recent Publications

- “The Influence of Surface Hydroxyls on Catalyzed Tetrakis(dimethylamino) ethylene Chemiluminescence,” Chien-Chang Huang, Keith L. Hohn and John R. Schlup. Submitted to the *Journal of Physical Chemistry*.
- “Catalytic Deoxygenation of Fatty Acids: Conversion of Oleic Acid in the Presence of ZnO and ZSM-5,” Amol More, John R. Schlup, and Keith L. Hohn. Submitted for publication in *Biomass and Bioenergy*.
- “*In-situ* IR Investigation of Activation and Catalytic Ignition of Methane over Rh/Al₂O₃ Catalysts,” C. Cao, A. Bourane, J. R. Schlup, and K. L. Hohn. *Appl. Catal A – General* **344**(1) (2008) pp. 78 – 87.
- “Assessment of Sustainability-Potential: Hierarchical Approach,” L. T. Fan, T. Zhang, J. Liu, J. R. Schlup, P. A. Seib, F. Friedler, and B. Bertok. *Industrial & Engineering Chemistry Research* **46** (2007) pp. 4506 – 4516.
- “Energy Consumption vs. Energy Requirement,” L. T. Fan, T. Zhang, and J. R. Schlup. Accepted for publication in *Chemical Engineering Education*. **40** (2006) pp. 132 - 138.

Synergistic Activities

Research Leadership:

Member of the internal advisory board for the Biobased and Industrial Value Added Program (BIVAP) (Manhattan, KS).

Participant with planning process for the Sun Grant Initiative, South Central Region

Educational Leadership:

Lead faculty member for developing a secondary major in biological engineering and currently chair of the governing board for the secondary major in Biological Engineering. Lead faculty member in developing a graduate certificate in biomass

technologies currently in the process of approval at Kansas State University. Currently part of the leadership team exploring multi-institutional collaboration related to interdisciplinary programs in Biobased Materials Science and Engineering.

Presentations:

Delivered ten (10) invited, sixty-three oral (64), and twenty (21) poster presentations in various settings

Sessions Organized:

Conference Chair, Conference on Creating Value for Biobased Resources: Moving Beyond Petroleum, November, 2002.

Individual and Panel Reviews for:

American Association for the Advancement of Science (AAAS), Agricultural Experiment Station (KSU), Office of Biorenewables Programs (Iowa State Univ.), NSF and USDA

Papers Reviewed for:

Chemistry of Materials, Chemical Engineering Education, Composites: Part A, and Journal of the American Institute of Chemical Engineers

Collaborators & Other Affiliations

Collaborators and Co-Editor (within Previous 5 Years)

- Dr. L. T. Fan Kansas State University
- Dr. Keith Hohn Kansas State University
- Dr. Ron Madl Biobased and Industrial Value Added Program, Kansas State University

Graduate Students Advised Total = 18

PhD: Fang Meng, Zongwei Shen, LiSheng Xu, Jing Zeng

MS: Amol A. More, D. A. Spieker, Mark H. Wilson, Robert A. Johnson, Shing Sung, H.K. Liaw, J.S. Waters, B.S. Sywe, Y.Y. Chiu, M.A. Reichwein, N.C. Rigas, C.N. Christodoulou, M.C. Collins, B.L. Angell

Graduate and Postgraduate Advisors

Dr. Robert Dr. Robert W. Vaughan (deceased) and Dr. W. Henry Weinberg

Scott Staggenborg

Professor
Cropping Systems
30% T, 70% R

Professional Experience:

2008 – present, Professor, Department of Agronomy, Kansas State University
2004-2008, Associate Professor, Department of Agronomy, Kansas State University
2004-2001. Associate Professor, Northeast Area Extension, Kansas State University
2001-1995. Assistant Professor, Northeast Area Extension, Kansas State University
1993-1995. Assistant Professor-Extension (temporary), Dep. of Agricultural & Biological Engineering – Clemson University, Clemson, SC.

