MAE 365 - FLIGHT MECHANICS I - Spring 2015
Department of Mechanical and Aerospace Engineering

INSTRUCTOR: Marcello R. Napolitano
E-mail: Marcello.napolitano@mail.wvu.edu, Room 519 ESB

OFFICE HOURS: T-Th from 2:30 PM to 3:30 PM. If the instructor is not available in those hours “make-up” office hours will be allocated in the same week. The TA will also have office hours on M-W-F (to be announced).

CREDIT: 3 hrs.

PREREQUISITE: MAE 116 and MAE 242; computer programming skills and knowledge of Matlab.

TEXTBOOK: M.R. Napolitano “Aircraft Dynamics: From Modeling to Simulation”, published by John Wiley. The instructor will provide a massive set of handouts. Students are encouraged to purchase a large 3-hole folder to store the material provided by the instructor.

GOALS: This course is designed to give aerospace engineering undergraduate students the fundamental concepts of modeling of the aircraft dynamic and aerodynamic behavior as well as concepts of static, dynamic stability and simulation of the aircraft dynamics. Also the concept of handling qualities will be introduced. The students will also be introduced to Matlab® software package for the analysis of dynamic systems.

LEARNING OUTCOMES: Students are expected to learn in details all the aspect of aircraft dynamics and to be able to perform linear simulations of the aircraft longitudinal and lateral-directional dynamics. Students are also expected to learn the aerodynamic design process to achieve desirable handling qualities for the aircraft dynamics.

ABET RELEVANCE
MAE 365 will cover topics to support ABET Learning Outcome A and K.

GRADING PROCEDURE:
Quizzes 15 %
NOTE: Quizzes will include “announced” and “un-announced” quizzes.
Homework 25 %
Mid Exams (3) 45 %
Final Exam 15 %
The final grade in this course will be assigned using the scale:
90-100 = A; 80-89 = B; 70-79 = C; 60-69 = D, <60 = F.

Class attendance is mandatory and will have a direct impact on your grade; attendance sheets will be taken every class. The only justifiable absences will be those according to official WVU policies. Some curving will be done on the final grade. The final grade will be multiplied by a number equal to the number of attended classes divided by the total number of classes.
PREREQUISITES BY TOPIC:
1 - Aircraft performance.
2 - Aerodynamics of aircraft.

TOPICS:
1 - Review of Aerodynamics concepts.
2 - Derivation of the dynamic equations of the motion for a rigid aircraft.
3 – Modeling of aerodynamic forces and moments.
4 – Modeling of thrust forces and moments.
5 – Aircraft Static Stability; steady state equations; trim conditions and trim diagrams.
6 - Review of Laplace Transforms.
7 - Longitudinal Dynamic Stability.
8 - Lateral-Directional Dynamic Stability.
9 - Stability Sensitivity Analysis.
10 – Aircraft Handling Qualities.

CLASS POLICIES:
- **It is expected that the students will review the material between classes.** This is necessary due to the fact that the topics in this course are strongly correlated. Additionally, there will be unannounced quizzes on the material of the previous lecture(s). For this purpose the students are strongly encouraged to take good notes; additionally, the instructor will provide a substantial amount of handouts which, along with the textbook, are designed with the specific purpose of assisting the students in the learning process outside the classroom.
- **It is expected that homework are to be prepared in a professional manner with a detailed documentation of the work.** Homework is supposed to represent the work by an individual student; cooperation between students while working on homework is neither encouraged nor tolerated. The use of the Solution Manual of the textbook is not allowed or tolerated and will be considered ‘plagiarism’. A “zero” score will be assigned to all the parties involved in the homework in the first occurrence of ‘plagiarism’; a “zero” score for all the semester’s homework will be assigned to all the parties involved in the second occurrence of ‘plagiarism’. Students are encouraged to consult available WVU material on the definition of ‘academic plagiarism’. **Homework is due at the beginning of the class period on the due date.** Late homework in my mailbox or under my door will not be accepted without any prior arrangement.
- A make-up test shall be given only if the student can show valid reason as per WVU rules. This has to be established before the regularly scheduled test.
- **The use of ‘Programmable’ calculators, ‘smart phones’ and/or text storing devices is NOT allowed during tests and quizzes.** Students are required to use ONLY calculators without programming and text storage capabilities.
- The class format will be in the form of lectures; student participation through feedback and questions is strongly requested and encouraged by the instructor. **Extra curriculum activities (such as text messaging, use of smart phones, tablets & laptops, reading the DA, cross-words, Sudoku, …) will not be tolerated during the class. Students engaging in these activities will be asked to leave the classroom and will be considered absent for that lecture. An occasional beverage and/or a drink is OK; however, it is not appropriate for students to have meals while attending class. Students consuming food will be asked to leave the classroom.**

STATEMENT ON SOCIAL JUSTICE:
WVU is committed to social justice. The instructor of this course concurs with WVU’s commitment and expects to maintain a positive learning environment based upon open communication and mutual respect and nondiscrimination. Our University does not discriminate on the basis of race, sex, age disability, veteran status, religion, sexual orientation, color, or national origin. Any suggestions as to how to further such a positive and open environment will be appreciated and given serious consideration. If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, please advise us and make appropriate arrangements with Disability Services (293-6700).