

Physics 585 – *Experimental Methods in Applied Physics*

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Course website. <https://d21.pdx.edu/>

Office Hours. Monday 2-3 & Thursday 2-3 and by appointment

Course Meeting Location. Wednesday 1–5 PM, 148 Science Research and Teaching Center

Course Description. Introduction to modern instrumentation used in applied physics, focusing on nanoscience and materials, atmospheric physics, and biophysics, including theory and practice of the instruments.

Required Elements. There are three required elements for all students enrolled in Ph 585:

1. We will conduct a study of kinetic isotope effects in the reaction of electronically excited atomic oxygen (O^1D) with nitrous oxide (N_2O). We will work as a team on this study with sub-groups taking on different aspects of this work. The study will span the entire quarter including all aspects of a laboratory experiment including: literature review, experimental design and instrumentation, running the experiment, data analysis, results synthesis, and manuscript preparation (see Gantt chart below). A successful work product of this element will be a manuscript for submission to a peer reviewed scientific journal.

2. Laboratory safety training. These are offered approximately once per month through the chemistry stockroom staff (Nicolas Meier). You can sign up for preferred times here:

[Laboratory Safety Training](#)

Laboratory training are currently scheduled for weeks 3 and 8 this term. If you have completed PSU laboratory safety training previously, you are not required to repeat training (please see me).

3. An introduction to the machine shop including: student-shop safety training; using CAD software to design and prepare drawings for the machine shop; and a brief introduction to machining techniques. All students will attend shop safety training and design workshops during our regularly scheduled meeting times. Hands-on machine shop training will be in the student shop in small groups of 3-4; you will need to sign up for a 2-day session with machine shop engineer Alexander Chally during the term. These are tentatively scheduled Wed and Fri 1-5PM during the first 3 weeks of November.

Course Grading. This course is graded on a P/NP basis. Successful completion of required elements will result in a passing grade. Attendance at all class meetings is required. Please let me know in advance if you are unable to attend our regularly scheduled meetings or any of the training sessions listed.

Academic Honesty: ‘Academic honesty is a cornerstone of any meaningful education and a reflection of each student's maturity and integrity. The Code of Student Conduct and Responsibility, which applies to all students, prohibits all forms of academic cheating, fraud, and dishonesty. These acts include, but are not limited to: plagiarism, buying and selling of course assignments and research papers, performing academic assignments (including tests and examinations) for other persons, unauthorized disclosure and receipt of academic information, and other practices commonly understood to be academically dishonest.’ – Portland State University Bulletin, General Catalog Issue, Vol. 49, 2015-2016.

Absence due to sickness – Due to concern about this year's flu season, if you are ill with flu-like symptoms please stay home for at least 24 hours after your fever is gone except to receive medical care. You will not be penalized for illness-related absences. If you will not be able to attend due to illness, please contact me via email or phone.

Tentative Schedule (subject to change)

Week 1 – Wed. Sept. 30

Introduction to course

Machine shop safety training – Alex Chally in 1 SB1

Week 2 – Wed. Oct. 7

Discussion of literature review; organization of research sub-groups

Week 3 – Wed. Oct. 14

Sub-group experimental design

Solidworks training – Alex Chally in Engineering Building 325

Laboratory safety training I

Week 4 – Wed. Oct. 21

Sub-group experimental design and testing; complete experimental setup

Week 5 – Wed. Oct. 28

Testing of experimental design

Week 6 – Wed. Nov. 4

KIE experiment; data analysis

Machine shop training I – Alex Chally in 1 SB1

Week 7 – Wed. Nov. 11

KIE experiment; data analysis

Machine shop training II – Alex Chally in 1 SB1

Week 8 – Wed. Nov. 18

KIE experiment; data analysis; manuscript preparation

Machine shop training III – Alex Chally in 1 SB1

Laboratory safety training II

Week 9 – Wed. Nov. 25

Manuscript preparation

Week 10 – Wed. Dec. 2

Manuscript editing

Week 11 – Wed. Dec 9

Manuscript in final format

Kinetic Isotope Effect Experiment Gantt Chart

| Objective | Oct | | | | | Nov | | | | Dec | |
|-----------------------------------|-----|---|---|---|---|-----|---|---|---|-----|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| Literature review | █ | █ | | | | | | | | | |
| Experimental design | | █ | █ | █ | | | | | | | |
| Testing of kinetics chamber | | | | █ | █ | █ | | | | | |
| Kinetic isotope effect experiment | | | | | █ | █ | █ | █ | █ | | |
| Analysis of results | | | | | | █ | █ | █ | █ | █ | |
| Manuscript preparation | | | | | | | | █ | █ | █ | █ |