Education:

Ph.D., 1993. Texas Tech University (agronomy).
M.S., 1990. Kansas State University (agronomy).
B.S., 1988. Kansas State University (agronomy).

Professional Societies:

American Society of Agronomy. Gamma Sigma Delta
Crop Science Society of America.

Professional Interests and Responsibilities:

Cropping Systems teaching and research, Technology and Site Specific Management research and teaching. Management of the KSU Weather Data Library.

Teaching/Graduate Student Advising (2004 – present):

Courses Taught:

AGRON 640, Cropping Systems, 3 credits, annually
AGRON 655, Site Specific Management, 3 credits, annually

Undergraduate and Graduate Students Advised:

Average 10 undergraduate students each semester; 4 M.S. students completed, currently advising 4 M.S. students and 2 Ph. D. students.

Awards (2000 - present):

2000 Syngenta Crop Protection Award – American Society of Agronomy

Significant Committee/Professional Service (2000 – present):

Associate Editor, *Agronomy Journal of Environmental Quality*, 2008 to present
Board Member, Sorghum Improvement Conference of North America. 2003 to present
Technical Editor, *Crop Management Journal*, 2004-2007

Extramural Funding Received (2000 – present):

Total Funding Received: \$1.7million

Selected Funded Research Projects:

- Staggenborg, S.A., L. McKinney, D.Wang, and P. Vadlani. U. S. Dept of Agriculture/Energy. Pelletizing forages to increase cellulosic ethanol production: Proof of concept justification. 2007. \$659,000.
- Roozeboom, K.L., W.F. Heer, J.D. Holman, V.L. Martin, S.A. Staggenborg, M.J. Stamm. Establishing winter canola on the southern Great Plains. U.S. Dept. of Agriculture. 2007. \$24,816.
- Staggenborg, S.A. and D. Mengel. Development of rice production recommendations in Kansas. Venturia BioScience. May 1, 2007 to April 30, 2009. \$46,720.
- Staggenborg, S.A., and S.R. Duncan. Yield and risk assessment and support for the inclusion of cotton as a limited water use alternative over the Ogallala Aquifer. National Cotton Foundation. July 1, 2007 to June 30, 2008. \$5,000.
- Wang, D., R. Madl, S.A. Staggenborg, M. Woolverton. Developing a comprehensive understanding and utilization of sorghum stover and brown midrib forage sorghum for ethanol production. Sun Grant Biofuel Initiative (U.S. DOT). July 1, 2007 to June 30 2009. \$70,000.
- Rooney, W., Y. Blumenthal, G.A. Peterson, B. Bean, J. Marsalis, R. Kochenower, D. Bellmer, R. Huhnke, S. A. Staggenborg, and D. Wang. Evaluation of Sweet Sorghum Hybrids as a Bioenergy Feedstock--Germplasm Development, Agronomic Practices, and Conversion Efficiency. Sun Grant Biofuel Initiative (U.S. DOT). July 1, 2007 to June 30, 2010. \$125,000.
- Roozeboom, K., W. Heer, S.A. Staggenborg, M. Stamm, J. Holman. Establishing winter canola on the southern Great Plains. U.S. Canola Association. July 1, 2007 to June 30, 2008. \$24,816.
- Staggenborg, S.A., C.W. Rice, A. Schlegel, J. Holman. Biofuel production from annual and perennial crops in Kansas. ICM. July 1, 2007 to June 30, 2009. \$81,760.
- Wang, D., M. Tunistra, S.A. Staggenborg, C.W. Rice. Development and utilization of sorghum as feedstock for biofuel production. Kansas Grain Sorghum Commission. July 1, 2007 to June 30 2008. \$30,000.
- Staggenborg, S.A. Improving our understanding of the mechanism of grain sorghum drought tolerance. Kansas Grain Sorghum Commission. July 1, 2007 to June 30 2008. \$8,000.
- Prasad. P.V., S.A. Staggenborg, D. Mengel, T Kastens. Integrated soil, water, nutrient and crop management strategies productivity in sorghum and millet based cropping systems. International Sorghum and Millet Improvement (INTSORMIL). July 1, 2007 to September 29, 2011. \$348,500.
- Staggenborg, S.A. Evaluating biofuel feedstock cropping and forage systems to maintain soil quality, reduce erosion and maximize water use efficiency. U.S. Dept. of Agriculture-Ogallala Initiative. October 1, 2007 to September 31, 2008.\$8,000.

