

SYLLABUS & COURSE INFORMATION

MEC 317 – THERMAL SCIENCES AND FLUID MECHANICS LABORATORY

SPRING 2020

Description

Hands-on experience in fluid mechanics, heat transfer, and thermodynamics. Introduction to a variety of sensors and instruments commonly used in mechanical engineering with focus on temperature, pressure, and flow velocity measurements. Student groups perform ten experiments with emphasis on the understanding of fundamental principles as well as familiarity with modern experimentation. Lectures provide background information and theories of experimentation. Report writing is an integral part of the course. Provides students with the ability to apply their knowledge of correct written English and engineering ethics in the professional workplace. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.

Prerequisites: MEC major; PHY 134; U3 or U4 standing

Co-requisites: MEC 214; MEC 220; MEC 300; MEC 301; MEC 364; AMS 361 or MAT 303

Not to be taken in the same semester as MEC 316

Instructors

- David Hwang (david.hwang@stonybrook.edu),
Office hours: Monday 1:00 – 4:00 PM (Light Engineering 117)

Laboratory Teaching Assistants

- Thai Dinh (thai.dinh@stonybrook.edu)
 - TBD
- T.A. Office hours = Lab hours

Writing Grader

- Coral Kopetz (coral.kopetz@stonybrook.edu)

Weekly schedule:

Lectures: Monday 12:00 – 12:53 PM, Melville Library 4320

Laboratory sessions: Tuesday or Thursday 2:00 – 5:00 PM, Heavy Engineering 206

Credit earned: 3 credits

Grading: Your semester letter grade will be based upon your performance in the following categories:

10 laboratory reports – 70 %
1 individual writing requirement – 15 %
Ethics test – 15 %

Students form groups of three or four individuals to perform all labs. The group collectively submits a single report for each experiment. Each student must write at least two reports as a **primary author**. Once a graded report is returned, the primary author can decide to submit the revised manuscript to fulfill the individual writing requirement. In this case, the primary author revises the document, accounting for all comments and corrections. As reports are mainly graded by instructors and laboratory TA for their technical content, the student must read through it carefully to correct any grammatical errors, clarity/completeness issues, and formatting problems that he or she may have missed. The revised report is then submitted electronically to the writing grader who evaluate and grade writing aspects of the report, which correspond to 15% of the total grade for MEC 317. **Only one report per student is to be submitted to fulfill the individual writing requirement.**

Laboratory fee: A laboratory fee of \$100 is required

Text Book: A laboratory instruction manual will be provided in the second week of class

Lab Reports

You must submit your previous lab report when you *arrive* at the lab for the next lab class.

Penalty for Late Submission of Reports

10 points (10%) deducted from final score for *each* day late. No exceptions will be made.

Report Content

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|--|---|
| 1. Title Page (experiment title, <i>all</i> names, date) | 7. Results |
| 2. Abstract | 8. Discussion |
| 3. Introduction | 9. Error Analysis |
| 4. List of Equipment | 10. Conclusions |
| 5. Theory (includes drawings and descriptions) | 11. References (if you have them) |
| 6. Experimental Procedures | 12. Appendices (handwritten and spreadsheet calculations) |

Reports must be typed with a 12 pt font and double-spaced. Handmade drawings of experimental setup are permitted. Graphs of data may be done by hand but it is strongly recommended to use a computer equipped with software such as Excel.

Grading Rubrics

| | | |
|------------------------|---------|------------------|
| Abstract | | / 5 pts |
| Introduction | | / 5 pts |
| List of Equipment | | / 5 pts |
| Theory | | / 10 pts |
| Experimental Procedure | | / 10 pts |
| Results | | / 15 pts |
| Discussion | | / 15 pts |
| Error Analysis | | / 15 pts |
| Conclusions | | / 5 pts |
| Writing | | / 15 pts |
| Clarity | / 5 pts | |
| Style | / 5 pts | |
| Presentation | / 5 pts | |
| Total | | / 100 pts |

