Course Syllabus for AerE 411 – Aerospace Vehicle Propulsion I

Note: this document is subject to change by the instructor during the semester. It is your responsibility to understand and follow all policies contained in this syllabus.

General Information

Instructor:	Alric P. Rothmayer	
	2235 Howe Hall	
	roth@iastate.edu	(To reach me, please email)
Office hours:	To be arranged.	(If my door is closed, please knock)

Pre–requisites: AerE311 and AerE 344.

It is the policy of the Department of Aerospace Engineering and the College of Engineering to require all students enrolled in this course to have satisfied all of the course's prerequisite requirements. If it is discovered that a student has not met any applicable prerequisite requirements, he/she will be required to immediately drop the course. The failure to drop the course will result in a final course grade of "F", regardless of course performance. Students who discover they have improperly enrolled in a course without meeting the applicable prerequisite requirements are strongly encouraged to meet with advising staff to promptly drop the course and make alternative scheduling arrangements or discuss if an official waiver of the pre–requisite requirements may be applicable.

Course structure:

Optional Textbook: Oates, *Aerothermodynamics of Gas Turbines and Rocket Propulsion.*

Other Reference Books:

Anderson, *Fundamentals of Aerodynamics*
NACA Report 1135, *Equations Tables and Charts for Compressible Flow*
Moran & Shapiro, *Fundamentals of Engineering Thermodynamics*

Grading: midterm exam (30%), final exam (30%), quizzes (20% = 4 quizzes + in class problems counted as 2 quiz grades) and homework (20%). Grading scales and policies are outlined below.

Please address any special needs or special accommodations with me at the beginning of the semester or as soon as you become aware of your needs. Those seeking accommodations based on disabilities should obtain a Student Academic Accommodation Request (SAAR) form from the Student Disability Resource (SDR) office (phone 515–294–7220). SDR is located on the main floor of the Student Services Building, Room 1076.

Student Learning Outcomes/Objectives

By completion of the course, students should be able to

1. Generate a mathematical model of thrust for a specified engine configuration.

2. Generate a mathematical model of fuel consumption for a specified engine configuration.

3. Compute the thrust of one or more of the following engine types using ideal cycle analysis: turbojet, ramjet, turbofan, rocket.

4. Compute the fuel consumption of one or more of the following engine types using ideal cycle analysis: turbojet, ramjet, turbofan, rocket.

5. Generate a mathematical model and/or compute a non–ideal cycle for a specified engine configuration.

6. Draw thermodynamic maps (temperature–entropy) diagrams for a specified engine configuration.

ISU Academic Policies

Academic Dishonesty
The class will follow Iowa State University's policy on academic dishonesty. Anyone suspected of academic dishonesty will be reported to the Dean of Students Office.
http://www.dso.iastate.edu/ja/academic/misconduct.html

Disability Accommodation
Iowa State University complies with the Americans with Disabilities Act and Sect 504 of the Rehabilitation Act. If you have a disability and anticipate needing accommodations in this course, please contact (instructor name) to set up a meeting within the first two weeks of the semester or as soon as you become aware of your need. Before meeting with (instructor name), you will need to obtain a SAAR form with recommendations for accommodations from the Disability Resources Office, located in Room 1076 on the main floor of the Student Services Building http://new.dso.iastate.edu/dr/student. Their telephone number is 515–294–7220 or email disabilityresources@iastate.edu . Retroactive requests for accommodations will not be honored.

Dead Week
This class follows the Iowa State University Dead Week policy as noted in section 10.6.4 of the Faculty Handbook http://www.provost.iastate.edu/resources/faculty–handbook .

Harassment and Discrimination
Iowa State University strives to maintain our campus as a place of work and study for faculty, staff, and students that is free of all forms of prohibited discrimination and harassment based upon race, ethnicity, sex (including sexual assault), pregnancy, color, religion, national origin, physical or mental disability, age, marital status, sexual orientation, gender identity, genetic information, or status as a U.S. veteran. Any student who has concerns about such behavior should contact his/her instructor, http://new.dso.iastate.edu/sa/, Student Assistance at 515–294–1020 or email dso–sas@iastate.edu, or the http://www.hrs.iastate.edu/hrs/node/99 Office of Equal Opportunity and Compliance at 515–294–7612.

Religious Accommodation
If an academic or work requirement conflicts with your religious practices and/or observances, you may request reasonable accommodations. Your request must be in writing, and your instructor or supervisor will review the request. You or your instructor may also seek assistance from the http://new.dso.iastate.edu/ Dean of Students Office or the www.hrs.iastate.edu/hrs/node/269 Office of Equal Opportunity and Compliance.