Publications (2000 – present):

Refereed: 10 Extension bulletins: 20 Abstracts/proceedings: 39 Invited presentations: 12

Selected Publications (2000 – present):

Evert, S.J. S.A. Staggenborg, and B.L.S. Olsen. 2008. Soil temperature and planting depth effects on tef emergence. J. of Agron. and Crop Sci. In Press.

- Epler, M.G., and S.A. Staggenborg. Soybean yield and yield component response to plant density in narrow row systems. Crop Mgmt CM-2008-0925-01-RS.
- Staggenborg, S.A., W.B. Gordon, K.C. Dhuyvetter. 2008. Grain sorghum and corn comparisons: Yield, economic and environmental responses. *Agron. J.* 100:1600-1604.
- Carignano, M., S.A. Staggenborg, and J.P. Shroyer. 2008. Management practices to minimize tan spot in continuous wheat. *Agron. J.* 100:145-153.
- Staggenborg, S.A., M. Carignano, and L. Haag. 2007. Predicting soil pH and buffer pH with a real-time sensor. *Agron. J.* 99:854-861.
- Staggenborg, S.A. and R.L. Vanderlip. 2005. Crop simulation models can be used as dryland cropping systems research tools. *Agron. J.* 97:378-384.
- Staggenborg, S.A., R.K. Taylor, and L.D. Maddux. 2004. Effect of planter speed and seed firmers on corn stand establishment. *Applied Engineering in Agriculture* 20:573-580.
- Deines, S.R., J.A. Dille, E.L. Blinka, D.L. Regehr, and S.A. Staggenborg. 2004. Common sunflower (*Helianthus annuus*) and shattercane (*Sorghum bicolor*) interference in corn. *Weed Sci.* 52:976-983.
- Staggenborg, S.A., D.A. Whitney, D.L. Fjell, and J.P. Shroyer. 2002. Seed and Nitrogen Rates needed to Optimize Winter Wheat Yields following Two Summer Crops. *Agron. J.* 95:253-259.
- Issacs, N.E., R.K. Taylor, S.A. Staggenborg, M.D. Schrock, and D.F. Leikam. 2002. Using cone index data to explain yield variation within a field. *Agric. Engin. Int.: the CIGR Journal of Scientific Research and Development*. Manuscript PM 02 004. Vol

Susan X. Sun

Professor, Department of Grain Science and Industry, Bio-Materials & Technology Lab, Kansas State University, Manhattan, KS 66506, Tel: (785)532-4077; E-mail: xss@ksu.edu

Relevant Work History

- 01/07 to present Director, Center for Biobased Polymers By Design, Kansas State Univ., Manhattan, KS
- 07/04 to present Professor, Grain Science & Industry, Kansas State Univ., Manhattan, KS
- 07/01 to 06/04 Associate Prof., Grain Science & Industry, Kansas State Univ., Manhattan, KS
- 01/96 to 06/01 Assistant Prof., Grain Science & Industry, Kansas State Univ., Manhattan, KS
- 12/82 to 08/89 Lecturer, Bio. & Agric. Engineering, Northeast Agricultural University, China

Technical Experience

- Technical Panel Manager, Biobased Products and Bioenergy USDA National Research Initiative, 2004, 2005

Commercialization Experience

USDA Small business funds Phase I and II on Biodegradable and edible feed packaging containers. The green containers were commercialized by Ridley Block Operations.

