



Topics to be covered are provided in the table below. This is a draft schedule which is subject to change without prior notice based on time required to cover each topic or availability of some key invited outside speakers

SECTION 1	Topic	Keywords
Tues	Introduction	
Thurs	Fundamentals of molecular biology: The Central Dogma	Central dogma, replication, gene regulation, epigenetics
Tues	Recombinant DNA: Design and Manipulation of DNA	Restriction digestion, plasmid replication, plasmid design, transformation vectors, nuclear vs chloroplast transformation, protein targeting
Thurs	Genetic Diversity - fundamentals and assessment - marker-based techniques	Markers, Analog and digital markers, AFLP, TRAP, SNP, SNParray, Microarray
Tues	DNA sequencing: The technology	Sanger sequencing, Illumina sequencing, pyrosequencing, bioinformatics
Thurs	DNA sequencing: The data	Polymorphisms, mutation, evolution, genomes, gene discovery, genome arrangement, phylogeny, polymorphisms, genomes, gene discovery, transposons, viral DNA
Tues	Review of topics covered till date	N/A
Thurs	TEST	N/A
<b>SECTION 2</b>		
Tues	Identifying traits of interest and Forward Genetics	Phenotyping, Traits, invasive/destructive sampling
Thurs	DNA Recombination and Inheritance of Traits	Recombination, inheritance, ploidy, self-pollination, cross-pollination
Tues	Genome Cartography: Markers and Genetic Maps	Markers, Genetic Maps, QTL analysis, Association mapping, Pedigree mapping
Thurs	Mapping traits to genes	Trait mapping, Forward Genetics
Tues	High-throughput Phenotyping: Using	Non-invasive sampling, automation, engineering, optics, real-time measurement

	chlorophyll to rapidly assess plant health	
Thurs	Mining the data: Inferring phenotypes	Transcriptome, metabolome, Proteome, bioinformatics
Tues	Case studies of marker-based genetic analysis	AFLP, TRAP, SNP, chloroplast sequencing, pedigree, mapping
Thurs	Case studies of data mining	transcriptomics, gene discovery, expression clusters, gene-trait association
Tues	Review of topics covered so far	N/A
Thurs	TEST of topics covered so far from the start of the class	N/A
SECTION 3		
Tues	Traditional breeding: using the existing diversity	Traditional, marker assisted, fastrack breeding
Thurs	Novel approaches to crop improvement: building genetic diversity	Mutation breeding, chromosomal mutation, ploidy mutation, TILLING, reverse genetics in model systems, 'seedless' fruit
Tues	In vitro plant culture	In vitro, tissue culture, plant hormones, somatic embryogenesis, organogenesis
Thurs	Techniques in genetic engineering: tools of the trade	Agrobacterium, Gene Gun, Protoplasts, Floral dip, plasmids, selectable markers
Tues	The New Frontier of Genome Editing - What's the deal with CRISPR-Cas9?	TALENs, Zinc-finger Endonucleases, CRISPR-Cas9
Thurs	Case Studies in currently deployed technologies: Producer-based appeal	Bt, Roundup-Ready, Rainbow Papaya, Mildew-Resistant Squash, Flavr-Savr, Terminator technology
Tues	Case Studies in Emerging technologies: Consumer-based appeal and regional needs	Artic Apple, Non-browning mushroom, American Chestnut, Golden Rice, Crispr-Cas9
Thurs	Genetic engineering as a response to new threats	Climate change, emerging plant disease, Coffee rust, wheat rusts (UG-99), Citrus Greening/Huanglongbing, Fusarium wilt, downy mildew
Tues	<b>THANKSGIVING BREAK</b>	
Thurs	<b>THANKSGIVING BREAK</b>	
Tues	Review session	
Thurs	Comprehensive Exam - covers all topics	N/A
Tues	Communication in Genetic Engineering: Pros and Cons	Ethics, GMO, GE, DNA, Public Perception, GRAS, Regulation

	of the technology	
Thurs	Addressing the myths of GE	Ethics, GMO, GE, DNA, Public Perception, GRAS, Regulation

