**GDCB/BCB/ME 585 (4 credits)**

Foundations of Predictive Plant Phenomics   
Fall 2019 Syllabus

**Class:**MWF 9:00 am - 9:50 am @ 1424 Molecular Biology Building

**Lab:**Tu 8:00 am - 10:50 am, location varies

**Instructor:**Dr. Carolyn J. Lawrence-Dill ([triffid@iastate.edu](mailto:triffid@iastate.edu))  
                    0035B [Roy J. Carver Co-Lab](http://www.fpm.iastate.edu/maps/default.asp?zoom=2&xcenter=1603&ycenter=1703&background=map&layer=buildingnames&xshow=1358&yshow=1452)                    294-4294

**Contact:**The best way to contact your instructor is by email. Office hours for CJLD are 2-4 PM Wednesdays *and require an appointment*.

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**Course description:**Principles of engineering, data analysis, and plant sciences and their interplay applied to predictive plant phenomics. Transport phenomena, sensor design, image analysis, graph models, network data analysis, fundamentals of genomics and phenomics. Multidisciplinary laboratory exercises.

**Text:**None.

**Online:**Various resources are available. Use online dictionaries where jargon is prevalent. Assignments will be announced in class and posted on Blackboard. For labs, material for preparation outside of class will be assigned.

**Canvas**will be used to report grades and post other class materials. To access Canvas, go to the Iowa State Homepage (http://www.iastate.edu), and click "Sign Ons" link in the top right, choose Canvas or visit ([http://canvas.iastate.edu](http://canvas.iastate.edu/))To login, enter your NET ID (that part of your ISU e-mail address before @) and your e-mail password.

**Attendance is mandatory.**Each student is allowed two excused absences. If you have a legitimate conflict beyond the two excused absences (scheduled hospitalization, ISU-sponsored sports event, educational trip, etc.) **you must notify the instructor in advance of your absence and share documentation.**Please do not come to class if you get the flu or an infectious disease.

**Assessment**: Grades will be assessed based on: daily attendance and submission of a paragraph describing the utility of the day’s subject matter, laboratory exercises, formal presentation(s) for the class, and a final report on the laboratory. If you have a legitimate conflict (scheduled hospitalization, ISU-sponsored sports event, educational trip, etc.) **you must make arrangements prior to the exam.**

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| --- | --- | --- |
|  | Attendance & Daily Note | 45 points |
|  | Laboratory Exercises | 45 points |
|  | Presentation | 30 points |
|  | Laboratory Final Report | 30 points |
|  | **Total** | **150 points** |
|  |  |  |

Please note: attendance and daily notes constitute more than half your grade!

The following grading scale will be used:

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| --- | --- | --- |
|  | A | 135+ points |
|  | B | 120+ points |
|  | C | 105+ points |
|  | D | 90+ points |
|  | F | below 90 points |

The instructor reserves the right to use +/- grading within the above-stated grading scale.

**Tentative Schedule by Week**

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| --- | --- | --- | --- |
|  | **Week** | **Topic/activity/event** | **Lab** |
|  | 1 | Course overview,  how to present and visualize data | Intro: plants and sensors |
|  | 2 | Biology and molecular biology | Plant measurements |
|  | 3 | Genetics and cytogenetics | Plant dissections |
|  | 4 | Plant biology | DNA and cytogenetics |
|  | 5 | Plant biology and genomics | Matlab intro |
|  | 6 | Comparative genomics | Annotating gene structures |
|  | 7 | Recombinant DNA techniques, GMOs | GWAS |
|  | 8 | Plant stress | Controlled environments |
|  | 9 | Optics, image analysis | Transparent soil systems |
|  | 10 | Transport phenomena | Image processing |
|  | 11 | Heat transfer | Visualization methods |
|  | 12 | Graph models, network analysis | Network construction |
|  |  |  |  |
|  | **13** | **Thanksgiving** |  |
|  | 14 | Machine learning | Crowdsourcing |
|  | 15 | Optimization | Project reports |
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**Course Goals:**Enable students to speak across engineering, data science, and plant science disciplines. Understand how biological concepts fit with computational representations of the data.

**Student Learning Outcomes:**

1. Students will achieve fundamental understanding of how plant science, engineering, and data science can be used together for research.
2. Students will be able to formulate a hypothesis and then design computational experiments that test that hypothesis.
3. Students will be able to take information learned in one context and transfer/apply it to a different context.
4. Students will be able to articulate ideas outside their own primary disciplines and find others to work with where their skills are insufficient to pursue meaningful research.
5. Students will be able to graphically represent experimental data in a meaningful way.

**Academic Dishonesty:**The class will follow Iowa State University’s policy on academic dishonesty. Anyone suspected of academic dishonesty will be reported to the Dean of Students Office. <http://www.dso.iastate.edu/ja/academic/misconduct.html>

**Disability Accommodation:**Iowa State University is committed to assuring that all educational activities are free from discrimination and harassment based on disability status. All students requesting accommodations are required to meet with staff in Student Disability Resources (SDR) to establish eligibility. A Student Academic Accommodation Request (SAAR) form will be provided to eligible students. The provision of reasonable accommodations in this course will be arranged after timely delivery of the SAAR form to the instructor. Students are encouraged to deliver completed SAAR forms as early in the semester as possible.  SDR, a unit in the Dean of Students Office, is located in room 1076, Student Services Building or online at [www.dso.iastate.edu/dr.](http://www.dso.iastate.edu/dr/)Contact SDR by e-mail at [disabilityresources@iastate.edu](mailto:disabilityresources@iastate.edu) or by phone at 515- 294-7220 for additional information.

**Dead Week:**This class follows the Iowa State University Dead Week policy as noted in section 10.6.4 of the Faculty Handbook  <http://www.provost.iastate.edu/resources/faculty-handbook>.

**Harassment and Discrimination:**  Iowa State University strives to maintain our campus as a place of work and study for faculty, staff, and students that is free of all forms of prohibited discrimination and harassment based upon race, ethnicity, sex (including sexual assault), pregnancy, color, religion, national origin, physical or mental disability, age, marital status, sexual orientation, gender identity, genetic information, or status as a U.S. veteran. Any student who has concerns about such behavior should contact his/her instructor, Student Assistance at 515-294-1020 or email [dso-sas@iastate.edu,](mailto:dso-sas@iastate.edu) or the Office of Equal Opportunity and Compliance at 515-294-7612.

**Religious Accommodation:**If an academic or work requirement conflicts with your religious practices and/or observances, you may request reasonable accommodations. Your request must be in writing, and your instructor or supervisor will review the request. You or your instructor may also seek assistance from the Dean of Students Office or the Office of Equal Opportunity and Compliance.

**Contact Information:** If you are experiencing, or have experienced, a problem with any of the above issues, email [academicissues@iastate.edu](mailto:disabilityresources@iastate.edu).

**Last Comments**

Be sure that everything you turn in has your name, exercise number, and the exercise statement annotated.

Please make note of the below image when crafting email communications to the instructor.

The instructor reserves the right to vary from this syllabus and probably will.