(<http://www.crystalix.com/biobarrel>)

Biobased Adhesives, industrial sponsored projects, the technology has been patent and field test will be conducted, and scale up process of the soy protein based binder will be conducted.

Work with various companies on biochemicals and polymers including Dow Chemicals (Rohm and Haas), Franklin International, Georgia Pacific Resin, Inc., H.B. Fuller, Fosco Metallurgici Inc., and Wrigley.

Project Management Experience

- Project leader, Affordable adhesives derived from optimum soybean varieties. DOE, \$5 M, 2002-2005.
- Program leader, Biomaterials By Design, KSU Targeted Excellence Project. 2004-2008

Educational Attainment

Northeast Agricultural University, China; Bio. & Agric. Engineering, B.S., 1982

Northeast Agricultural University, China; Bio. & Agric. Engineering, M.S., 1986

University of Illinois at Champaign, IL; Bio. & Agric. Engineering Ph.D., 1993

Texas A&M University, College Station, TX; Bio. & Agric. Engineering Postdoc, 1993-95

Honors and Recognitions

- Outstanding Food Scientist Award, Institute of Food Technology Society, KSU Chapter 2008.
- Outstanding Senior Scientist Award, American Research Scientist Sigma Xi, KSU Chapter 2007.
- Longjiang Outstanding Scholar Award, Heilongjiang Province, China, 2006.
- ADVANCE CAP Award, NSF, KSU, 2006.

Other

- DOE Panel, Identification of Industrial Crops for Biofuel and Bioproducts, 2002
- Associate Editor, J. of Biobased Materials and Bioenergy and Cereal Chemistry; Scientific Societies

Selected recent publications (out of 115)

1. X. S. Sun, D. Wang, L. Zhang, X. Mo, L. Zhu, D. Boyle. Morphology and Phase Separation of Hydrophobic Clusters of Soy Globular Protein Polymers, *Macromolecular Bioscience* 2008, 8:295-303.
2. X. Mo, Y. Hiromasa, A. Al-Rawi, M. Warner, T. Iwamoto, T. Rahman, X. S. Sun and J. M. Tomich. Design of Bio-Based 11- Residue Adhesive Peptides with Different Properties: Induced Secondary Structure in the Absence of Water. *Biophysical J* 2008, 94: 1807-1817.
3. Acioli-Moura, R., and X. S. Sun. 2008. Thermal degradation and physical aging of poly(lactic acid) and its blends with starch. *Polymer Engineering and Science* DOI 2008, 10.1002.pen.21019, 829-836.
4. Zhang, L., and X. S. Sun. Effects of sodium bisulfite on soybean glycinin protein. *J. Agriculture and Food Chemistry* 2008 (in press)
5. L. Zhu and X. S. Sun, Adhesion Performance of Amino Groups (ϵ -NH₂) of Soybean Glycinin Proteins. *J. Biobased Materials and Bioenergy* 2007, 1 (1): 64-70.
6. X. Shen, M. Robyn, X. Mo, S J. Frazier, T. Iwamoto, J. M. Tomich and X. S. Sun, Adhesion and Structure Properties of Protein Nanomaterials Containing Hydrophobic-Charged Amino Acids. *J. Nanoscience and Nanotechnology* 2006, 6: 837-844.
7. P.R. Wool and X. S. Sun, 2005, *Biobased Polymers and Composites*, Elsevier Science publisher, MA USA.
8. J. Zhang, and X. S. Sun. Mechanical properties of poly(lactic acid)/starch composites compatibilized by maleic anhydride. *Biomacromolecules* 2004, 5: 1446-1451.
9. J. Zhang and X. S. Sun, Mechanical properties and crystallization behavior of poly(lactic acid) blended with dendritic hyperbranched polymer, *Polymer International* 2004, 53: 716-722.
10. J. Zhang and X. S. Sun, Physical characterization of coupled poly(lactic acid) /starch/maleic anhydride blends

BIOGRAPHICAL SKETCH

Donghai Wang

PROFESSIONAL PREPARATION

Northeast Agricultural Univ. (China), Bio. & Agric. Engineering, B.S., 1982.

