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

**Required Effective Date:** 08/01/2014  
- ☐ New course  
- ☐ Temporary course  
- ☐ Drop service course  
- ☐ There is a course fee associated with this course  
  - [http://www.schedules.wsu.edu/Schedules/ Apps/ CourseFeesASP](http://www.schedules.wsu.edu/Schedules/ Apps/ CourseFeesASP)

- ☐ Variable credit  
- ☐ Increase credit (former credit ___)  
- ☐ Number (former number ___)  
- ☐ Crosslisting (between WSU departments)  
  - (Must have both departmental signatures)
- ☐ Conjoint listing (400/500)  
- ☐ S, F grading  
- ☐ Repeat credit (cumulative maximum ___ hours)  
- ☐ Lecture-lab ratio (former ratio)  
- ☐ Prefix (former prefix ___)  
- ☐ Cooperative listing (UI prefix and number ___)  
  - taught by: WSU [X] UI [ ] jointly taught [ ]

- ☐ 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) ___

<table>
<thead>
<tr>
<th>Crop, Sci</th>
<th>555</th>
<th>Epigenetics in Plants</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Prefix</td>
<td></td>
<td>Title</td>
<td>----------</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>Recommended preparation: General genetics</td>
<td>prerequisite</td>
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</tbody>
</table>

**Description (20 words or less):** Understanding principles of epigenetics in plants with a focus on its role in understanding and improving plant genomes and their adaptation to changing environments.

**Instructor:** Kulvinder Gill  
**Contact:** Deb Marsh

- Phone number: (509) 335-4666  
- Email: kulvindergill@loloud.com

- Phone number: (509) 335-2815  
- Email: marshdj@wsu.edu

- Chair/date: 10/15/13  
- Dean/date: 1/28/13  
- 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: 10 October 2013

TO: Kimberlee Kidwell, Executive Associate Dean, Academic Programs

FROM: Kulvinder S. Gill, Professor, CSS

VIA: Dr. James Harsh, Chair

SUBJECT: Crop_Sci 555, Epigenetics in Plants

I am proposing to start a new graduate level course “Epigenetics in Plants”. It would be a 2 credit course taught twice weekly. It will be taught in Pullman with simultaneous delivery to off-campus students using AMS services. Epigenetics was identified as a major gap in our graduate plant sciences curriculum after discussions among faculty from various departments including that from the Molecular Plant Sciences (MPS) program. I expect that the course will appeal to graduate students from Crop and Soil Sciences, Horticulture, Plant Pathology, and MPS.

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.

Epigenetics in Plants was developed after identifying critical gaps in our graduate program offerings which identified this area as one of those gaps. The proposed course is expected to complement the current course offering in the general area of plant sciences and will fill the curriculum gap. Epigenetics plays a significant role in controlling biological processes, especially for economically important plants. As a result it is a critical need for plant sciences and is both a logical and needed addition to our curriculum. The course would align very well with the CAHNRS Strategic Plan. The course would focus on numerous aspects of the mission statement, including a) contributing to a safe and abundant food supply, and b) enhancing sustainability of agricultural systems.

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.

   The proposed course will be offered alternate years (even number of years) starting with Fall 2014. Kulvinder Gill will be the instructor.

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.

   The proposed course is designed to attract graduate students from various WSU departments and programs. It would be of particular interest to the graduate students from Crop and Soil Sciences, Horticulture, Plant Pathology, and in the MPS program. I anticipate that this course would attract approximately 10-15 students. It will be capped at 25 students. This course would be advertised vigorously through appropriate list-serves, fliers posted and emailed around campus, and word-of-mouth from instructors teaching related courses.

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?**

   Kulvinder Gill has been teaching Crop_Sci 554. The department is suggesting to drop this course because of the lack of students interested in that course. Because Kulvinder Gill will teach the proposed course instead of Crop_Sci 554, no new resources will be needed.

7. **Describe the funding model for the course if an instructor on permanent budget is not assigned to the course.** Not applicable.
Crop Sci 555 –rop SciEpigenetics in plants (2cr)  Fall 2014

The course will target understanding principles of epigenetics in plants with a focus on its role in understanding and improving plant genomes and their adaptation to changing environment.

Meeting Room:  Johnson Hall 204

Time:  Tu, Th, 12:10

Instructor:  Kulvinder Gill (ksgill@wsu.edu) 277 JSN, Phone: 5-4666

Office hours: Immediately after the class or by appointment

Course Prerequisites:  Recommended preparation:  General genetics

Reference Material:

-  Recent original and review articles on the discussion topics

Student Learning Outcomes for the Course:

Students are expected to be able to:

1. Explain major concepts and theories of epigenetic inheritance and appreciate its importance in plant development
2. Describe role of epigenetics in crop improvement
3. Describe key mechanisms of epigenetic regulation
4. Articulate role of epigenetics in plant’s response to changing environment and abiotic stresses
5. Comprehend concepts of RNAi and its application in crop improvement.
6. Critically evaluate literature and improve their oral and written communication skills.

