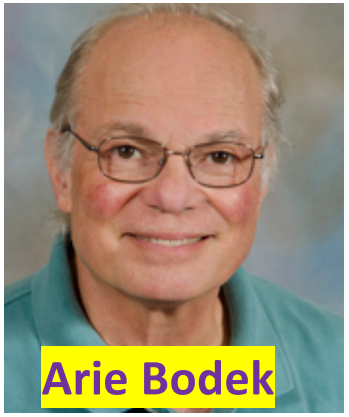
Introductory physics labs - Prof. Arie Bodek-



Friday Feb. 5, 21 15:25-16:40 Via Zoom For P113, P113P, P121, P121P
https://rochester.zoom.us/j/98362508792

(1) Look at Detailed **Statistic Lecture video and Slides** on Blackboard before coming to the the Zoom session). The slides are on blackboard and also on:
http://www.pas.rochester.edu/~physlabs/manuals/L2C-StatisticsForWeb-AB5-short.pdf

(2) Do the prelab for the First Lab before coming to the Zoom session. (Read Lab general notes, lab manual for lab 1, and notes for lab 1).
The Zoom meeting is mostly to answer questions: It will be a quick outline about how the labs are run (which is on blackboard), a short review of statistics and error analysis.

Part 3: Zoom: For P121P students – Introduction to 121P - 16:50-18:05

See Lab information on

http://www.pas.rochester.edu/~physlabs/

Mechanics: PHY121, PHY121P, PHY113, PHY181 Experiments 1-5
E&M: PHY122, PHY122P, PHY142, PHY182 Experiments 6-10
Modern: PHY123, PHY183 Experiments 11-15
General Physics E&M: PHY114, PHY184 Experiments 6,8,9 12,13

PDF Lab manuals and short notes

Lab Calendar, Table arrangements and General Notess

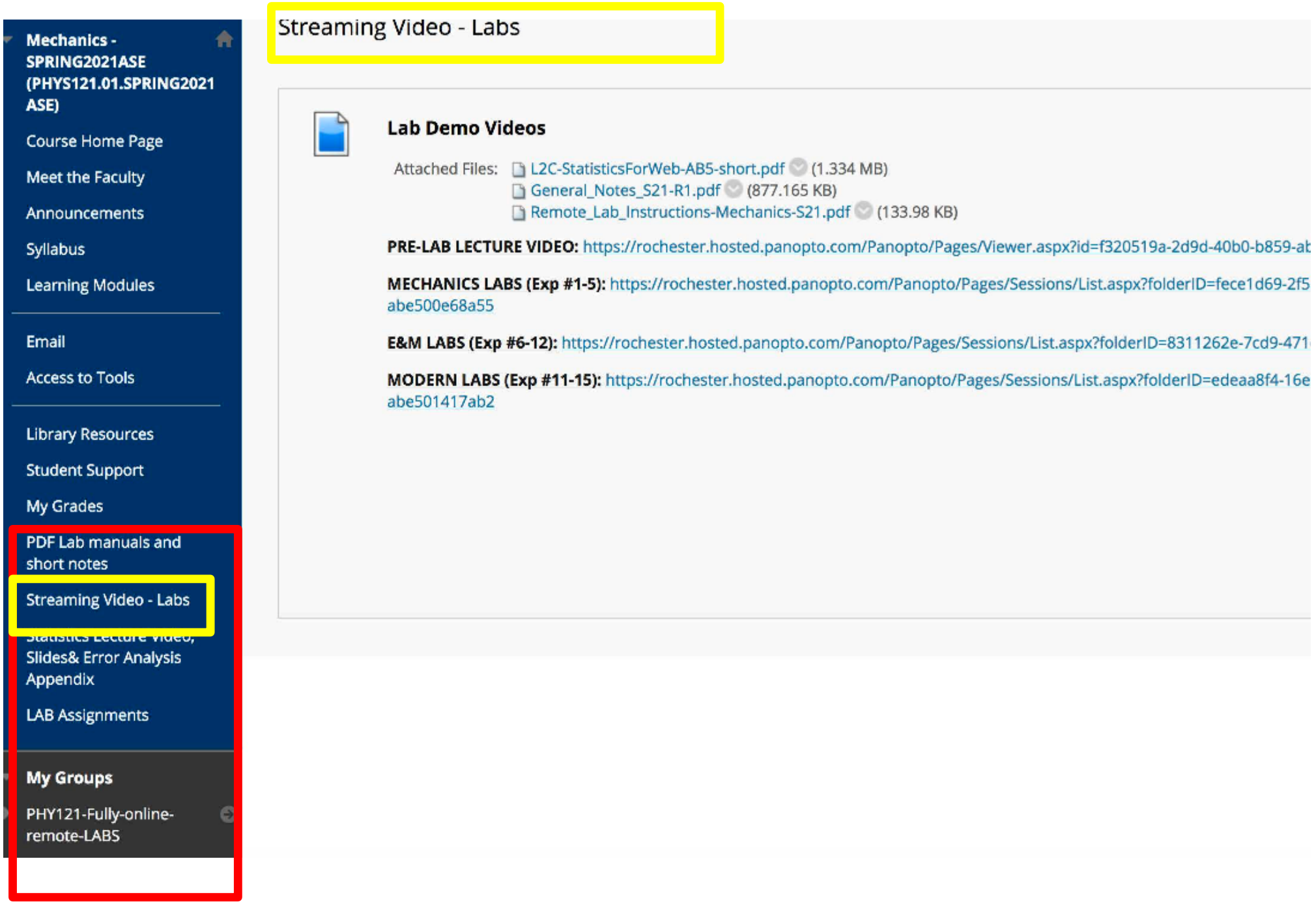
Attached Files:
- Lab_Calendar_S21-A_B_weeks..pdf (36.303 KB)
- Lab-Tables.pdf (356.702 KB)
- Remote_Lab_Instructions-Mechanics-S21.pdf (133.98 KB)
- General_Notes_S21-R1.pdf (877.165 KB)
- LAB-Intro-infomation-S21.pdf (2.925 MB)

PDF: Mechanics Lab manuals and short brief notes

Attached Files:
- Lab2_Manual_F20-R.pdf (531.178 KB)
- Lab4_Manual_F20-R.pdf (442.026 KB)
- Lab3_Manual_F20-R.pdf (620.897 KB)
- Lab1_Manual_F20-R.pdf (470.587 KB)
- Lab5_Manual_F20-R11.pdf (1,009.682 KB)
- AppendixB-error-analysis.pdf (39.614 KB)
- Lab3_Notes_F20-R.pdf (708.28 KB)
- Lab1_Notes_F20-R.pdf (1.337 MB)
- Lab5_Notes_F20-R.pdf (479.044 KB)
- Lab4_Notes_F20-R.pdf (452.225 KB)
- Lab2_Notes_F20-R.pdf (691.494 KB)

These are mechanics lab manuals General notes and short brief notes,

R means reduced length PDF for faster download. 11 means use MS11 with MathType for editing.