Univ. of Illinois (Urbana, IL), Bio. & Agric. Engineering, M. S., 1994.

Texas A&M Univ. (College Station, TX), Bio. & Agric. Engineering, Ph.D., 1997.

USDA-GMPRC (Manhattan, KS), Postdoc, 1997-1999.

APPOINTMENTS

07/07 to present, Associate Professor, Kansas State Univ., Manhattan, KS.

10/00 to 06/07, Assistant Professor, Kansas State Univ., Manhattan, KS.

08/99 to 09/00, Project Manager, Kansas Advanced Technologies, Inc., Manhattan, KS.

10/97 to 07/99, Postdoctoral Research Associate, USDA-GMPRC, Manhattan, KS.

12/82 to 01/90, Instructor and Lecturer, Northeast Agricultural Univ., China.

SELECTED RECENT PUBLICATIONS

(i) Most Closely Related

- [1] D.Y. Corredor, J.M. Salazar, K.L. Hohn, S. Bean, B. Bean, D. Wang, Evaluation and characterization of forage sorghum as feedstock for fermentable sugar production, *Applied Biochemistry and Biotechnology* (Published online July 31, 2008).
- [2] D.Y. Corredor, X.S. Sun, J.M. Salazar, K.L. Hohn, D. Wang, Enzymatic hydrolysis of soybean hull using dilute acid and steam explosion pretreatments. *Biobased Materials and BioEnergy* 2 (1) (2008) 51-56.
- [3] Y. Zheng, Z. Pan, R. Zhang, D. Wang, B. Jenkin, Non-ionic Surfactants and Non-Catalytic Protein Treatment on Enzymatic Hydrolysis of Pretreated Creeping Wild Ryegrass, *Applied Biochemistry and Biotechnology* 146 (1-3) (2008) 221-248.
- [4] D. Wang, S. Bean, J. McLaren, P. Seib, R. Madl, M. Tuinstra, M. Lenz, X. Wu, R. Zhao, Grain Sorghum is a Viable Feedstock for Ethanol Production, *J. of Industrial Microbiology & Biotechnology* 35 (5) (2008) 313-320.
- [5] D. Corredor, S.R. Bean, D. Wang, Pretreatment and enzymatic hydrolysis of sorghum fiber, *Cereal Chemistry* 84 (1) (2007) 61-66.

(ii) Other

- [1] R. Zhao, S.R. Bean, B.P. Loerger, D. Wang, D.L. Boyle, Impact of mashing on sorghum proteins and its relationship to ethanol fermentation. *J. Agriculture and Foods and Chemistry* 56 (3) (2008) 946-953.
- [2] Y. Zheng, Z. Pan, R. Zhang, J. Labavitch, D. Wang, S. Teter, B. Jenkins, Evaluation of Different Biomass Materials as Feedstock for Fermentable Sugar Production, *Applied Biochemistry and Biotechnology* 136-140 (1-12) (2007) 423-436.
- [3] X. Wu, R. Zhao, S.R. Bean, P.A. Seib, J.S. McLaren, R.L. Modl, M. Tuinstra, M. C. Lenz, D. Wang, Factors impacting ethanol production from grain sorghum in dry-grind process. *Cereal Chemistry* 84 (2) (2007) 130-136.
- [4] X. Wu, R. Zhao, D. Wang, S.R. Bean, P.A. Seib, M. Tuinstra, M. Campbell, A. O'Brien, Effects of amylose amylopectin ratio, corn protein and corn fiber contents on ethanol production, *Cereal Chemistry* 83 (5) (2006) 569-575.

- [5] D.Y. Corredor, S.R. Bean, T. Schober, D. Wang, Effect of decorticating sorghum on ethanol production and composition of DDGS, Cereal Chemistry 83 (1) (2006) 17-21.

