**MEC 465/565, Spring 2020 (SBU)**

Aerospace Propulsion

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**Class Time and Location:** Mondays, Wednesdays: 2:30 – 3:50 PM FREY 317

**Instructor:** Professor Foluso Ladeinde **Office Location:** Heavy 224

**Preferred E-mail Address:** foluso.ladeinde@stonybrook.edu

**Instructor Office Hours (Tentative)**: TuTh: 1:00 – 2:30 PM

**Extra Help**: TBD **Office Hours**: TBD

**Textbook**: Aircraft Propulsion, Saeed Farokhi, Second Edition, 2014, Wiley Publ. 2014, ISBN 978-1-118-80677-7.

**Recommended Books**:

1. Jet Propulsion, Nicholas Cumpsty, Second Edition, 2003, Cambridge University Press Publ.
2. Mechanics and Thermodynamics of Propulsion, Philip Hill and Carl Peterson, Second Edition, 1992, Addison Wesley Publ.

**Prerequisite:** MEC 301, MEC 305, MEC 364, or Written Permission of the Instructor.

**Course Description:** Fundamentals of propulsion; performance parameters, thermodynamic cycles. Introduction to combustion and combustors. Performance and cycle analysis of various flight propulsion systems: turbojets, turbofans, turboprops, ramjets, scramjets, rockets, propellers. Design of supersonic inlet nozzles, component matching and map.

**Class Schedule (Subject to Change):**

| Topic | Description (Chapter in Text) | Date |
|---|---|---|
| 1. | Introduction: Trust generation – Propeller, Rocket, Ramjet, Scramjet, Pulsejet, Turbojet, Turbofan, Turboprop, Reciprocating Engines | January 27, 29 |
| 2. | Review of Compressible Flow, with Friction and Heat Transfer (2+) | February 3,5,10, 12 |
| 3. | Engine Thrust and Performance Parameters (3) | February 17, 19 |
| 4. | Gas Turbine Engine Cycle Analysis (4) | February 24, 26, March 2, 4 |
| | Midterm | March 9 |
| 5. | Aircraft Engine Inlets and Nozzles (6) | March 11, 23, 25 |
| 6. | Combustion Chambers (7) | March 30, April 1 |
| 7. | Axial Compressors, Axial Turbines (8,9,10) | April 6, 8, 15, 15 |
| 8. | Aircraft Engine Component Matching and Off-Design Analysis (11) | April 20, 22 |
| 9. | Chemical Rocket and Hypersonic Propulsion (12) | April 27, 29 |
| 10. | Advanced Propulsion Concepts | May 4, 6 |

**MEC 465 Grading Scheme (Subject to Change):**

Midterm: 35%
Final (24-Hour Take Home, Comprehensive): 40%
Homework: 20%
Attendance: 5%

**MEC 565 Grading Scheme (Subject to Change):**

Midterm: 35%
Final (24-Hour Take Home, Comprehensive): 30%
Group Project: 20%
Homework: 10%
Attendance: 5%

**Note:** The exams for MEC 565 contain a few relatively more difficult problems compared to MEC 465.

**About the Project**:

The MEC 565 project will involve an in-depth research into aspects of propulsion and/or turbomachinery that interest the students. Group projects are envisioned. A design change of a component, subsystem, or system, backed by the analytical tools developed in the course, will be required of each group, and efforts will be hinged on an agreed figure of merit.

**Make-up classes:**

I may be travelling somewhat during the semester and may not be able to attend a few of our regularly scheduled classes. I will have substitutes for the missed classes or make them up at a mutually convenient time. I will announce suggested make-up times well in advance and ensure that they are reasonable for everyone.

**Homework:**

Approximately one homework assignment every two weeks.
Homework will be due one week after it is assigned.
Late homework will receive half credit before the solutions are posted and will not be accepted after that.

Homework is to be done individually. Homework must be neat and orderly so that your work can be followed clearly. Solutions which are not clearly written and easy to follow (based on the judgment of the instructor) will not be graded.

**Exams:**

All exams will be scheduled in class, unless otherwise stated
No makeup exam unless arranged prior to the exam.

**Grading Scale:**

Will grade on the curve

**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 website: 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.

**Allowed Calculators**
Following the Mechanical Engineering Department's mandatory calculator policy, **only** the following calculators will be allowed to be used on the midterm and final exams. There will be no exceptions. This list of calculators is identical to that allowed for the *National Council for Examiners for Engineering and Surveying* (NCEES) Fundamentals of Engineering (FE) exam that many of you will take in your senior year, as well as the Professional Engineering (PE) exam that you may take several years from now. The sooner you become comfortable on one of these calculators, the better. If you have any questions on this policy please feel free to contact me. The NCEES policy on calculators can be found here: http://www.ncees.org/exams/calculators/.

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| **Casio:** | All **fx-115** models. Any Casio calculator must contain **fx-115** in its model name. |
| **Hewlett Packard:** | The **HP 33s** and **HP 35s** models, but no others. |
| **Texas Instruments:** | All **TI-30X** and **TI-36X** models. Any Texas Instruments calculator must contain either **TI-30X** or **TI-36X** in its model name. |