| Writing points | Unsatisfactory 1 | Developing 2 | Satisfactory 3 | Exemplary 4 | Outstanding 5 |
|---------------------------------|--|---|---|--|---|
| Clarity and organization | Little evidence of attention to organization, ideas do not flow within paragraphs and in the document as a whole | Some attention to organization evident with either paragraph, sections, or in the overall document | Organization of thoughts does not detract from the clarity of the work, sequence of ideas could be improved | Organization of ideas is well conceived and adds to the clarity of the work | Displays logically rigorous and engaging organization of thoughts, insightful scientific reasoning |
| Style and grammar | Generally limited or inappropriate vocabulary, regular and repeated grammatical errors | Often limited and at time inappropriate vocabulary, regular grammatical errors with examples of the correct forms | Generally effective use of vocabulary, avoids use of slang, grammatical error limited to likely typographical error | Uses effective and engaging language and word choices, consistently follows the rules of standard English | Uses specific terminology, combines practical and elegant word choices |
| Presentation and format | Document is poorly formatted, equations poorly typeset, tables and figures have no captions, text is not aligned, text/headings poorly paginated | Some attention to aesthetics is evident, but many aspects of acceptable presentation is missing | Clear attention to aesthetics, there is an apparent understanding that presentation style can enhance the clarity of the work | A clear effort is made to use presentation format to draw the reader's attention to important aspects of the work for enhancement of clarity | Adapts figures and tables to foster understanding of information, professional formatting of text and equations |

Grading scheme of all reports

Grading scheme of each report writing section **and** individual writing requirement

Course Learning Objectives

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|---|
| 1. Demonstrate the ability to collect data from thermocouple, RTD, thermistor, mass flow meter, pitot tube manometer, pressure sensors, and digital image processing |
| 2. Learn how to work in a team and meet deadlines |
| 3. Assess quantitatively experimental accuracy and dominant sources of uncertainties |
| 4. Learn how to compare experimental data with theoretical predictions |
| 5. Refinement of a student's writing style, organization, and clarity in drafting a technical report. |
| 6. Elimination of common writing mistakes as the use of slang, inconstant or improper use of tense, use of fragments or run-on sentences, unnecessary repetition of words or ideas, and not writing from the perspective of the reader. |
| 7. Knowledge of proper report formatting and ability to use modern typesetting, graphing, and analysis software to create a manuscript of professional appearance |
| 8. Utilize the Code of Engineering Ethics to analyze case studies found in engineering and business involving ethical questions |

Detailed Schedule for Thermal-Fluid Labs – Spring 2020 (tentative, subject to change)

| | Monday (Lecture) 12:00 – 12:53 pm Melville Library 4320 | Tuesday (Lab) 2:00 – 5:00 pm 206 Heavy Engineering | Thursday (Lab) 2:00 – 5:00 pm 206 Heavy Engineering |
|----------------|--|---|--|
| Week 1 | 27-January Intro, Group, Safety | 28-January No Lab | 30-January No Lab |
| Week 2 | 3-February Error Analysis Report Writing | 4-February LabView Tutorial | 6-February LabView Tutorial |
| Week 3 | 10-February Overview of Exp. 1 – 5 | 11-February LabView Tutorial | 13-February LabView Tutorial |
| Week 4 | 17-February Basics of Writing | 18-February Exp. 1 – 5 | 20-February Exp. 1 – 5 |
| Week 5 | 24-February No Lecture | 25-February Exp. 1 – 5 | 27-February Exp. 1 – 5 |
| Week 6 | 2-March No Lecture | 3-March Exp. 1 – 5 | 5-March Exp. 1 – 5 |
| Week 7 | 9-March No Lecture | 10-March Exp. 1 – 5 | 12-March Exp. 1 – 5 |
| Week 8 | 16-March No Lecture (Spring Recess) | 17-March Exp. 1 – 5 (Spring Recess) | 19-March Exp. 1 – 5 (Spring Recess) |
| Week 9 | 23-March Overview of Exp. 6 – 10 | 24-March Exp. 1 – 5 | 26-March Exp. 1 – 5 |
| Week 10 | 30-March Engineering Ethics | 31-March Exp. 6 – 10 | 2-April Exp. 6 – 10 |
| Week 11 | 6-April Ethics Test | 7-April Exp. 6 – 10 | 9-April Exp. 6 – 10 |
| Week 12 | 13-April Complementary Ethics Test | 14-April Exp. 6 – 10 | 16-April Exp. 6 – 10 |
| Week 13 | 20-April No Lecture | 21-April Exp. 6 – 10 | 23-April Exp. 6 – 10 |
| Week 14 | 27-April No Lecture | 28-April Exp. 6 – 10 | 30-April Exp. 6 – 10 |
| Week 15 | 4-May No Lecture | 5-May Complementary lab session | 7-May Complementary lab session |