SYNERGISTIC ACTIVITIES

- Professional Society: Associate editor of Transactions of the ASABE and Applied Engineering in Agriculture.
- Research Leadership: Research leader of Sorghum Utilization Group, Center for Sorghum Improvement, KSU; Research leader of Bioenergy Research and Development Group, Center for Sustainable Energy, KSU.
- Presentations: Delivered more than 40 presentations at national and international conferences.
- Papers reviewed for: J. Cereal Science, Cereal Chem., Oil Chem., Transaction of the ASABE, Bioresource Technology, J. Agric. & Food Chem., J. Biosystems Engineering, J. Applied Biochemistry and Biotechnology, Biotechnology and Bioengineering, etc.
- Conducted major projects: "Sorghum as viable renewable resource for biofuels and bio-based products (USDA-NRI), "Develop comprehensive understanding and utilization of sorghum stover and brown midrib forage sorghum for ethanol production" (DOT-Sun Grant), Processing genetically engineered biomass to obtain optimal enzymatic digestion of cell wall polysaccharides in cellulosic biofuel production (NSF STTR subaward), and Sorghum fermentation quality (USDA) as PI; Pelleting forage to increase cellulosic ethanol production: Proof of concept justification (USDA/DOE), Evaluation of sweet sorghum hybrids as a bioenergy feedstock-germplasm development, agronomic practices, and conversion efficiency (DOT-Sun Grant), and Affordable and durable biobased adhesives for wood veneer applications (USDA) as co-PI.

COLLABORATORS AND CO-EDITORS

(i) Collaborators and Co-Editors

S.R. Bean, USDA-ARS-GMPRC, Manhattan, KS;
D. Hays and B. Rooney, Texas A & M Univ., College Station, TX;
J.S. McLaren, StathKirn Inc., Chesterfield, MO;
J. Wilson, USDA-ARS-UGA, Tifton, GA;
J. Pederson, USDA-ARS Lincoln, NE;
K. Pappan, Edenspace, Manhattan, KS;
P.A. Seib, S.X. Sun, K. Hohn, S. Staggenborg, Z.J. Pei, R. Madl, Y. Shi, J. Yu, Y. Wen, and R. Nelson, Kansas State Univ., Manhattan, KS

(ii) Graduate Advisors and Postdoctoral Sponsors

M.S. Advisor: Dr. Steve R. Eckhoff, Univ. of Illinois, Urbana, IL
Ph. D. Advisor: Dr. Ronald Lacey, Texas A&M Univ., College Station, TX
Postdoctoral Advisor: Dr. Floyd E. Dowell, USDA-ARS-GMPRC, Manhattan, KS

(iii) Thesis Advisor and Postgraduate-Scholar Sponsor (total # of students advised =11)

Ph.D. Students: X. Zhan (Professor, Jiannan Univ., China); Y. Wang (Postdoc, Kansas State Univ.); D. Corredor (Edenspace System, Inc.), R. Zhao (Professor, Henan Univ. of Technology, China), K. Theerarattanoon, S. Yan, N. Li, and F. Xu.

M.S. Students: D. Corredor (Edenspace System, Inc), L. Pena, and L. Liu.

Post-doctoral Researchers and visiting scholars: G. Yang (Shanghai Univ. of Technology, China); X. Wu, Y. Wang, and D. Hao (Kansas State Univ.);

Appendix IV
Student Learning Outcomes and Assessment Plan in Format
Requested by Office of Assessment

Proposed Graduate Certificate
Biobased Products and Bioenergy
Assessment of Student Learning Plan
Kansas State University

College, Department, and Date

College: Graduate School

Department: Interdisciplinary graduate certificate program. Initial participating departments include agronomy, biological & agricultural engineering, chemical engineering, and grain science & industry

Date: March 17, 2009

Contact Person(s) for the Assessment Plans

Dr. John R. Schlup, Professor, Department of Chemical Engineering

Degree Program

Graduate Certificate in Biobased Products and Bioenergy

Assessment of Student Learning Three-Year Plan

1. Student Learning Outcome(s)

a. List (or attach a list) all of the student learning outcomes for the program.