Course Outline

<table>
<thead>
<tr>
<th>Lecture (Week)</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1.</td>
<td>Introduction, DNA structure and folding</td>
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<tr>
<td>2.</td>
<td>Histone code</td>
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<tr>
<td>3.</td>
<td>Genes involved in Epigenetic regulation</td>
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<tr>
<td>4.</td>
<td>Mechanisms of Epigenetic regulation</td>
</tr>
<tr>
<td>5.</td>
<td>Epigenetic regulation of genome stability</td>
</tr>
<tr>
<td>6.</td>
<td>Epigenetic modifications in response to environmental stress</td>
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</tbody>
</table>
7. Epialleles in response to abiotic stress: methylation and trait variation
8. Epigenetic control of other agronomic traits
9. Epigenetic in crop improvement: Epigenetic control of other agronomic traits
10. Heritable vs. transient epigenetic modifications
11. Epigenetics in controlling transposon mobility
12. RNAi: General mechanisms
13. Applications of RNAi in crop improvement
14. Term paper presentations and discussion
15. Term paper presentations and discussion

Evaluation and Grading

Grading:
There will be a midterm exam (in class and/or take home) and a comprehensive final exam. There will be frequent pop quizzes and take-home exercises. All these exams and quizzes will cover the first five student learning outcomes.

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Quizzes/Take-home exercises</td>
<td>15%</td>
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<tr>
<td>Term paper</td>
<td>20%</td>
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<tr>
<td>Class discussion/participation</td>
<td>05%</td>
</tr>
<tr>
<td>Midterm</td>
<td>20%</td>
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<tr>
<td>Final</td>
<td>40%</td>
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</table>

90% or more  A
87.1-89.9%  A-
84.1-87%  B+
81.1-84%  B
78.1-81%  B-
75.1-78%  C+
72.1-75%  C
69.1-72%  C-
66.1-69%  D+
60 -66%  D
<60%  F

Term paper:
University regulation states that a paper may not be turned in for graded credit more than once. You may not just redo an old paper. This paper must be a new one.
You will be expected to write and present a term paper on a topic selected based on the recent literature. The term paper will be evaluated based on the quality and
thoroughness of the literature review, systematic presentation of the facts along with your own opinions about the material, epigenetic concepts and theories, and their application in abiotic stress tolerance and crop improvement. The presentation will be evaluated based on the presentation material, logical presentation of the material, and on the presentation discussion.

**Quizzes and take-home exercises:** There will be un-announced quizzes in the class and take home exercises. The total number will be less than 15. The quizzes and take-home exercises will account for 15% of the grade. Points for each quiz or term-paper may range from 10 to 40 depending upon the nature of the material covered and work required for the exercise. Total of all the exercises will then be converted into 15% of the grade.

**You are expected to have textbook knowledge of:**
- Laws of Inheritance
- DNA structure
- Meiosis and Mitosis
- Principles of Genetics

You will find these topics in any textbook on genetics, molecular genetics, or molecular biology.

**Attendance policy:** Attendance is required and prior approval is needed for any absence. You will lose 0.5% for each unapproved absence up to a maximum of 10%.

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

**Academic Integrity**
As an institution of higher education, Washington State University is committed to principles of truth and academic honesty. All members of the University community share the responsibility for maintaining and supporting these principles. When a student enrolls in Washington State University, the student assumes an obligation to pursue academic endeavors in a manner consistent with the standards of academic integrity adopted by the University. To maintain the academic integrity of the community, the University cannot tolerate acts of academic dishonesty including any forms of cheating, plagiarism, or fabrication. Washington State University reserves the right and the power to discipline or to exclude students who engage in academic dishonesty.”
Students found responsible for academic integrity violations may receive an F on the particular assignment or exam, as well as an F for the course. Repeated and/or serious offenses may result in referral to the conduct board and expulsion from WSU. For graduate students, academic integrity violations may also result in the loss of teaching and/or research assistantships.

Academic Integrity Statement and link to WSUgrity viol

http://www.wsulibs.wsu.edu/plagiarism/main.html
http://conduct.wsu.edu/academic-integrity-policies-and-resources/

**Campus Safety Plan**
The Campus Safety Plan, which can be found at http://safetyplan.wsu.edu, contains a comprehensive listing of University policies, procedures, statistics, and information relating to campus safety, emergency management, and the health and welfare of the campus community. All faculty, staff, and students are encouraged to visit this web site as well as the University emergency management web site at http://oem.wsu.edu/Emergencies.html to become familiar with the campus safety and emergency information provided.
### Assessment of Student Learning Outcomes (Course Objectives) - Crops555

<table>
<thead>
<tr>
<th>Student Learning Outcomes (Course Objectives)</th>
<th>Assessment Methods</th>
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<tbody>
<tr>
<td>Should be able to explain major concepts and theories of epigenetics</td>
<td>Class discussions, exams, quizzes and take home exercises.</td>
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<tr>
<td>Should be able to state role of epigenetics in crop improvement</td>
<td>Class discussions, exams, quizzes and take home exercises, term paper and presentation</td>
</tr>
<tr>
<td>Should be able to state key mechanisms of epigenetic regulation</td>
<td>Class discussions, exams, quizzes and take home exercises.</td>
</tr>
<tr>
<td>Should be able to articulate role of epigenetics in abiotic stress tolerance</td>
<td>Term-paper and presentations, exams and quizzes.</td>
</tr>
<tr>
<td>Comprehend concepts of RNAi and its application in crop improvement.</td>
<td>Class discussions, exams, quizzes and take home exercises.</td>
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<td>Should be able to critically evaluate literature and improve their oral and written communication skills.</td>
<td>Class discussions, term-paper and presentations</td>
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