Mechanics - SPRING2021ASE (PHYS121.01.SPRING2021 ASE)
Course Home Page
Meet the Faculty
Announcements
Syllabus
Learning Modules
Email
Access to Tools
Library Resources
Student Support
My Grades
PDF Lab manuals and short notes
Streaming Video - Labs
Slides& Error Analysis Appendix
LAB Assignments
My Groups
PHY121-Fully-online-remote-LABS
Streaming Video - Labs
Lab Demo Videos
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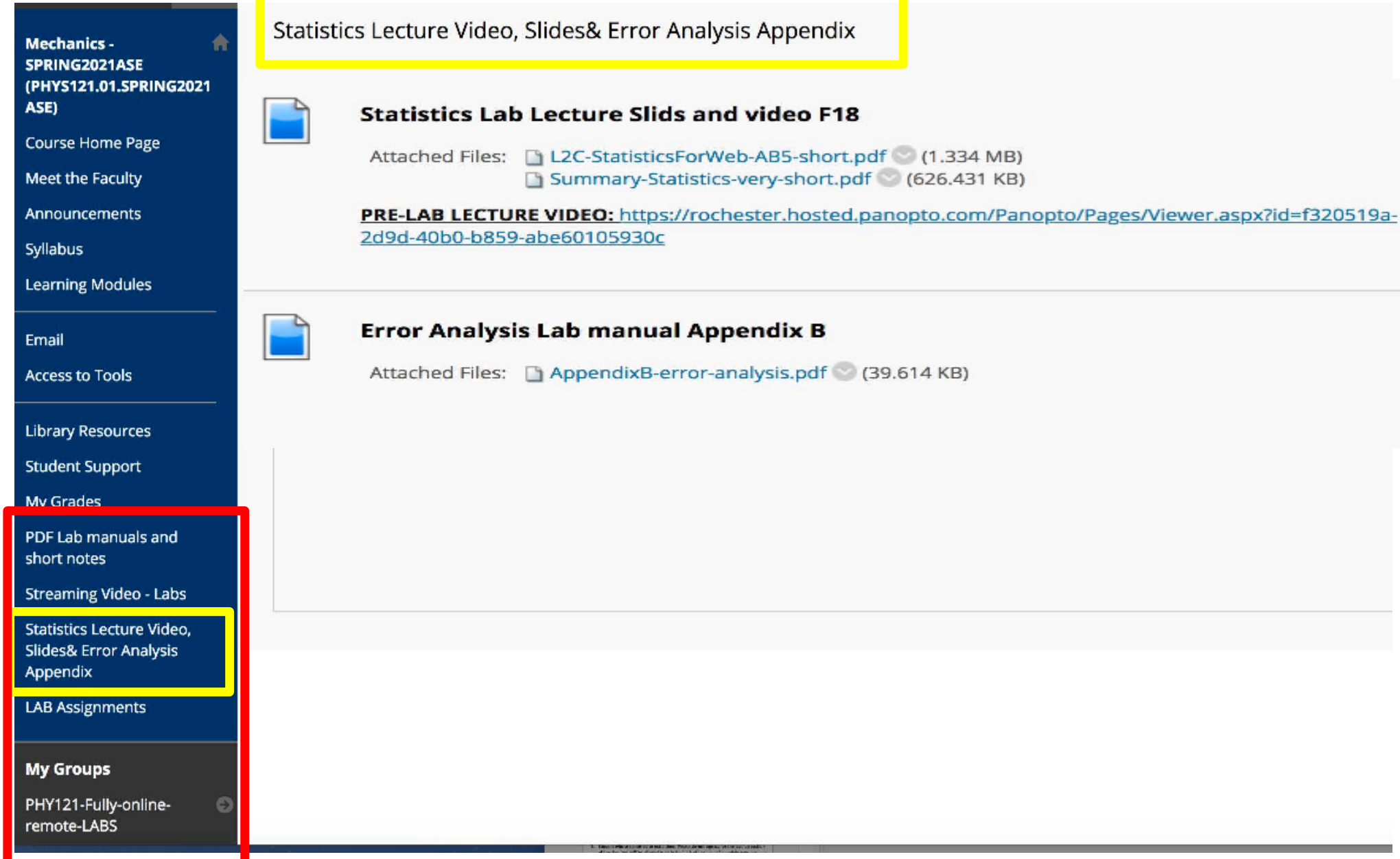
General_Notes_S21-R1.pdf (877.165 KB)
Remote_Lab_Instructions-Mechanics-S21.pdf (133.98 KB)
PRE-LAB LECTURE VIDEO: https://rochester.hosted.panopto.com/Panopto/Pages/Viewer.aspx?id=f320519a-2d9d-40b0-b859-ab
MECHANICS LABS (Exp #1-5): https://rochester.hosted.panopto.com/Panopto/Pages/Sessions/List.aspx?folderID=fece1d69-2f5
abe500e68a55
E&M LABS (Exp #6-12): https://rochester.hosted.panopto.com/Panopto/Pages/Sessions/List.aspx?folderID=8311262e-7cd9-471
MODERN LABS (Exp #11-15): https://rochester.hosted.panopto.com/Panopto/Pages/Sessions/List.aspx?folderID=edeaa8f4-16e
abe501417ab2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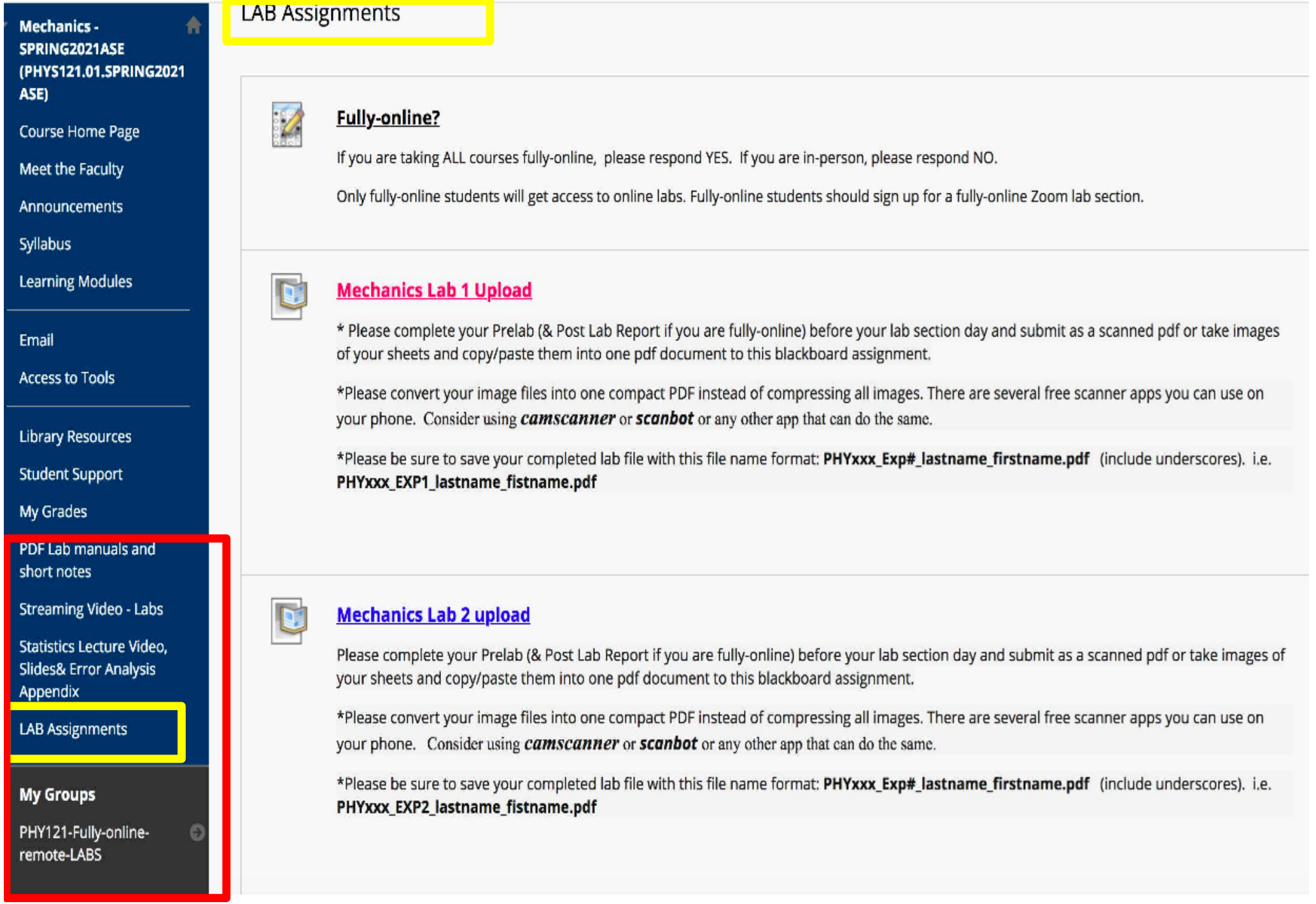
PHY121-Fully-online-remote-LABS
Statistics Lecture Video, Slides& Error Analysis Appendix
Statistics Lab Lecture Slids and video F18
Attached Files: L2C-StatisticsForWeb-AB5-short.pdf (1.334 MB)
Summary-Statistics-very-short.pdf (626.431 KB)
PRE-LAB LECTURE VIDEO: https://rochester.hosted.panopto.com/Panopto/Pages/Viewer.aspx?id=f320519a-2d9d-40b0-b859-abe60105930c
Error Analysis Lab manual Appendix B
Attached Files: AppendixB-error-analysis.pdf (39.614 KB)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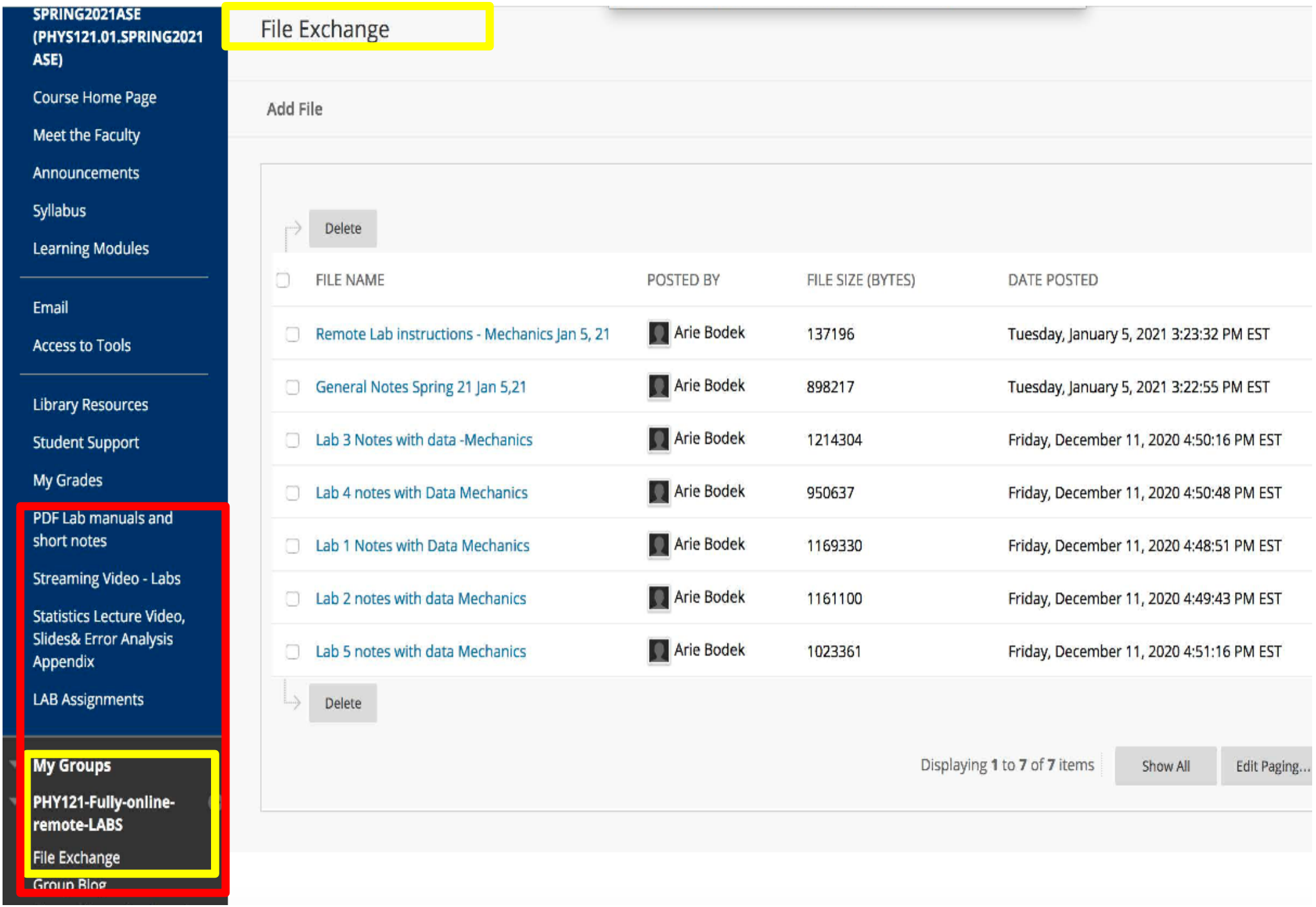
LAB Assignments
My Groups
PHY121-Fully-online-remote-LABS
LAB Assignments
Fully-online?
If you are taking ALL courses fully-online, please respond YES. If you are in-person, please respond NO.
Only fully-online students will get access to online labs. Fully-online students should sign up for a fully-online Zoom lab section.
Mechanics Lab 1 Upload
