Course Description
Flexible timing; to be determined in consultation with TA
Experiments in solid and fluid mechanics with emphasis on current research methods. Pre-requisites: ACM 104 and ACM 95/100 ab or equivalent (may be taken concurrently) and Ae/APh/CE/ME 101 abc or equivalent (may be taken concurrently) or Ae/AM/CE/ME 102 abc or equivalent (may be taken concurrently). 9 units (0-6-3)

Course Outline
Each student will be placed in a lab group, each of which will perform three experiments according to the schedule below and begin planning final term projects. Uniting requires three hours in the lab and six hours homework (report preparation) per week.

Learning Outcomes
By the end of this course, students will be able to:
• Acquire experimental data using a range of current research techniques
• Identify and quantify sources of error in experimental measurements
• Analyze data and construct graphics to summarize and communicate the outcome of the analysis
• Write technical reports documenting experimental procedures, characterization of observations, data analysis, and outcomes.

Course Website and Learning Management System
Overview  http://mckeon.caltech.edu/teaching/104/index.html
Piazza  http://piazza.com/caltech/fall2019/aeaph104b/home
Sign-up for a Piazza account at https://piazza.com/caltech/fall2019/aeaph104b

Attendance and Participation
All students are expected to participate fully in all laboratory and report writing sessions, and are required to attend the mandatory laser safety training class on Tuesday January 7, 12 noon – 1pm in 384 Firestone. This will be a good opportunity to meet the experiment TAs and arrange your first laboratory sessions.

Assessment Rubric
3 x Laboratory reports, 33% each [no exam]
Students will be assessed on three, equally weighted laboratory reports and an assessment of individual contribution to the group effort. Each group has been assigned three experiments based on the preferences submitted and will spend 3 weeks on each experiment in the lab, plus write-up time (a suggested division of time is one week for preparation, one for data acquisition and the remaining time for analysis and report writing). The start dates for each experiment, for each group, are shown in the table below, along with the laboratory report due dates. The remaining class time will be set aside for preparation for the Ae104c projects.
Every group is required to submit a laboratory report for each assigned experiment. The outcome of each report will be worth the same percentage of your final grade.

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Start Date</th>
<th>End Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laser Safety Training</td>
<td>7-Jan</td>
<td>7-Jan</td>
</tr>
<tr>
<td>Report 1</td>
<td>6-Jan</td>
<td>27-Jan</td>
</tr>
<tr>
<td>Report 2</td>
<td>27-Jan</td>
<td>17-Feb</td>
</tr>
<tr>
<td>Report 3</td>
<td>17-Feb</td>
<td>10-Mar</td>
</tr>
<tr>
<td>Ae/APh104c preparation</td>
<td>10-Mar</td>
<td>14-Mar</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group/Experiment</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>TA</th>
</tr>
</thead>
<tbody>
<tr>
<td>[DIC] Digital Image Correlation (Ravichandran, B282F)</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>Vatsa Gandhi vgandhi@</td>
<td></td>
</tr>
<tr>
<td>[PIV] Particle Image Velocimetry (Gharib, Cann Lab)</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>Alexandros Rosakis ayrosaki@...</td>
<td></td>
</tr>
<tr>
<td>[SCH] Schlieren (Shepherd, Cann Lab)</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>Conor Martin cdmartin@...</td>
<td></td>
</tr>
<tr>
<td>[SIP] Signal Processing (McKeon, Cann Lab)</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>Yuting Huang yhuang1@...</td>
<td></td>
</tr>
</tbody>
</table>

Groups: A Arun, Chan, Gunnarson B Harms, Pederson, Schoeffler C Andre, Luo, Manchikanti D Chevalier, Magda

Reports and group self-assessments are due to the TA by 5pm on the date indicated on the schedule above. Reports submitted late will not be accepted unless you have emailed Dr. McKeon to request an extension in advance of the due date. Submit an electronic version of your laboratory report (one per group) to both the experiment TA and the head TA. Each group member must also individually email the Instructor with a summary of the approximate ratio of contributions of each group member to the group effort. Ideal participation will involve equal effort by all group members. Significant under-participation may lead to a spread of grades within a particular laboratory group.

The experiment TA will grade the report and pass it to the lead TA to ensure equality of grading across experiments. You will receive the grade for each report as soon as possible. Please contact the TAs via email or after the mandatory laser safety training session to set up the first meeting for each experiment.

Honor Code
“No member of the Caltech community shall take unfair advantage of any other member of the Caltech community.”

Collaboration Policy
Collaboration on the laboratory work and final laboratory reports within lab groups is required. You may consult outside reference materials, other students, the TA, or the instructor, but you cannot consult laboratory reports from prior years and you must cite any use of material from outside references. All text that is handed in should reflect your group’s understanding of the subject matter at the time of writing.

Students with Documented Disabilities
Students who may need an academic accommodation based on the impact of a disability must initiate the request with Caltech Accessibility Services for Students (CASS). Professional staff will evaluate the request with required documentation,
recommend reasonable accommodations, and prepare an Accommodation Letter for faculty dated in the current quarter in which the request is being made. Students should contact CASS as soon as possible, since timely notice is needed to coordinate accommodations. http://cass.caltech.edu/. Undergraduate students should contact Dr. Lesley Nye, Associate Dean of Undergraduate Students (administrative contact: Beth Larranaga) and graduate students should contact Dr. Kate McAnulty, Associate Dean of Graduate Studies (administrative contact: Angelica Medina-Cuevas).