

COMPARISON OF FACE-TO-FACE AND ONLINE OUTCOMES FOR PHYSICS 100

WAPT ANNUAL MEETING PRESENTATION

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THE COURSE

Physics 100 *Energy in Today's World*

Basic energy concepts; energy sources and processes; projected depletion of present resources; role of conservation, research, development; alternatives and prospects for the future. 2 hrs lec, 2 hrs lab per wk.

- Satisfies **Quantitative Literacy** GEP requirement, (not natural science)
- Satisfies **Environmental Responsibility** GEP requirement.

Mechanical Energy

Course introduction, definition of work
Work and mechanical energy
Conservation of mechanical energy

Thermal Energy

Temperature
The laws of thermodynamics
Thermal energy transfer
Heat engines and the 2nd law of thermodynamics

Electrical Energy

Electric charges and voltage
Electric circuits
Magnetism
Faraday's law
Electric power generation and distribution

Nuclear Fission Energy

The nucleus and radioactive decay
Energy from nuclear fission

Fossil Fuel Energy

Energy from oil
The US fossil fuel energy mix

Environmental Effects

The greenhouse effect and global warming
Air pollution

Solar and Wind Energies

Solar thermal energy
Solar photovoltaic energy
Wind Energy

New Energy Strategies

Biomass energy
Geothermal energy
Energy from nuclear fusion
Fuel cells
The hydrogen economy

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THE ONLINE VERSION

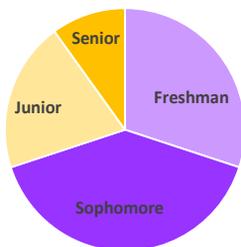
- Nearly identical assignments as face-to-face version.
- Each lecture broken into short video segments, avg 37 min total
- Students answer “in-class,” homework, quiz questions in Canvas
- Video labs, students must analyze data (often in Excel) and answer questions in Canvas
 - Lab handout
 - Theory video
 - Data video
- Exams must be proctored.
 - More than 80% took exams in person with me.

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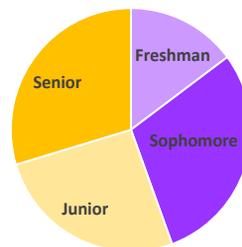
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THE TWO COURSES

Spring 2018 F2F
30 active students
53% Men 41% Women



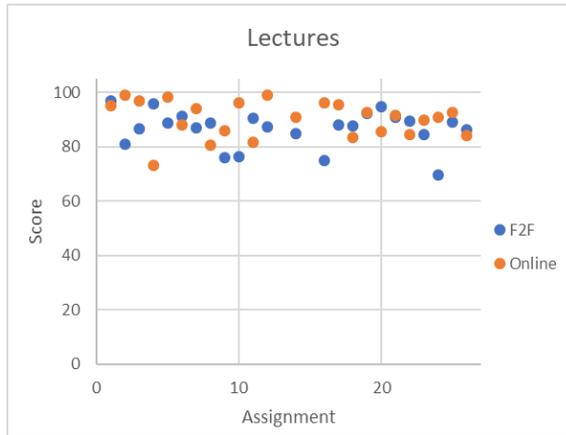
Spring 2019 Online
27 active students
41% Men 59% Women



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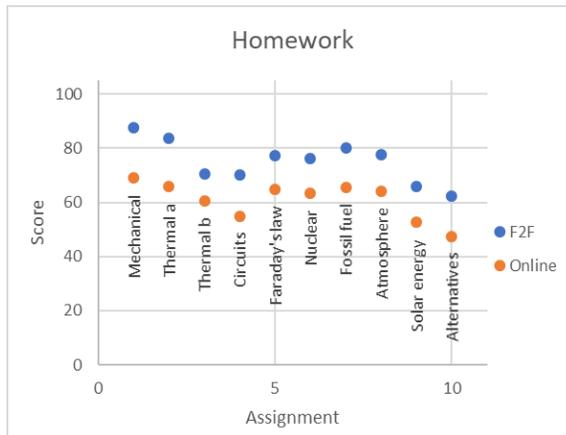
LECTURES



