

# COURSE APPROVAL/CHANGE DOCUMENT

(See back of form for instructions)

1. ADDITION \_\_\_ REVISION \_\_\_ TERMINATION \_\_\_

2. IF REVISION: denote changes (i.e. Title only; Title, CIP and Description; etc.):

3. COURSE NUMBER \_\_\_ - \_\_\_

4. COURSE TITLE \_\_\_\_\_ -

5. IF REVISION: Previous Course No. \_\_\_\_\_ Previous Title \_\_\_\_\_

6. FOR ADDITIONS AND REVISIONS -  
FIRST TERM/YEAR TO BE OFFERED:

Fall \_\_\_ Spring \_\_\_ Summer \_\_\_ Term \_\_\_\_\_

7. FOR TERMINATIONS ONLY -  
LAST TERM/YEAR TO BE OFFERED:

Fall \_\_\_ Spring \_\_\_ Summer \_\_\_ Term \_\_\_\_\_

8. COLLEGE:

9. DEPARTMENT NAME:

10. CIP CODE (Classification of Instructional Program / US Bureau of Labor Statistics): \_\_\_\_\_

11. FIXED CREDIT HOURS: YES \_\_\_ NO \_\_\_

\_\_\_ Total Credit Hours

\_\_\_ Lec Contact Hours

\_\_\_ Lab Contact Hours

\_\_\_ Other Contact Hours

12. VARIABLE CREDIT HOURS: YES \_\_\_ NO \_\_\_

\_\_\_ Min Total Credit Hours \_\_\_ Max Total Credit Hours

\_\_\_ Min Lec Contact Hours \_\_\_ Max Lec Contact Hours

\_\_\_ Min Lab Contact Hours \_\_\_ Max Lab Contact Hours

\_\_\_ Min Other Contact Hours \_\_\_ Max Other Contact Hours

13. CAN THIS COURSE BE TAKEN FOR ADDITIONAL CREDIT: YES \_\_\_ NO \_\_\_ If YES, total number of times course can be taken \_\_\_\_\_

14. MAXIMUM ENROLLMENT ALLOWED FOR COURSE: \_\_\_\_\_ Justification of maximum enrollment:

15. CLASS SCHEDULE TYPE/ FACULTY WORKLOAD: Choose appropriate schedule type:

Faculty Workload: \_\_\_\_\_

Class schedule type justification:

16. COURSE LEVEL:

17. GRADE TYPE:

18. DEVELOPMENTAL COURSE: YES \_\_\_ NO \_\_\_

19. CROSS-LISTED COURSE:

YES \_\_\_ WITH \_\_\_\_\_ NO \_\_\_

20. SPECIAL COURSE FEE? (Must be Board approved)

YES \_\_\_ Amount \$ \_\_\_\_\_ NO \_\_\_

21. Required faculty qualifications to teach this course:

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22. GENERAL EDUCATION COURSE: YES \_\_\_\_\_ NO \_\_\_\_\_

If yes, please select one general education category:

If yes, please select up to three general education learning goals that reflect the priorities for student learning in the course. Please rank these in priority order, i.e. 1,2,3 by inserting the numbers/rankings into the boxes:

- \_\_\_\_ General Education Learning Goal 1: Ethical Reasoning
- \_\_\_\_ General Education Learning Goal 2: Global Learning
- \_\_\_\_ General Education Learning Goal 3: Information Literacy
- \_\_\_\_ General Education Learning Goal 4: Written Communication
- \_\_\_\_ General Education Learning Goal 5: Oral Communication
- \_\_\_\_ General Education Learning Goal 6: Critical Thinking
- \_\_\_\_ General Education Learning Goal 7: Quantitative Literacy

If the proposed new or revised course is a General Education course, please provide a short rationale why this course should be considered as a general education course.

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Attach the following:

- a) Class syllabus using the syllabus template.
- b) Memo from Library Dean assessing available and needed library resources and services.
- c) If applicable, memos from Department Chair(s) in affected department(s) stating support or that issues/conflicts are resolved.