Contact Information
If you are experiencing, or have experienced, a problem with any of the above issues, email academicissues@iastate.edu.

Grading Policies and Grading

Overall Grading:

30% – Midterm exam (closed book, an equation sheet may be provided)
30% – Final examination (closed book, an equation sheet may be provided)
20% – Quizzes (4 closed book quizzes + in class problems counted as 2 quiz grades)
20% – Homework

Homework will be collected in class on the days listed in the schedule or announced in class. Homework will be collected at the beginning of the class. Grading scales and policies are outlined below.

Important: all quizzes and tests are closed book. No extra paper, notes or electronic devices of any type may be used for quizzes or tests unless stated in class. Only the equation sheet provided can be used for tests.

Pet Peeves and Suggestions

1. Please be on time (especially on quiz and test days), coming in late can be very disruptive.
2. Keep up with the material and review the notes before each class.
3. Do not study and do homework at the last minute. Pace yourselves.
4. Attend class and pay attention. Material is often clarified during class discussion and I will hold you responsible for any material presented and discussed in class.
5. Ask questions during class. There is no such thing as a bad question.
6. If you are having problems, see me early – don't wait until it's too late.
7. You may consult each other for homework, but you will be better off doing it yourself.
8. Put away your cell phone! Tablet and cell phone use is only o.k. for reading lecture notes.
9. No game playing, web browsing, text messaging, etc.!

Curving Grades: any item that states that the item will be curved will use the following approach. A multiplicative factor, M, will be calculated so that the highest curved grade is 100. For example, if the highest raw score of the item is 90 then M=100/90. All grades will be multiplied by M to obtain the final item grade. For example, a raw score of 70 will result in a curved score of 70*M. Curves are only applied to individual components (as indicated). The final course grade will not be curved.

Return of Graded Materials: Due to departmental policies, all graded materials (i.e. tests, quizzes and homeworks) will be returned individually during class. In order to avoid significant disruption to the class schedule, this will be done when we have in–class problem sessions that are longer than 15 minutes. This may delay the return of graded material, since the material will be returned during the first available in–class problem session that lasts longer than 15 minutes. Graded materials can be picked up in my office only after the bulk of the graded materials have been handed back in class. In–class practice problems and final examinations will not be returned.

Homework: I expect the homework to be neat, readable and complete. Points are listed on the homework statement and grading will be 0.5 or 1 point accuracy, depending on the problem. Extra consideration will be given for more complete analyses. Points will be deducted for sloppiness, lack of clar-

ity and lack of detail – even if you have the right answer. If your solutions are sloppy enough that I or the grader cannot easily see what you are doing then you will get a zero, irrespective of whether or not your solution is correct. The final averaged homework grades will be curved.

Problems that require a solution graph must use computer generated plots (hand–plotted graphs are not allowed). To save time, hand annotation of computer generated plots is allowed. The problem will state the number and type of plots required.

Points will be deducted for sloppy or incomplete plots and/or annotation.

To receive full credit for problems that require or use computed solutions, **a listing of the source code must be included** with the solution and **the steps of the solution and input parameters must be listed in the problem write–up.** Solutions that do not include source code listings or a problem write–up will receive substantial point deductions.

Any solution that involves the use of calculators, online programs or computational methods must have all of the problem details documented. Solutions that simply state an answer with little or no detail will receive substantial point deductions.

You should feel free to collaborate with your classmates on the homework. Some (but not all) of the homework solutions may be posted on the course website. Homework solutions may be representative of the correct solution but not exactly the same as the required solution.

Homework grading policy: Available points for each problem will be listed on the homework. Full points will be given if everything is done (even if not completely correct). 50% credit will be given if major elements are missing from a problem, or if there is not enough detail, or if the solution has major conceptual mistakes (a minimum 50% deduction will automatically be given if source codes or plots are not provided for homeworks that require them, a 100% deduction will be given when most of the plots are not provided for problems that are primarily computational). You get no points if the problem is not done or if it is completely wrong (i.e. wildly in error). **Late homeworks will not be accepted. Failure to follow homework instructions will result in an automatic 2 point deduction per homework set.**

Homework problems or closely related problems may be used on the midterm and final exams.

Homeworks may only be turned in during regularly scheduled classes.