* Please complete your Prelab (& Post Lab Report if you are fully-online) before your lab section day and submit as a scanned pdf or take images of your sheets and copy/paste them into one pdf document to this blackboard assignment.
*Please convert your image files into one compact PDF instead of compressing all images. There are several free scanner apps you can use on your phone. Consider using camscanner or scanbot or any other app that can do the same.
*Please be sure to save your completed lab file with this file name format: PHYxxx_Exp#_lastname_firstname.pdf (include underscores). i.e. PHYxxx_EXP1_lastname_fistname.pdf
Mechanics Lab 2 upload
Please complete your Prelab (& Post Lab Report if you are fully-online) before your lab section day and submit as a scanned pdf or take images of your sheets and copy/paste them into one pdf document to this blackboard assignment.
*Please convert your image files into one compact PDF instead of compressing all images. There are several free scanner apps you can use on your phone. Consider using camscanner or scanbot or any other app that can do the same.
*Please be sure to save your completed lab file with this file name format: PHYxxx_Exp#_lastname_firstname.pdf (include underscores). i.e. PHYxxx_EXP2_lastname_fistname.pdf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LAB Assignments
My Groups
PHY121-Fully-online-remote-LABS
File Exchange
Group Blog
File Exchange
Add File
Delete
FILE NAME
POSTED BY
FILE SIZE (BYTES)
DATE POSTED
Remote Lab instructions - Mechanics Jan 5, 21
Arie Bodek
137196
Tuesday, January 5, 2021 3:23:32 PM EST
General Notes Spring 21 Jan 5,21
Arie Bodek
898217
Tuesday, January 5, 2021 3:22:55 PM EST
Lab 3 Notes with data -Mechanics
Arie Bodek
1214304
Friday, December 11, 2020 4:50:16 PM EST
Lab 4 notes with Data Mechanics
Arie Bodek
950637
Friday, December 11, 2020 4:50:48 PM EST
Lab 1 Notes with Data Mechanics
Arie Bodek
1169330
Friday, December 11, 2020 4:48:51 PM EST
Lab 2 notes with data Mechanics
Arie Bodek
1161100
Friday, December 11, 2020 4:49:43 PM EST
Lab 5 notes with data Mechanics
Arie Bodek
1023361
Friday, December 11, 2020 4:51:16 PM EST
Delete
Displaying 1 to 7 of 7 items
Show All
Edit Paging...