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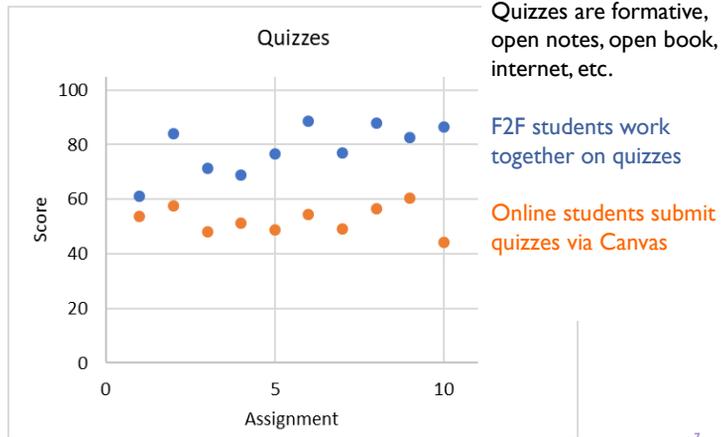
HOMEWORK



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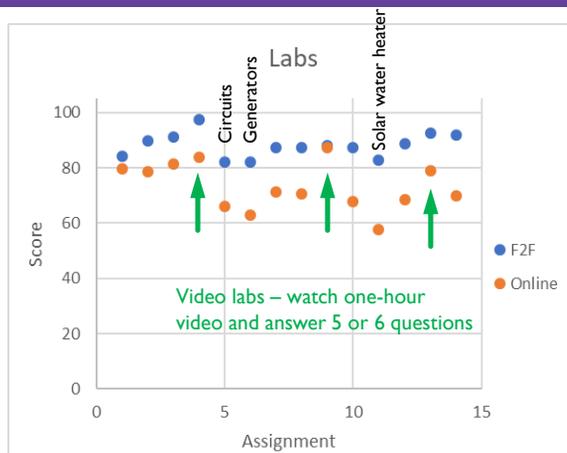
HOMEWORK QUIZZES (TIMED 30 MIN)



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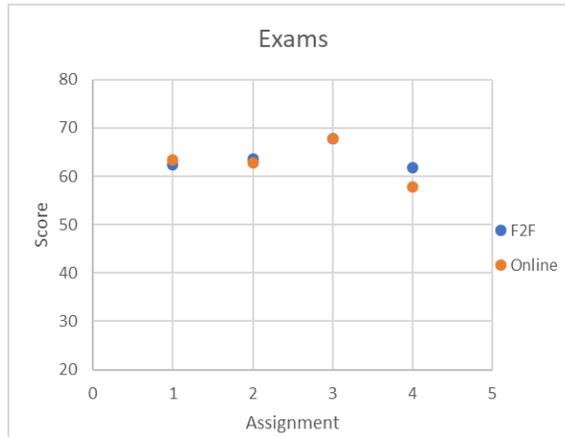
LABS



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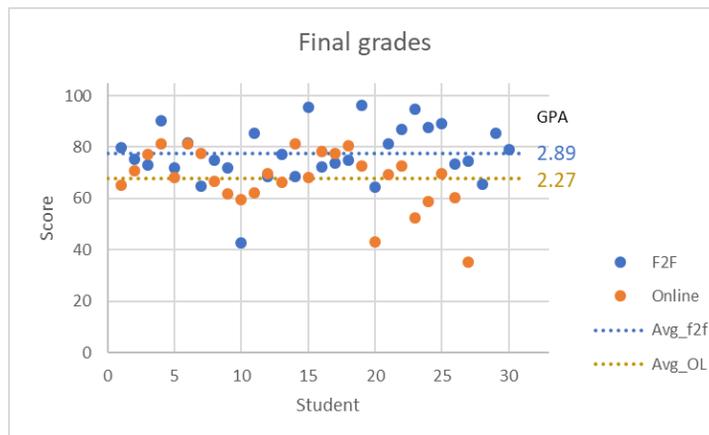
EXAMS



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FINAL GRADES



10

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FIRM CONCLUSIONS

- None
- (What did you expect?)

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TENTATIVE CONCLUSIONS

- Student assumptions about online courses (*deadlines are customizable, I can fit course into my schedule instead of adjusting my schedule to succeed in the course, less effort is required than face-to-face, should be easy, etc.*) work against student success.
- Reduced student-student and student-faculty interaction harms learning, especially on the lab assignments.
- A segment of the student population excels in online courses, but many do not. Providing a list of strategies for success does *not* help many struggling students to improve. ¹²

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