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WSU REGISTRAR

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Washington State University
MAJOR CURRICULAR CHANGE FORM - - COURSE
(Submit original signed form and ten copies to the Registrar's Office, zip 1035.)
See www.ronet.wsu.edu/ROPubs/ *for this form.*

Required Effective Date: ___1/1/2013_____ X New course X Temporary course ☐ Drop service course
(effective date cannot be retroactive) ☐ There is a course fee associated with this course
http://www.schedules.wsu.edu/Schedules/Apps/CourseFees.ASP

☐ Variable credit _____ ☐ Repeat credit (cumulative maximum _____ hours)

☐ Increase credit (former credit _____) ☐ Lecture-lab ratio (former ratio _____)

☐ Number (former number _____) ☐ Prefix (former prefix _____)

☐ Crosslisting (between WSU departments) **(Must have both departmental signatures)** ☐ Cooperative listing (UI prefix and number _____)
taught by: WSU ☐ UI ☐ jointly taught ☐

☐ Conjoint listing (400/500) ☐ S, F grading

☐ Request to meet Writing in the Major [M] requirement **(Must have All-University Writing Committee Approval)**

☐ Request to meet GER in _____ **(Must have GenEd Committee Approval)** ☐ Fulfills GER lab (L) requirement

☐ Professional course **(Pharmacy & Vet Med only)** ☐ Graduate credit **(professional programs only)**

☐ Other (please list request) _____

Crops	545	Quantitative Trait Improvement
course prefix	course no.	title

3	3			Graduate standing
credit	lecture hrs per week	lab hrs per week	studio hrs per week	prerequisite

Description (**20 words or less**) Understanding quantitative trait improvement, concepts and application, in modern plant breeding programs.

Instructor: Michael Pumphrey Phone number: 509-335-0509 Email: m.pumphrey@wsu.edu
Contact: Deb Marsh Phone number: 509-335-2615 Email: marshdj@wsu.edu

- Please attach rationale for your request, a detailed course outline/syllabus and explain how this impacts other units in Pullman and other branches (if applicable).
- Secure all required signatures and provide 10 copies to the Registrar's Office.

4/4/12	4/23/12	
Chair/date	**Dean/date**	**General Education Com/date**
Chair (if crosslisted/interdisciplinary)*	**Dean (if crosslisted/interdisciplinary) ***	**Graduate Studies Com/date**
All-University Writing Com/date	**Academic Affairs Com/date**	**Senate/date**

***If the proposed change impacts or involves collaboration with other units, use the additional signature lines provided for each impacted unit and college.**

MEMORANDUM

DATE: **March 9, 2012**

TO: **Kimberlee Kidwell, Associate Dean, Academic Programs**

FROM: **Michael Pumphrey, Assistant Professor, CSS**

SUBJECT: **CropS 545: Quantitative Trait Improvement-NEW Course Request**

This proposal is to add a new graduate level plant breeding course to be named 'Quantitative Trait Improvement', listed as CropS 545. It would be a 3 credit course taught two times weekly. It will be taught in Pullman with simultaneous delivery to off-campus students through DDP. This course is intended to fill a clear gap in our graduate curriculum and enhance plant breeding and genetics training at WSU. This course was identified as a high-priority among plant sciences faculty involved with reviewing our plant breeding and genetics curriculum. In addition to students in the Crop Science graduate program, this course should attract students from Horticulture, Plant Pathology, Molecular Plant Sciences, and other related graduate programs at WSU.

Requirements for New Course/Major Program Adjustment Requests

1. *Syllabus for the proposed course.* Attached

2. *Justification of how the proposed course or degree program aligns with the intentions of the academic program for the department in which it is housed, and how it aligns with the strategic plan for CAHNRS.* Plant breeding and genetics is an area of strength identified by faculty in the Dept of Crop and Soil Sciences, outlined as a core area of strength in recent strategic planning efforts. This course aligns very well with the CAHNRS Strategic Plan and supports goals 2, 4, 5, 6, 7, and 18. The course would focus on numerous aspects of the mission statement, including a) *contributing to a safe and abundant food supply*, b) *enhancing sustainability of agricultural systems*, and c) *promoting stewardship of natural resources.*

3. *A management plan, including name of the program manager, must be provided for degree programs.* Not Applicable

4. *Course delivery schedule: Identify who will teach the course, how often the course be offered and what delivery cycle (semester, odd year/even year) the course will be offered in.* CropS 545 will be offered spring semesters in odd years starting in 2013. Dr. Mike

Pumphrey is the instructor. This timing is based on careful analysis of existing curriculum for graduate students in plant sciences program in CAHNRS.