The student learner outcomes for the graduate certificate being proposed are

1. Broad education in several disciplines integral to biobased products and bioenergy.
2. Demonstrated ability to utilize biobased and other renewable resources as energy sources and industrial raw materials as opposed to petroleum-based feedstocks.
3. Demonstrated ability to integrate the subject areas identified above in their understanding and implementation of biobased products and bioenergy.

b. Identify outcomes that will be assessed in the first three years of the plan.

Over the next three years, all three of the learner outcomes above will be assessed.

Special rationale for selecting these learning outcomes (optional):

The participants in the Biobased Products and Bioenergy graduate certificate program will have diverse academic backgrounds and most likely widely varying academic and career goals. Therefore, the program itself centers on designing an individualized program of study from a menu of courses. The student learning outcomes, thus, do not focus on specific topics or courses, but rather on integration of course content in a manner that meets student needs in this very interdisciplinary field. Thus, the outcomes above focus on the student's abilities to integrate content from various disciplines to address interdisciplinary problems.

No new courses are being proposed, and, as existing courses, each is a part of the assessment process within their respective departments. Thus, additional learning outcomes will not be identified with

each course. The selection of the courses ensures that the required subject areas are available to and accessed by the students; the structure of the program ensures exposure of the students to the necessary disciplines. Each of the choices for a student's required (foundational) course provides a basis for understanding renewable resources as feedstocks instead of petrochemicals.

Relationship to K-State Student Learning Outcomes (insert the program SLOs and check all that apply):

<i>Program SLOs</i>	<i>University-wide SLOs (Graduate Programs)</i>			<i>Program SLO is conceptually different from university SLOs</i>
	<i>Knowledge</i>	<i>Skills</i>	<i>Attitudes and Professional Conduct</i>	
1. Broad education in several disciplines	XXX	XXX		
2. Ability to utilize biobased and other renewable resources	XXX			
3. Ability to integrate the subject areas	XXX	XXX	XXX	
4.				
5.				

2. How will the learning outcomes be assessed? What groups will be included in the assessment?

Assessment will focus on the ability of the student to integrate course material and to implement that material in addressing issues related to biobased products and bioenergy.

Broad education in several disciplines integral to biobased products and bioenergy

- Completion of an approved (by BPBCC) program of study which meets subject matter criteria (direct measure).
- The BPBCC will administer an exit survey to each student at the completion of their program (indirect measure).

Demonstrated ability to utilize biobased and other renewable resources as energy sources and industrial raw materials as opposed to petroleum-based feedstocks

- Review of the student's multidisciplinary team project resulting from participation in the seminar course (direct measure).
- The BPBCC will administer an exit survey to each student at the completion of their program (indirect measure).

Demonstrated ability to integrate the subject areas identified above in their understanding and implementation of biobased products and bioenergy

- Review of the student's multidisciplinary team project resulting from participation in the seminar course (direct measure).
- The BPBCC will administer an exit survey to each student at the completion of their program (indirect measure).

3. When will these outcomes be assessed? When and in what format will the results of the assessment be discussed?

It should be noted that the essence of the assessment process centers on the student's multidisciplinary team project resulting from participation in the seminar course. This provides a very direct measure, similar to that of a portfolio. These assessments will be implemented from the outset of the program. The assessments themselves will be performed at the end of each semester following completion of the capstone experience seminar courses. The product of the design experience (written materials stored electronically along with the materials from a final presentation) will be stored on a CD. This material will be assessed as well by a rubric developed for these course materials so that a direct, quantifiable measure of the work is available in addition to the electronic portfolio itself.

In addition, upon completion of the graduate certificate, each student will undergo an exit interview. The BPBCC will design the instrument and will be responsible for performing the exit interviews.