There are five labs in each course. **All labs must be completed to pass each course** (if not, then the labs can be made up in a future semester). Prelab assignments (typically 5% of course grade) are done before coming to lab. Post lab data analysis (Typically 5% to 10% of course grade) are all done in the lab after taking the data.

Read the general notes on labs on blackboard (for all labs)

Before coming to lab do the following:

(1) Look and read at the **lab manual**, and the **brief notes** on each lab. **Print the lab manual and brief notes.** The brief notes will have *pictures of the equipment setup. You will need to restore the setup after you finish the lab.*

(2) Watch the video of instructions on doing the lab and taking the data. See links on blackboard in the general brief note about the labs.

(3) Do the prelab assignments and think about answers to some of the postlab questions which you will need to answer in the post lab report.

(4) Upload the completed prelab report to blackboard and **bring a hard copy** and hand to the TA before you start the lab. **Bring a blank copy of the lab manual**. You will write the lab report in the postlab section of the lab manual and turn it in before leaving the lab.

Spring:
Mechanics labs in Spring semester (for PHY113, 113P, 121, 121P and 181) are held in room **B&L 267.**

EM & Modern labs in Spring semester (for PHY114, and 184) are held in room **B&L 268**

Modern Physics Labs in Spring semester (for PHY 123 and PHY183) are held in room **B&L 165**

- Afternoon Labs are from 2:00PM to 4:40PM.
- Evening Labs are from 4:50PM to 7:30PM.
- Nighttime Labs are from 7:40PM to 10:20PM

If your schedule changes and you need to make a permanent switch to another lab section, please contact Lysa Wade: **(Email: lwade3@ur.rochester.edu)**

In lab

1. **Befor**e you start the lab **clean/disinfect the equipment**. **After** end of data taking, **clear/disinfect the equipment** and put back together as

2. There is one person per lab setup. Wear a mask and social distance.

3. Labs run every two weeks **(week A and week B).** You should have signed up for a lab section when you registered for your physics course. The lab section which you signed up for should have had "Lab A" or "Lab B" included in the title. This is the lab week which you should attend.

4. **You MUST attend the lab section for which you are registered.** This is because each lab section can only accommodate 10 students. Students work alone, no lab partners.

5. **Student who are entitled to extra time.** Please **do not sign up for the last lab section of the day.** You will be allowed to sit in the back of the lab and complete your post lab report per the amount of extra time that you are entitled to,

Missing a Lab

1. **If you know that you will miss a lab (illness, personal emergencies, etc.) you must make it up during the two week cycle period for that lab**. please email the lab admin as soon as possible .