Quizzes: will be graded on a 1–10 scale with 0.5 accuracy. The quizzes will cover definitions, theory and derivations given in the lecture as well as simple problems related to the lecture. Quizzes will be comprehensive from the start of the semester. It is relatively easy to get a high grade on quizzes if you study regularly. The final averaged quiz grades will be curved before adding the practice problem scores to the quiz grades.

Quiz problems or closely related problems may be used on the midterm and final exams. All quizzes are closed book/notes. You may not use any electronic device of any sort while taking a quiz. Any use of an electronic device will result in a zero for that quiz.

Taking the quizzes/tests and cheating: The quizzes and tests will be handed out upside down with a cover. You are not allowed to look through the stack, look at the quiz or turn it over until instructed to do so. Anyone caught looking at a quiz or looking through the stack prior to the instruction to turn the quizzes over will receive a zero – no exceptions, for any reason whatsoever.

In Class Problems: Short problems will be handed out in class for solution that day or in subsequent classes. These may be collected and graded. Grades for each problem will be 0 or 1, and you will not be penalized for incorrect solutions. You will only get a 0 if you do not turn the problem in or if you do not make a reasonable attempt to solve the problem. The in–class problem grades will not be curved. The final in–class problem grade will be normalized to a maximum of 10 points and will be counted as **two quiz grades** (i.e. 1/3 of the total quiz grade).

You may submit in–class problems when they are collected in–class or up to one week after they are collected in class. Problems turned in after that time will not be graded.

In–class problems or closely related problems may be used on the midterm and final exams.

In–class problems may only be turned in during regularly scheduled classes.

Exams/Tests: The midterm exam and the final exam will be closed book. An equation sheet may be provided for the exams. All exams are comprehensive and graded on a 1–100 scale with one point accuracy. The test grades for each exam will be independently curved.

Warning: test questions may be taken from each of the following categories: homework, quizzes, qualitative quiz questions, and in–class problems.

Final Grading Scale:

final grade = 0.3 x Midterm + 0.3 x Final Exam + 0.2 x Quiz Ave. + 0.2 x Homework Ave.

90–100	= A
85–90	= A–
80–85	= B+
75–80	= B
70–75	= B–
65–70	= C+
60–65	= C
55–60	= C–
50–55	= D+
45–50	= D
40–45	= D–
below 40	= F

Policy for Curving Grades for Multiple Sections:

If I teach multiple sections in the same semester, then the curve for each item will usually be an average of the curve for the multiple sections. However, the curve for each section may be applied individually to each section at the instructors discretion.

Policy for Missed Assignments and Examinations:

In general, you may make up assignments or turn in assignments late for an excused absence that follows university policy. A written statement documenting the absence must be provided and must contain sufficient information to verify the reason for the absence.

Homework is due at the beginning of the class period on the due date assigned in the class schedule. Late homework will not be accepted and will be given a grade of zero. **If you know that you have to miss a class, or if you are sick on the due date, then it is your responsibility to either arrange to have the homework delivered to me on, or before, the due date or contact me by email to arrange an extension.** When arranging an extension by email, you must state the reason for the extension in the email and I must approve the extension. The extension will be no later than the class period after the due date.

To be allowed to take a make–up quiz, the absence from a quiz must be communicated to me by email on or before the date of the quiz. The quiz should be made up as soon as possible following the original date of the quiz.

Any missed in–class problem will be given a grade of zero, unless it is an excused absence that follows university policy. In–class problems may be submitted up to one week after they are first collected in class without incurring a penalty.

To be excused from an examination requires **written notice** and must include substantial written justification (i.e. a detailed written explanation about why you had to miss the exam, including contact information that can be used to verify the reason for missing the exam). In general, absences from the midterm and final examinations will not be allowed except due to extreme mitigating circumstances, which must be documented in writing.

Important: Make–up examination content, grading and curving are at the discretion of the instructor and will not follow guidelines established for regular examinations.

Policy for Changing a Grade:

All grade change requests for quizzes, homeworks or tests must be submitted in writing with a clear justification for the requested change and a clear indication of the location of the item in question.

Policy for Pre–Requisite Violation:

The department provides faculty with a list of students who do not satisfy the pre–requisites for the course. If you are on this list then you will receive an F as your final grade unless you obtain a waiver. I will only grant a waiver if you can clearly and convincingly demonstrate that you have passed a course or courses that are equivalent to the required pre–requisites. This must be documented in writing. If you believe that you qualify for a waiver then it is your responsibility to work with your advisor to initiate a waiver request. I will not initiate the waiver request. Any student on that list who remains in the course will receive an F at the end of the semester unless they have obtained a waiver.