5. *A marketing plan for the course/program, including target audience, programs of study it will support, expected student numbers, and methods of advertising the course must be provided.* 'Quantitative Trait Improvement' is intended to attract graduate students from Crop Sciences, Horticulture, Plant Pathology, Entomology, and the Molecular Plant Sciences graduate programs at WSU. I anticipate that this course would attract approximately 20 graduate students when offered alternate years. This course will be advertised through appropriate graduate student and faculty list-serves, fliers posted, and word-of-mouth from faculty involved in plant breeding and genetics. As this is also a distance course, it will also be advertised through CDPE.

6. *Will the new course/program require redeployment of existing resources? If so, what will be the impact on existing courses and/or programs, teaching loads, research productivity, and service and outreach?* The course will not change existing resources. this would be part of Mike Pumphrey's academic appointment.

7. *Describe the funding model for the course if an instructor on permanent budget is not assigned to the course.* N/A

Crops 545
Quantitative Trait Improvement
3 credit hours- Spring 2013

Professor: Dr. Mike Pumphrey
Office 381 Johnson Hall.
Phone 335-0509
Email m.pumphrey@wsu.edu

I will respond to emails as soon as possible during working hours. Weekend and night correspondence may be limited or delayed until the beginning of the next workday. Please communicate in a clear and concise manner.

Office hours: By appointment

Lecture: Johnson Hall 204. Wed/Fri 3:10-4:35.

Attendance: Participation in each session is expected, as you will spend considerable time in discussion and working in small groups. Please notify me in advance if you will be gone due to research responsibilities, meetings, or professional conflicts.

Course Objective: This goal of this course is for students to understand quantitative trait improvement, concepts and application, in modern plant breeding programs.

Course Description and Format: This course will be a combination of short lectures and discussion focused on breeding for quantitative traits, including: practical breeding decisions and methods, population structures, population means and genetic variances, selection in and among populations, and application of DNA sequence information for quantitative trait analysis and improvement. We will focus heavily on concepts rather than detailed information and formulas that can readily be looked up in a textbook. You are expected to read assigned background information prior to coming to class and be prepared to discuss important principles, work on group problem sets, and present key papers during our time together.

Reference Text: Bernardo, R. 2010. Breeding for Quantitative Traits in Plants. Second Edition. Available at: http://stemmapress.com/book_info.html. I highly recommend you purchase this text.

Unofficial Prerequisites: The subjects covered assume that students have taken a course in plant breeding and a graduate course in statistics/experimental design. An introductory quantitative genetics course is also recommended, though the reference text provides adequate background information.

Course Evaluation: Grading of examinations, presentations, discussions, and the proposal will focus on demonstration of knowledge of concepts, not ability to memorize, derive, and/or calculate detailed formulas. Make-up work will only be allowed for valid, documented reasons.

Grades will be based on:
Four tests (60%)
25-minute presentation of a paper/topic (15%)
Five-page breeding project proposal (15%)
Questions for paper discussions (10%)

A =	93% +	B- =	80-82%	D+ =	67-69%
A- =	90-92%	C+ =	77-79%	D =	60-66%
B+ =	87-89%	C =	73-76%	F =	below 60%
B =	83-86%	C- =	70-72%		

Lecture questions: I will provide papers or other reference material to be read prior to each class. Similarly, papers selected for student presentations should be read by all prior to attending class. *You are required to prepare two insightful questions on this material prior to attendance each session.* **Please email your questions to me with the subject "Crops545 Questions".**

Presentation: Topics have been selected and randomly assigned to each student. A single paper is provided for the topic. Presentations should be a balanced coverage of the topic, emphasizing the quantitative genetic aspects. Please seek and include supporting literature/data to strengthen your coverage of the topic as appropriate. Your 25 minute presentation will be followed 5-10 minutes of discussion, driven by questions prepared by each of you prior to coming to class.

Proposal Assignment: The objective of this assignment is to develop/demonstrate an understanding of the complexity of breeding commercial crops. A crop species and target production region has been randomly assigned to everyone.

Dates
March 1. Pre-proposal due: 1 page- title, rationale and summary of objectives. Feedback will be provided within one week to shape development of your full proposal.

April 24. Proposal due

In a 5 page proposal (single spaced, not including references, 2 additional pages allowed for tables or figures), you will concisely outline a breeding program to develop commercially viable cultivars/hybrids in an emerging/under-developed market. Assume you have reasonable, but not unlimited, financial resources for such activities, and a staff of two-three full time employees and adequate seasonal labor. Proposals should demonstrate knowledge of quantitative genetic principles and cite relevant and convincing literature where possible. The rubric for proposal evaluation is included at the end of the syllabus.