2. In the email to the lab administrator you must state clearly your course, regular lab section, the lab section you wish to attend and the reason. Except in exceptional circumstances, each student can be allowed to attend only one make-up lab. If your do not hear back, then show up in the section marked ***MAKEUPS*** on the list of lab sections on ~physlabs.

3. Covid quarantine. If you cannot attend a lab because of a 2 week Covid quarantine, there will be a special makeup week at the end of the semester for such cases.

4. Lab administrator – **Lysa Wade.** **Use appropriate Email for each course.** The lab administrator emails for missed and makeup labs are:

physlabs.mechanics@pas.rochester.edu for PHY113 (fall,spring) and PHY121(spring) and PHY181 (fall, Spring) labs.
physlabs.em@pas.rochester.edu for PHY122/142/182 (fall) and PHY114 (Fall, Spring) and PHY182 and PHY184 labs.
physlabs.modern@pas.rochester.edu for PHY123 and PHY183 Modern Physics Labs (spring).

Summary of important points:

1. **Before you attend lab, download and print the lab manual, and complete the "prelab" section of the exercise. Then upload it to blackboard. A hard copy** of the prelab section is collected at the beginning of the lab.

2. **You will need your completed prelab, a copy of the lab manual, a calculator, and a pen or pencil for each lab.** You are also allowed to have your course textbook at your lab bench if you need it, but anything else (backpacks, etc.) must be put along the sides of the room or the back wall. You may also use an Excel spreadsheet.

3. **Because your completed lab write-up is due at the end of the laboratory session, it is vital that you have read over the manual and brief notes, and watched the Lab video before coming to lab.** If you haven't done this beforehand, you will lose time, and may find yourself pressed for time at the end of the period.

4. **The worksheets in the lab manual (which you will fill out as you complete the lab) are collected at the end of the lab session (postlab report).**

5. **There are special instructions for fully-online students on blackboard in a separate "remote student" group section (only visible to remote students).**

For more details: All Students Go to Blackboard and Read file **General Notes**

I will not go through these items since I already gave a summary of the main points

Physics Introductory Labs General Notes – S21

During the pandemic period, labs require cleaning and disinfecting the equipment in the beginning and end of the lab sessions. To compensate for this extra time, **students must watch prelab videos** (~20 min each) before they come to lab. This will replace the 10 min introduction to the lab that was given in previous years. In order to satisfy NY state social distancing requirements, **the number of students per lab section is reduced from 20 students to 10**. There is also a spare 11th setup in case a piece of equipment is broken. *Note: Each of the 10 students has his/her own equipment on a separate lab table, and each student performs the lab experiments on their own*. Print a copy of this **general information** and bring it and copies of **lab manual** and **brief-notes for** for each lab with you.

Read Carefully: Students do the following preparations before they arrive at the lab.

- **Lab Manual:** Read the lab manual for the experiment and print a copy to bring to lab. The manual contains tables for recording data and blank spaces to answer questions as you complete the lab, so you must have a printed copy with you. Upload the prelab assignment to blackboard, bring a hard copy with you.
- **Video:** Watch the video of TAs explaining how to do the experiment in great detail. Your Lab TA will not give any pre-lab presentation in the beginning of the lab because it has already been done in the video. **Bring a laptop: You may want to replay parts of the video in lab. TURN CC ON FOR CAPTIONS.**
- **Brief-notes.** Read the brief-notes and look at the **picture of the setup** and **sample data** in its appendix. The brief-notes is an additional document detailing the modifications made to each lab in order to comply with the social distancing guidelines, as well as a written reminder about some of what has been shown in the video. It addresses **what to do in a situation where the standard lab manual calls for two students to work together**. *It also has color pictures of how the experiment is set up at the beginning of the lab and sample data from previous years. The sample data is not to be used by students in their lab reports unless they are participating in the class remotely.*

- **Prelab:** Complete the prelab assignment and upload it to Blackboard before showing up to the lab. Please format the file name as: **Last Name_First Name -PHYXXX-Prelab-Exp#XX** (where the X's should be filled in with your course number and the experiment number, respectively.)
- **Printed copy of manual:** Students should bring a printed copy of the lab manual to the lab.

In the laboratory (TA may show a 2 min video if needed)

- **Stamping**: In the beginning of lab, have the TA stamp the date on the data pages of the printed copy of the lab manual for each student. At this time, drop the paper copy of the prelab assignment in the marked box. (The uploaded copy of the prelab assignment on blackboard is backup in case the box becomes contaminated)
- **Tables**: Students use the equipment at their *pre-assigned lab table*. One student per table (see drawings).
- **Attendance:** The TA will take attendance.
- **Cleaning**: *Students should disinfect the lab equipment and the table before starting..*
- **Equipment:** *The lab manual sometimes assumes* that there are two lab partners sharing the same equipment on *one lab table*. We have not changed the lab manual and some of the lab videos show two TAs. Do not be confused. Now *each student has his/her own equipment and does the lab alone.* For cases in which the lab manual calls for the lab partners to work together, *the brief-notes address how the lab can be done alone but may require coordination with the paired student in the adjacent lab bench ("partner").* For example, Mechanics Labs 1 and 5 require collaboration with a "partner". See attached diagram of paired lab benches.
- **Lab Pairs (partners):** Sometimes (lab 1& Lab 5) it is less time consuming to collaborate with a student in the adjacent table as follows. The student at the first table takes data and reads it to the student in the adjacent lab bench, who records it. Then they switch roles and the student in the adjacent lab bench takes the data and the student in the first lab bench records. *These special situations are addressed in the brief-notes.* Students who ask to be paired with a friend in the beginning of the semester will be assigned to adjacent lab benches.
- **End of lab** *The equipment must be disinfected and put back together to its original configuration. Otherwise, there will be a grade penalty*. Drop the completed postlab report in the marked box.

Remote students Please Read Remote Lab Instructions on blackboard Remote Group file share area (restricted to declared fully-online students)

Physics Introductory Labs Remote Lab Instructions (Mechanics Labs S21)

1. There are scheduled Zoom lab sections which are restricted to students who are not on campus.
2. Only remote students should register for the remote Zoom Lab sections.
3. Remote students should read the GENERAL NOTES, Lab manuals and brief notes and watch the lab videos.
4. Please make sure that you understand the lab lecture on statistics and data analysis (slides are also on blackboard)
5. Read the following on blackboard. **1) General notes (2) Remote_Lab_Instructions.** For each lab XX do the following (1) Read the Lab manual for lab XX. (2) Watch the video for Lab XX. (3) Then at the **remote GROUP file** share area for **Lab XX Brief notes with data**
6. The **Lab XX Brief notes with data file has** several sets of sample data. Students should use the first two sets of data.
7. Unlike in-person students, fully online students do not upload the prelab before the Zoom session. (see item 8)
8. Remote students should do the prelab assignment and **Postlab work which includes the complete postlab assignment answering all the questions using the first set of data.** Then they should do the data analysis with the **second set of data**. Students **should do two postlabs** and compare the results from the two sets of data and comment on whether the two results are consistent **within the uncertainties**. **They only need to estimate uncertainties on the final results for this comparison. The comparison of the two sets of data should be about one page. See 2nd page for videos and slides on error analysis.**
9. This work should be done before the Zoom session but not uploaded yet.