STONY BROOK UNIVERSITY SYLLABUS STATEMENT:**Student Accessibility Support Center Statement**

If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Student Accessibility Support Center, ECC (Educational Communications Center) Building, Room 128, (631)632-6748. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential.

Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Student Accessibility Support Center. For procedures and information go to the following web-site: <http://www.stonybrook.edu/ehs/fire/disabilities>.

Academic Integrity Statement:

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty is required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty please refer to the academic judiciary website at http://www.stonybrook.edu/commcms/academic_integrity/index.html

Critical Incident Management

Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of University Community Standards any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures. Further information about most academic matters can be found in the Undergraduate Bulletin, the Undergraduate Class Schedule, and the Faculty-Employee Handbook.

Equivalent Opportunity/Religious Absences:

Some students may be unable to attend classes on certain days because of religious beliefs. Section 224-a of the New York State Education Law provides that:

1. No person shall be expelled from or be refused admission as a student to an institution of higher education for the reason that he or she is unable, because of his or her religious beliefs, to register or attend classes or to participate in any examination, study, or work requirements on a particular day or days.
2. Any student in an institution of higher education who is unable, because of his or her religious beliefs, to attend classes on a particular day or days shall, because of such absence on the particular day or days, be excused from any examination or any study or work requirements.
3. It shall be the responsibility of the faculty and of the administrative officials of each institution of higher education to make available to each student who is absent from school, because of his or her religious beliefs, an equivalent opportunity to register for classes or make up any examination, study, or work requirements which he or she may have missed because of such absence on any particular day or days. No fees of any kind shall be charged by the institution for making available to the said student such equivalent opportunity.
4. If registration, classes, examinations, study, or work requirements are held on Friday after 4:00 p.m. or on Saturday, similar or makeup classes, examinations, study, or work requirements, or opportunity to register shall be made available on other days, where it is possible and practicable to do so. No special fees shall be charged to the student for these classes, examinations, study, or work requirements, or registration held on other days.
5. In effectuating the provisions of this section, it shall be the duty of the faculty and of the administrative officials of each institution of higher education to exercise the fullest measure of good faith. No adverse or prejudicial effects shall result to any student because of his or her availing himself or herself of the provisions of this section.
6. Any student who is aggrieved by the alleged failure of any faculty or administrative officials to comply in good faith with the provisions of this section shall be entitled to maintain an action or proceeding in the supreme court of the county in which such institution of higher education is located for the enforcement of his or her rights under this section.
7. It shall be the responsibility of the administrative officials of each institution of higher education to give written notice to students of their rights under this section, informing them that each student who is absent from school, because of his or her religious beliefs, must be given an equivalent opportunity to register for classes or make up any examination, study, or work requirements which he or she may have missed because of such absence on any particular day or days. No fees of any kind shall be charged by the institution for making available to such student such equivalent opportunity.
8. As used in this section, the term "institution of higher education" shall mean any institution of higher education, recognized and approved by the Regents of the University of the State of New York, which provides a course of study leading to the granting of a post-secondary degree or diploma. Such term shall not include any institution which is operated, supervised, or controlled by a church or by a religious or denominational organization whose educational programs are principally designed for the purpose of training ministers or other religious functionaries or for the purpose of propagating religious doctrines. As used in this section, the term "religious belief" shall mean beliefs associated with any corporation organized and operated exclusively for religious purposes, which is not disqualified for tax exemption under section 501 of the United States code.