

SIO269 – Marine Chemistry Laboratory

Winter qtr. 2016

Instructor: Todd Martz, MESOM 337, x47466, trmartz@ucsd.edu
Lecture Location/Time: Tuesday 10-11am, MESOM 351
Lab Location/Time: MESOM 330 (scheduled on a per group basis)

Theme

Apply modern and classic techniques for analysis of seawater, introducing concepts of signal transduction, calibration, and measurement quality control. Emphasis will be placed on using LabView to perform basic functions including instrument control, data storage, and on-the-fly calculations. Students will learn fundamental aspects of analytical chemistry and instrumental analysis as they apply to the marine sciences. In addition to LabView, software specific to specialized projects will be used and Matlab will be used occasionally to facilitate data analysis.

Requirements

Students will complete several multi-week exercises, working in groups of 2-3, and prepare one written report per group per exercise. Class meets once per week for 1 hour to cover a brief theoretical overview and open discussion of the experiment or data analysis. Homework will be in the form of laboratory preparation and completion of reports (1-2 written and 1 oral presentation).

Laboratory time will be scheduled by the instructor based on availability of equipment and individual teams' schedules and is expected to require ~6-8 hours per week. Grades will be based 100% on laboratory reports. Grading considerations will include comprehension of the material, presentation of data (i.e. quality of graphs, figures, and tables), data interpretation, report organization & overall clarity. All lab reports undergo a single revision cycle and the grade is based on the revised report.

Prerequisite Knowledge

General college chemistry is required. Advanced concepts related to Analytical Chemistry and Quantitative Analysis will be introduced and reviewed as needed. No programming background is required although students are encouraged to prepare for the course by loading LabView and Matlab on their personal computer (see Course Materials).

Course Materials

- Computers and lab space in MESOM 330 will be assigned by group. Groups may need to share computers and equipment and will therefore need to schedule lab time appropriately using the shared Google calendar.
- Access to the LabVIEW and Matlab site licenses will be discussed in the first class period.

1. Salinity (Week 1-3)

- 1.1. *Lecture/discussion:* Use LabView to communicate with multiple instruments via RS232 and log the data. Review PSS-78, EOS-80, TEOS-10 conductivity measurement principles; composition of seawater; GSW software.
- 1.2. *Exercise:* Calibrate a Sea-Bird conductivity-temperature sensor.
- 1.3. *Links:* <http://www.teos-10.org/index.htm> <http://www.seabird.com>

2. Option: Oxygen Analysis OR Nutrient Analysis

3. Student Projects: TBD

Written Laboratory Report Format

Exercises will be carried out in groups of 2-3. All team participants will receive the same grade for their shared laboratory report and are expected to contribute to the laboratory exercise and write-up. Ideally, the tasks will be shared equally by both participants. However, in recognizing that certain students may be required to miss one experiment due to field work, it is hoped that this format will provide some flexibility for busy schedules.

As a general rule, all authors should provide a critical review of the report to a lead author so that corrections can be made before turning in the report. From this standpoint, inconsistencies such as ambiguous figure axes, incorrect punctuation/grammar are equally shared and a single grade per group is justified.

Figures and equations should be prepared as originals for your report (i.e. it is not permissible to simply cut & paste equations/figures from the laboratory exercise handouts provided as .pdf).

A broad guideline for the report is given below. Grades will be assigned based on organization, clarity, and concise wording, not length. In other words, it is not necessary to provide an exhaustive bibliography, but a few well-chosen references. In many cases, methods can be summarized by citing published work (e.g. "The titration was carried out following the procedure described by Dickson et al. (2007)").

Reports should follow the basic format below, using numbered outline, 12pt font, single spaced. Use numbered sub-sections as needed.

Title Page including names, roles and date.

1. Introduction (2pg max)
2. Methods (include a Bill of Materials)
3. Results
4. Discussion & Conclusions
5. References Cited

Oral Laboratory Report Format

The Final Exam consists of ~30min oral presentation of the main group experiment. PowerPoint slides should be clear and cover the same general list above for written reports.