10. The remote Zoom lab sections are for students to ask questions about the post-lab work that they have done **BEFORE the ZOOM SESSION.** After the Zoom session, remote students should **finalize the postlab assignment** and upload the **combined prelab and postlab and comparison** between the two sets of data to the LAB upload assignment in blackboard **within 4 hours of the end of the Zoom session.**
11. **Grading:** There are three components. (A) Prealab; (B) Postlab-1 which is the primary lab report; and (C) (postlab-2 plus comparison). In-person students get postlab points for taking the data. Fully-students are given the data, so these points are used instead for (postalab-2 plus comparison). Postlab-2 is primarily for comparison between the two sets of data samples.
12. Zoom sections for remote students TBA
13. Grader for remote students TBA

In summary: Students should **do two postlabs** and compare the results from the two sets of data and comment on whether the two results are consistent **within the uncertainties**. **They only need to estimate uncertainties on the final results for this comparison. The comparison of the two sets of data should be about one page . See 2nd page of remote instructions for videos and slides on error analysis.**

After the Zoom session, remote students should **finalize the postlab assignment** and upload the **combined prelab and postlab and comparison** between the two sets of data to the LAB upload assignment in blackboard **within 4 hours of the end of the Zoom session .**

NOTE for lab 3: There is no data given for table 3.2 B page 17. Answer the questions based on what you derive from the equation for inelastic collisions: Which of the combinations that you tested led to the smallest change in speed of the two carts after the collision? Table 3.2 B

Statistics/data analysis: Slides: http://www.pas.rochester.edu/~physlabs/manuals/L2C-StatisticsForWeb-AB5-short.pdf

Each Prelabs is graded from 0 to 2
(The 5 Prelabs typically count as 5% of the grade in the course)

Each Postlab report is graded from 0 to 20

(The 5 Postlab reports typically count 5%-10% of the grade in the course)