4. What is the unit's process for using assessment results to improve student learning?

The assessed outcomes will be reviewed annually by the BPBCC before the start of the fall semester of the academic year based upon the electronic portfolio and exit interview of each student graduating in the previous academic year. The recommendations based upon this review will be utilized for modifications of the graduate certificate including, but not limited to, inclusion of courses within the program, program requirements, desired outcomes, and appropriateness of assessment tools.

Appendix V
Endorsements from Other Academic Units

**Email Response Received from Dr. Michael Kanost, Head
Department of Biochemistry**

From: <kanost@ksu.edu>
To: "John R. Schlup" <jrsch@ksu.edu>
Subject: Re: I need your assistance please
Date: Wednesday, January 07, 2009 11:03 AM

John,
This is to confirm that are aware of our inclusion of biochemistry
courses in the graduate certificate program on Biobased
Products and Bioenergy and that I approve of their inclusion.

Mike Kanost

Dr. John Schlup
Dept. of Chemical Engineering
Durland Hall
Kansas State University

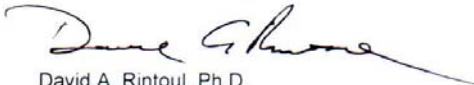
February 12, 2009

Dear Dr. Schlup

We have reviewed the materials that you provided re the proposed graduate certificate in Biobased Products and Bioenergy. Thank you for the opportunity to review this proposal, and to assess its impact on our programs here in the Division of Biology.

In general, it does appear that this proposal will have a negligible impact on enrollment in the Biology courses that are included as electives in the curriculum. However, it is probably also important for you to know that two of the Biology courses included in the curriculum (BIOL 800 and 801, Advanced Plant Physiology I and II, respectively) are not currently being offered because we do not have a faculty member with the appropriate expertise. These courses are still in the catalog, and it is possible that we will be able to include them a line schedule sometime in the future, but for now they are essentially unavailable for students in this program. I do not know if this will need to be reflected in a modified curriculum, but thought it best that you were fully aware of the situation for these two courses.

Sincerely



David A. Rintoul, Ph.D.
Associate Director
Division of Biology
KSU



Division of Biology
116 Ackert Hall
Manhattan, KS 66506-4901
785-532-6615
Fax: 785-532-6653

Email Response Received from Dr. Eric Maatta, Head Department of Chemistry

From: "John R. Schlup" <jrsch@ksu.edu>
To: "Eric Maatta" <eam@ksu.edu>
Subject: Re: Biobased Products and Bioenergy certificate
Date: Monday, January 05, 2009 12:47 PM

Eric Maatta wrote:

- > John -
- >
- > The Chemistry Department supports the inclusion of CHM 820 Materials
- > Chemistry as an elective for this certificate program.
- >
- > I also strongly encourage you and your colleagues to consider adding
- > CHM 766 Green Chemistry to the list. This is a relatively new course
- > that has been developed by Prof. Chris Levy, and is open to anyone
- > with graduate standing in Chemical Engineering.
- >
- > I've attached a copy of the 2008 CHM 766 syllabus, along with its
- > Course and Curriculum form.
- >
- > Eric



16 February 2009

Dr. John R. Schlup
Department of Chemical Engineering
105 Durland Hall
CAMPUS

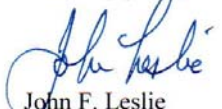
Department of Plant Pathology
4024 Throckmorton Plant
Sciences Center
Manhattan, KS 66506-5502
785-532-6176
Fax: 785-532-5692
<http://www.ksu.edu/plantpath>

Dear Dr. Schlup,

This letter is to indicate my department's support for the proposed interdisciplinary graduate certificate program in Biobased Products and Bioenergy. We look forward to the participation of the students who are obtaining this certification participating in relevant course in our department. We do not expect these students to significantly impact our ability to offer these classes.

If you have any further questions or need further assistance please do not hesitate to contact me again.

Sincerely yours,



John F. Leslie
Professor and Head