**Grading Policy:**

A 94-100    B+ 87-89    C+ 77-79    D+ 67-69    F < 60  
A- 90-93    B 84-86    C 74-76    D 60-66  
B- 80-83    C- 70-73

	Weight
Attendance	10%
Student Group Discussion	25%
Review Tests (2)	40%
Comprehensive Review Test	25%
Total	100%
Extra credit – paper review (off campus) or attending Academic Showcase (Pullman)	10%

**Attendance policy:** All students are expected to attend and participate in all meetings of the courses in which they are enrolled; any absence is incurred at the student’s own risk and will impact your grade. For Hort 480 a total of **4 absences are excused** after which each absence will result in 2% grade loss of your attendance grade. This is meant to apply to unforeseen illness, traveling for academic meetings, collegiate sports, general malaise, bad hair days, etc. Please plan accordingly and do not expect special treatment except perhaps for the most unusual of circumstances. Extremely unusual. Examples include, and are probably limited to: extended alien abduction (with video proof) and the Tuesday following the Apple Cup\*. Refer to Academic Regulation section 71-73 for additional information.

*\*only applicable if the Cougs are victorious.*

**Students with Disabilities:** Reasonable accommodations are available for students with a documented disability. If you have a disability and need accommodations to fully participate in this class, please either visit or call the Access Center (Washington Building 217; 509-335-3417) to schedule an appointment with an Access Advisor. All accommodations **MUST** be approved through the Access Center. For more information contact a Disability Specialist on your home campus:

**Pullman or WSU Online:** 509-335-3417 <http://accesscenter.wsu.edu>, [Access.Center@wsu.edu](mailto:Access.Center@wsu.edu)  
**Spokane:** <http://spokane.wsu.edu/students/current/studentaffairs/disability/>  
**Tri-Cities:** <http://www.tricity.wsu.edu/disability/>  
**Vancouver:** 360-546-9138 <http://studentaffairs.vancouver.wsu.edu/student-resource-center/disability-services>

**WSU Academic Integrity:** Academic integrity is the cornerstone of the university. You assume full responsibility for the content and integrity of the academic work you submit. You

may collaborate with classmates on assignments, with the instructor's permission. However the guiding principle of academic integrity shall be that your submitted work, examinations, reports, and projects must be your own work. Any student who violates the University's standard of conduct relating to academic integrity will be referred to the Office of Student Conduct and may fail the assignment or the course. You can learn more about Academic Integrity on your campus using the URL listed in the Academic Regulations section or to <http://conduct.wsu.edu/academic-integrity-policies-and-resources>. Please use these resources to ensure that you don't inadvertently violate WSU's standard of conduct.

**WSU Safety: Pullman:** “Washington State University is committed to enhancing the safety of the students, faculty, staff, and visitors. It is highly recommended that you review the Campus Safety Plan (<http://safetyplan.wsu.edu/>) and visit the Office of Emergency Management web site (<http://oem.wsu.edu/>) for a comprehensive listing of university policies, procedures, statistics, and information related to campus safety, emergency management, and the health and welfare of the campus community.”

**Tri-Cities:** “In order to receive notification regarding campus emergencies (including campus closures), all faculty, staff, and students register their emergency contact information for the Crisis Communication System (CCS) through Zzusion at <http://zzusion.wsu.edu>. Click “Update Now!” under “Tri-Cities Emergency Info” to register for notification by text message, e-mail, telephone, or any combination of the three. Providing multiple contact methods will help ensure you receive notifications in a timely manner, and your information will NOT be used for any other purpose. Messages regarding campus emergencies will also be distributed through local media. Please also review the Campus Safety Plan, which contains a listing of emergency contacts, and university policies, procedures, statistics, and information relating to campus safety and the health and welfare of the campus community. The Campus Safety Plan can be found at <http://www.tricity.wsu.edu/safetyplan/>.”