Spring 2021 - LABS START Mon. FEB 8th

WEEK LAB CYCLE

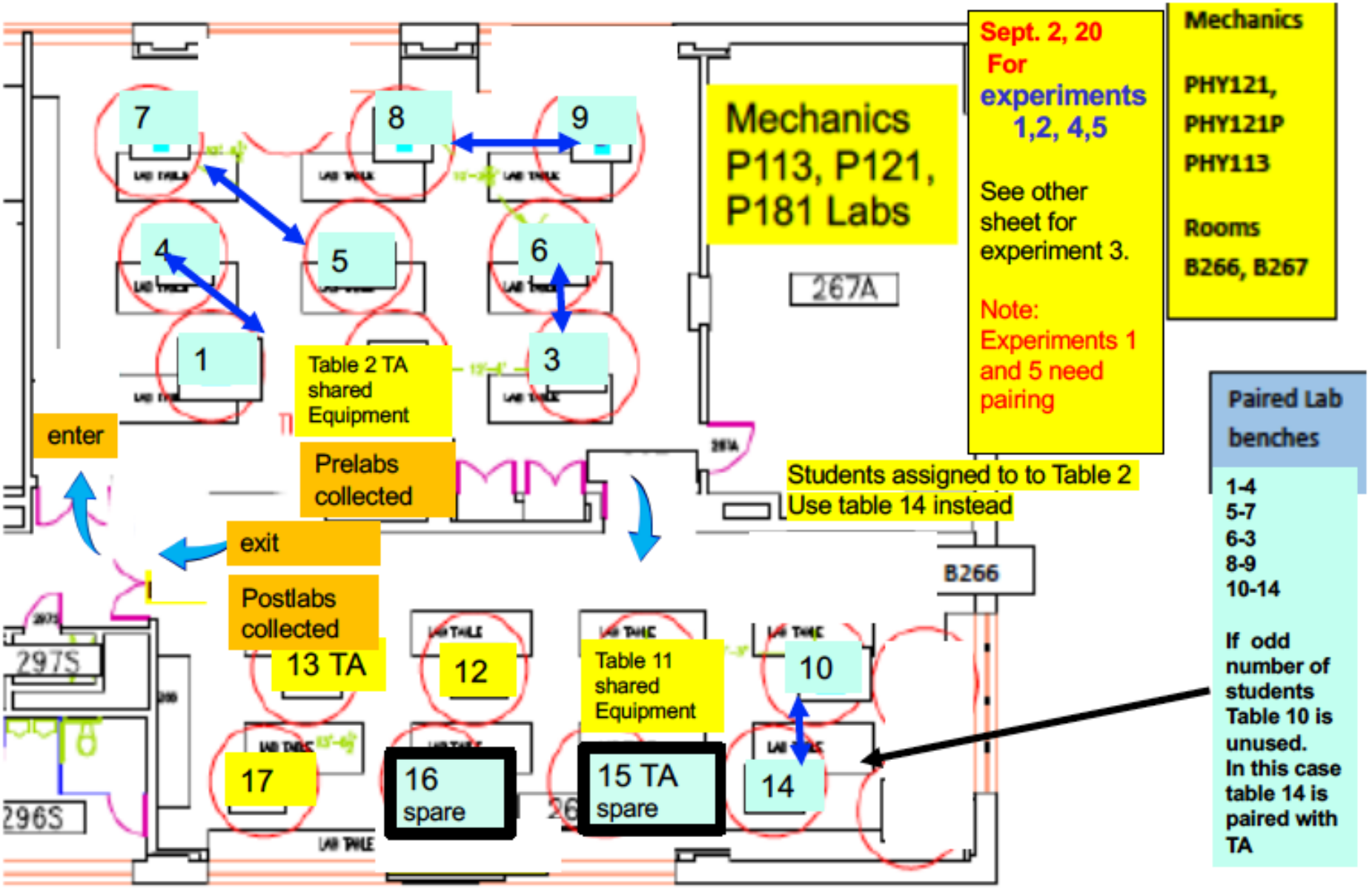
PHY 113/121/121P, 114, 123

www.pas.rochester.edu/~physlabs

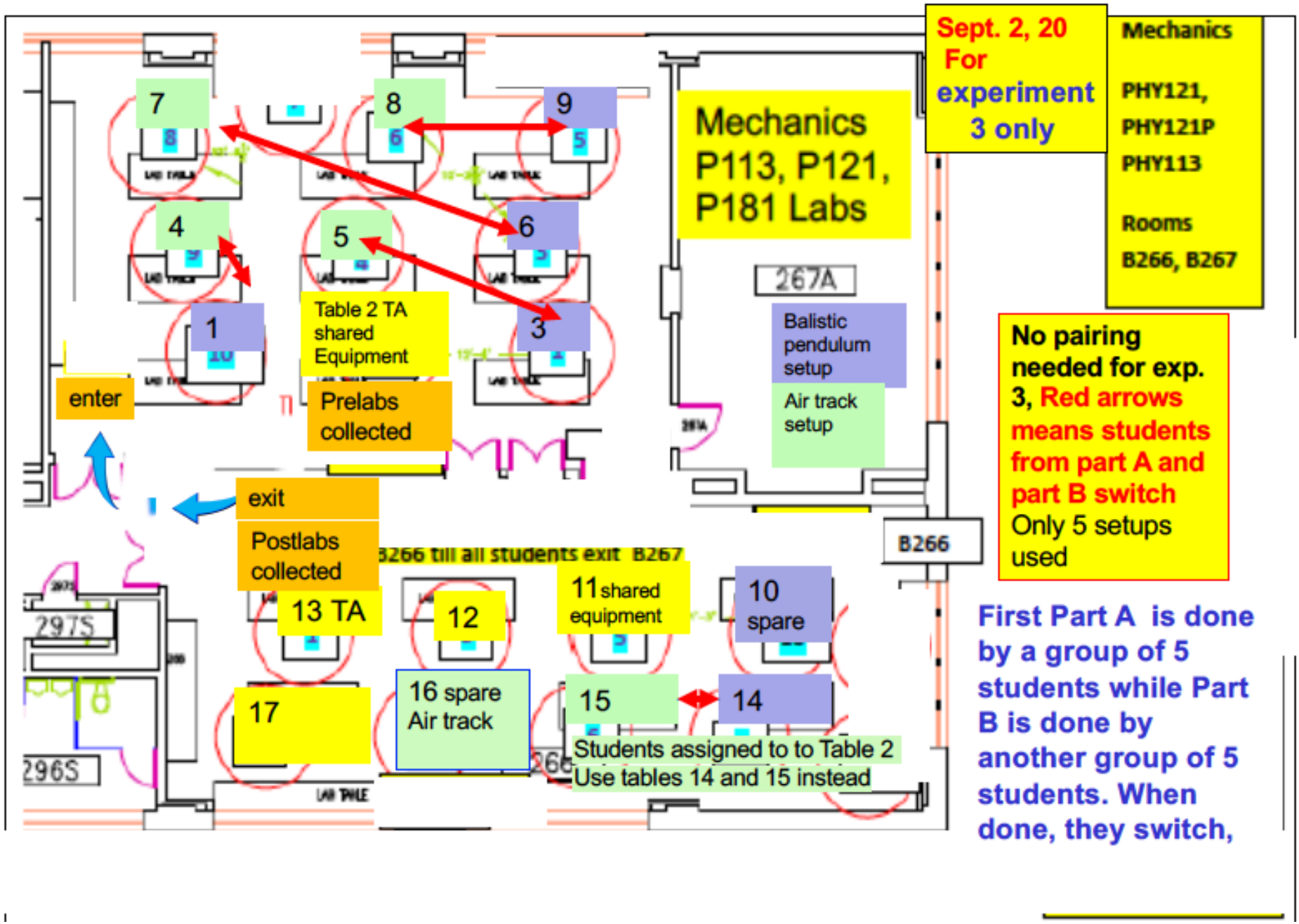
DATE	WEEK	LAB # 113 (P)/121(P),	114,	123
2/8/21	A	1,	6,	11
2/15/21	B	1,	6,	11
2/22/21	A	2,	8,	12
3/1/21	B	2,	8,	12
3/8/21	A	3,	9,	13
3/15/21	B	3,	9,	13
3/22/21	A	4,	12,	14
3/29/21	B	4,	12,	14
4/5/21	A	5,	13,	15
4/12/21	B	5,	13,	15

PHY 113 (F,S), 121(S), 181 (F,S) – B&L 267
PHY 114 (S,F), 122(F), 182 (F,S) , 184 (F,S) – B&L 268
PHY 123(S), 183 (S) – B&L 165