Essential components:
1) Identify traits of primary importance (must have's) for successful variety release/adoption:

-essential agronomics, market requirements, end-use qualities, disease/pest resistances

-describe the inheritance of these traits and/or recognize research opportunities to address information gaps

2) Describe germplasm and genetic resources to be used or created for trait improvement and describe breeding method(s)
3) Identify screening locations/selection methods used in each generation:
   -number of populations and population sizes
   -selection intensity, index?
   -screening tools/methods
4) Indicate potential/desired use of modern molecular tools where appropriate or beneficial.
5) Summarize how your efforts will benefit or strengthen the industry or product supply and give a timeline for such expectations to be realized.

Student Learning Outcomes:

1) Differentiate between qualitative and quantitative traits
2) Evaluate the quality of phenotypic trait data
3) Describe the one-locus model used in quantitative genetics
4) Describe the relationship between the mode of reproduction, the predominant types of genetic effects, and the desired type of cultivar
5) Outline a breeding program for a self pollinated crop and for a cross pollinated crop
6) Estimate or predict allele frequencies in a population
7) Give rules of thumb for the appropriate size of breeding populations
8) Differentiate between genotypic value and phenotypic value
9) Illustrate the dependence of genotypic values on the environment
10) Define and describe the concepts of breeding value, dominance deviations, and epistatic effects
11) Predict the mean/testcross mean of recombinant inbreds
12) Discuss criteria for determining whether to derive progeny from an F_2 or a backcross population between two inbreds
13) Discuss methods of identifying QTL and determining the value of a QTL
14) Discuss whether or not favorable alleles at QTL are easily fixed in a breeding population
15) Discuss methods/techniques for enrichment of favorable QTL alleles
16) Compare DNA marker systems and their utility in plant breeding

WSU Safety Information: alert.wsu.edu. Washington State University is committed to maintaining a safe environment for its faculty, staff, and students. Safety is the responsibility of every member of the campus community and individuals should know the appropriate actions to take when an emergency arises. In support of our commitment to the safety of the campus community the University has developed a Campus Safety Plan, http://safetyplan.wsu.edu. It is highly recommended that you visit this web site as well as the University emergency management web site at http://oem.wsu.edu/emergencies to become familiar with the information provided.

Campus Resources

- Writing Center, http://www.writingprogram.wsu.edu/units/writingcenter/
- Library Services, http://www.wsulibs.wsu.edu/
- CACD, Center for Advising and Career Development, http://www.cacd.wsu.edu/
- Office of Student Conduct, http://conduct.wsu.edu
- Counseling and Testing Services, http://counsel.wsu.edu/
- Academic Integrity, http://academicintegrity.wsu.edu

Students with Disabilities: Reasonable accommodations are available for students with a documented disability. If you have a disability or may need accommodations to fully participate in this class, please visit the Access Center. All accommodations MUST be approved through the Access Center (Washington Building, Room 217). Please stop by or call 509-335-3417 to make an appointment with a disability specialist. http://accesscenter.wsu.edu

Plagiarism and Cheating policy: (www.conduct.wsu.edu/) Copyright and Intellectual Property WAC 504-25-018. **Academic dishonesty of any kind or degree will not be tolerated.** Academic integrity is a core component of graduate student and professional behavior. Any student caught cheating on any assignment will be given an F grade for the course and will be reported to the Office Student Standards and Accountability. Cheating is defined in the Standards for Student Conduct WAC 504-26-010 (3). It is suggested that you read and understand these definitions: http://conduct.wsu.edu/default.asp?PageID=338

CropS 545 **Quantitative Trait Improvement** **Spring 2013**

Lecture Outline

W, F 3:10-4:25
Johnson 204

Professor Mike Pumphrey
381 Johnson Hall
m.pumphrey@wsu.edu

Date	Text Chapter	Topic
Jan 9	1	Syllabus/course overview; Plant Breeding and Society
11	2	Allele frequencies and linkage
16	2	Populations sizes-theoretical and practical considerations
18	2	Inbreeding, relatedness, and parental contributions
23	3	Phenotype and genotype values
25	3	Breeding values and deviations due to dominance
30		**Test #1**
Feb 1	4	Parent selection-population means
6	4	Parent selection-population means
8	5	Identifying quantitative trait loci
13	5	Validating quantitative trait loci
15	5	QTL mapping considerations-biotic/abiotic stresses
20		**Test#2**
22	6	Phenotypic and genetic variances
27	7	Genetic variances
March 1	7 **Pre-proposal**	Estimating genetic variances
6	8	GxE
8	8	GxE
13	*Spring Break*	
15	*Spring Break*	
20		**Test# 3**
22	9	Inbred and Testcross selection
27	9	QTL selection
29	10	Recurrent selection
April 3	10	Marker-assisted recurrent selection and long term selection
5	11	Genome-wide selection
10	13	Multiple trait/Index selection
12		**Test #4**
17		Resource allocation in applied breeding programs
19		Sample tracking, quality control, and database considerations
24	**Proposal Due**	Modern equipment for field trial management
26		Plant Variety Protection, Patents, and Intellectual Property

Lecture topics/guest lecture periods may change at the discretion of the instructor.

ORAL PRESENTATION RUBRIC
NAME_____

Element	Excellent (15)	Above Average (12)	Average (9)	Needs Improvement (5)	Score
Organization of Content and Originality	Logical, intuitive sequence of information. The product shows significant evidence of originality and inventiveness.	Logical sequence of information. The product shows evidence of originality and inventiveness.	Some logical sequence of information. There is some evidence of new thought or inventiveness.	No logical sequence of information. There is no evidence of new thought.	
Subject Knowledge	Subject knowledge is evident throughout the entire product. Info is clear, appropriate, and correct. Student demonstrates full knowledge (more than required) with explanations and elaborations.	Subject knowledge is evident in much of the product. Information is clear, appropriate, and correct. Student is at ease with content, but fails to elaborate.	Some subject knowledge is evident. Some information is confusing, incorrect or flawed. Student is uncomfortable with information and is able to answer only simple questions	Subject knowledge is not evident. Information is confusing, incorrect or flawed. Student does not have grasp of information; student cannot answer questions about subject	
Information Literacy	Gathered information from a variety of quality refereed sources. Sources are relevant, balanced and include critical info relating to the thesis or problem.	Gathered information from a variety of relevant refereed sources and at least one personal interview	Gathered information from a limited range of sources and displayed minimal effort in selecting quality or relevant resources	Gathered information that lacked relevance, quality, depth and balance.	
Slide Design	The slides are designed in a way that conveys clear information. Balance, color, readability, spacing are all considered when designing the slides.	The slides are designed in a way that conveys clear information, yet one of the following is missing when designing the slides; balance, color, readability, or spacing	The slides are designed in a way that does not convey clear information. many of the following are missing when designing the slides; balance, color, readability, or spacing	That slides are not clear. They are designed in a way that lack proper balance, color, readability, and spacing.	
Mechanics	Presentation has no misspelling or grammatical errors.	Presentation has fewer than two misspellings and/or grammatical errors.	Presentation has three or more misspellings and/or grammatical errors.	Presentation has four or more spelling errors and/or grammatical errors.	
Communication Skills	The presenter paces information effectively, speaks in a clear voice, uses proper posture and maintains good eye contact throughout the presentation.	The pace of the information does not hold attention effectively and is missing one of the following: 1. Speaks in a clear voice 2. Uses proper posture 3. Maintains good eye contact throughout the presentation.	Information does not hold attention effectively and is missing the following: 1. Speaks in a clear voice 2.Uses proper posture 3. Maintains good eye contact throughout the presentation 4. Uses LIKE, ANDS, UMS or YA KNOW phrases.	Did not present information in an organized or planned fashion is missing the following: 1. Speaks in a clear voice well 2. Uses proper posture 3. Maintains good eye contact throughout the presentation 4. Uses LIKE, ANDS, UMS or YA KNOW phrases	
Appearance/ Professionalism (10 point scale)	The presenters are well dressed and use a vocabulary that is conducive to professional conduct	The presenters are somewhat well dressed and vocabulary is limited	The presenters are not well dressed and vocabulary is limited; used some slang terms	The presenters are not well dressed and use much slang or profanity	

Proposal Rubric

Name _____

Executive Summary (5 points)
Please include a 250 summary of the proposed breeding activity ____

Introduction (15 points)
The crop, genetic system, and breeding emphasis/rationale are well introduced ____
Clearly state objective(s) of the proposal ____

Methods and Materials (40 points)
The approach is well described ____
To what extent are the approach and materials:
Relevant? ____
Accurate? ____
Complete? ____
To what extent does the approach show logical reasoning? ____
To what extent is there sufficient knowledge of the subject demonstrated? ____
To what extent does the use of specialized terms/concepts demonstrate understanding? ____

Expected Results (15 points)
Are the expected results convincing/in-line with the approach? ____
Is the timeline clear? ____
Is the benefit to the industry or stakeholders clear ____

Quality of writing (25 points)
How well does the introduction and approach connect with the goal? ____
Readability ____
Flow ____
Present the information clearly ____
Not redundant ____
Punctuation, spelling, typos … ____
Correctness of grammar; writing style and vocabulary ____
How accurately and completely is the information cited? ____