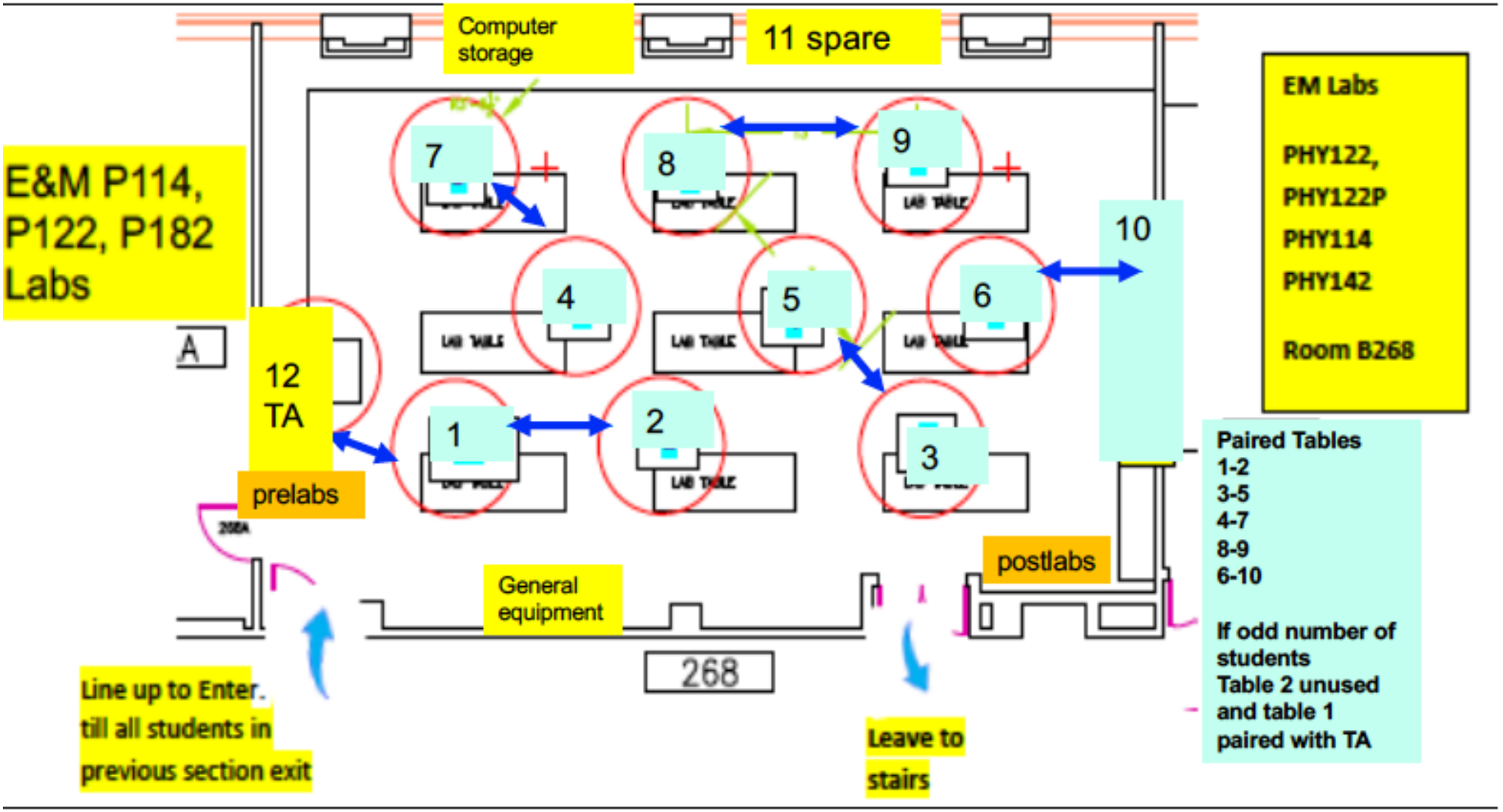
Pairing of Tables (needed for Mechanics exp. 1,2,4,5



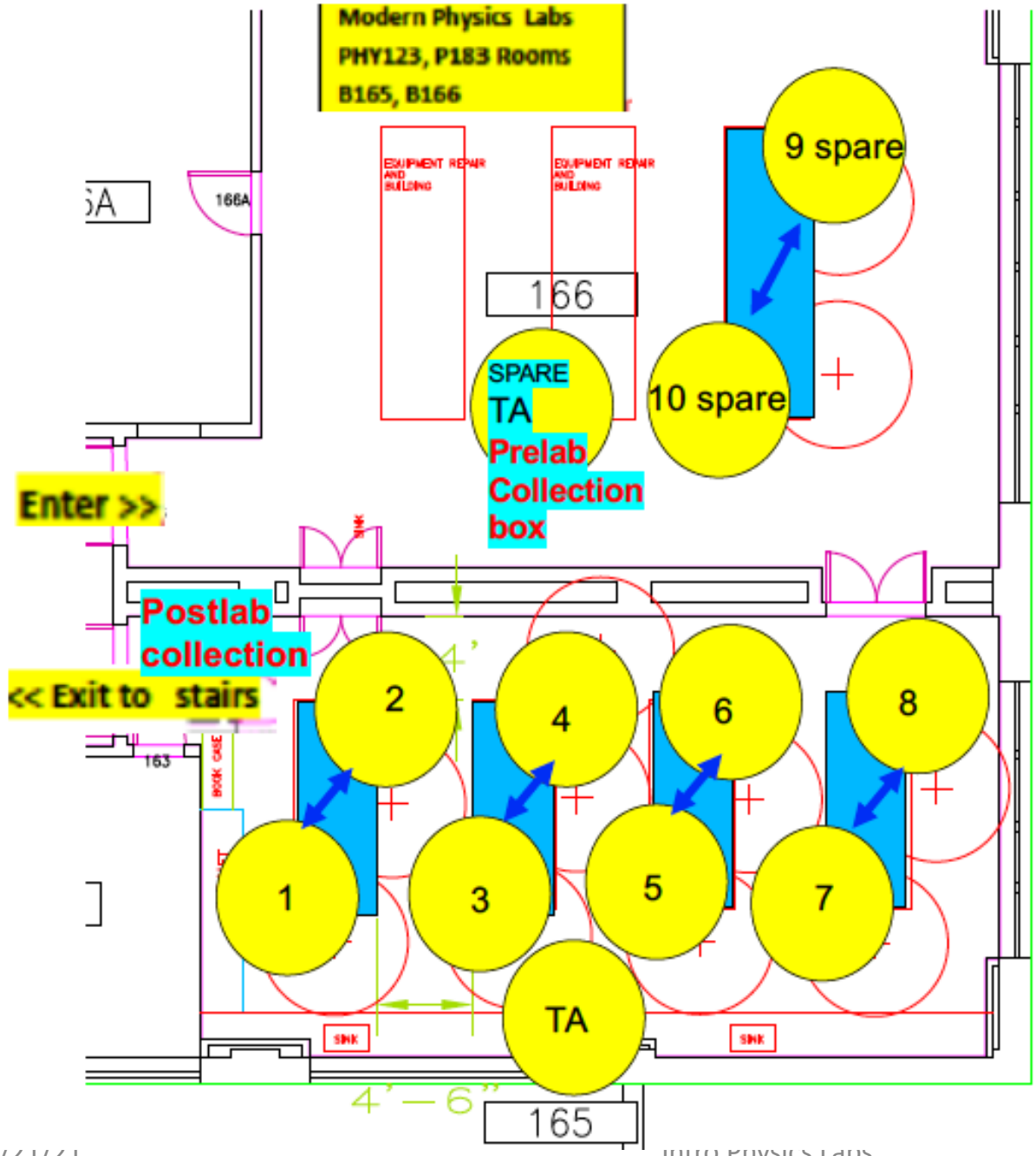
No pairing for mechanics lab 3, but different setup for parts A and B of the lab.



PHY 122, PHY114



PHY123 Modern Physics



Updated 10/26/20

Modern Physics Labs

PHY123, P183

Rooms B165, B166

pairs	Paired Lab benches
1-2	
3-4-	Makeups
5-6	Tables 9-10
7-8	
9-10	

Students who ask to be paired with a friend in the beginning of the semester will be assigned to adjacent tables.