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COURSE APPROVAL SIGNATURES

Department Chairperson

Dean of Kent Library

College Council

**Brad Deken** Digitally signed by Brad Deken  
Date: 2020.03.27 15:12:54  
-0500

Educator Preparation Committee

General Education Council

Graduate Council

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To obtain the next signature, save the pdf to your desktop and then email the form as an attachment to the next individual for signing. When submitting the form, the **email must come from your Southeast email account.**

**Registrar's Office Use Only**

SCACRSE \_\_\_\_\_ Degree Audit \_\_\_\_\_ Bulletin \_\_\_\_\_ Degree Map \_\_\_\_\_ SHATATR \_\_\_\_\_

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## Instructions for Completing Course Approval/Change Document

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1. Is the course an Addition, Revision or Termination?
2. If Revision: Please list changes being made to course such as title change; or title, CIP, and description change, etc.
3. Course Number: Two letters (choose discipline from drop down menu) and three numbers (i.e., EN 140). For course additions, ask for a list of available course numbers from the Registrar's Office.
4. Course Title: Full title of course.
5. If Revision: Indicate previous course number and/or title if change has been made. A new course number must be used if the revised course is not equivalent to the previous course offered.
6. For Additions and Revisions-First Semester/Year To Be Offered: Indicate first semester/year course is to be offered or when changes to the revised course will be put into place.
7. For Terminations Only-Last Semester/Year To Be Offered: Indicate last semester/year course is to be offered. For course terminations skip questions 10-22.
8. College Name: Choose the College Name from drop down menu. UI/IU courses belong to the Provost.
9. Department Name: Choose the Department Name from drop down menu. UI/IU courses belong to the Provost.
10. CIP Code: Enter six digit code number. Contact Institutional Research for information.
11. Fixed Credit Hours: Enter the total credit hours student will earn for course. Lecture, Lab, and/or Other Contact Hours should be completed as appropriate. Lecture contact hours should equal the student credit hours earned for the lecture component of the class. Lab contact hours will in most cases be entered as a 2 to 1 ratio (2 contact hours equals 1 student credit hour) for the lab component of the class. Other Contact hours will be entered for field experience courses, internships, practicums, etc.
12. Variable Credit Hours: If course is variable credit hour, indicate total minimum hours and total maximum hours for which credit can be received. Indicate minimum and maximum lecture, lab, and/or other contact hours as appropriate. See 10 for more detailed instructions.
13. Can This Course be Taken for Additional Credit: Indicate if students will be allowed to enroll in this course more than once for additional credit. NOTE: If the course allows for multiple repeats, it is outside the normal repeat procedure. If a student making a grade of 'D' or 'F' wants to repeat the course for a better grade, special handling is required.
14. Maximum enrollment allowed for course: Indicate the total number of students allowed to enroll in this course and the justification for that maximum.
15. Class Schedule Type/Faculty Workload: See Class Schedule Types sheet on Document Share for appropriate type of course and faculty workload.
16. Course Level: Choose appropriate course level from drop down menu. 500 level courses are mixed undergraduate/graduate.
17. Grade Type: Indicate if course is standard grade (A, B, C, etc.) or Credit/No Credit
18. Developmental Course: Indicate if course is to be offered for degree credit or developmental credit.
19. Cross-listed Course: List course that is cross-listed across disciplines (e.g., PY120/CF120)
20. Special Course Fee: Indicate course fee amount as approved by Board of Regents
21. Required faculty qualifications: What are the degrees, areas of specialty, and/or other characteristics of a faculty member that would qualify them to teach this course.
22. General Education Course: Choose NO, or the category in which the course falls and the general learning goals.

# AV 390- Aircraft Design

## Class Syllabus

- (1) Course Number: AV390
- (2) Course Title: Aircraft Design
- (3) Catalog Description: Design of transport-category airplanes and helicopters, including the electrical and mechanical systems, controls, and auxiliary systems.
- (4) Prerequisites: ET381 & PH120
- (5) Co-requisites: n/a
- (6) Credit Hours: 3
- (7) Semester: Fall 2021
- (8) Class Meeting Time(s), location and format: MWF 8-8:50 AM in PB201, face-to-face
- (9) Instructor: John Q. Pilot
- (10) Instructor Contact Information: jqpilot@semo.edu
- (11) Concerns: Questions, comments or request regarding this course should be taken to the instructor. Unanswered questions or unresolved issues about this class can be directed to Dr. Brad Deken.
- (12) Course Learning Outcomes:
  1. Students will be able to analyze an electrical power system in an aircraft.
  2. Students will be able to recognize and describe the operation of the components of the aircraft power plant.
  3. Students will be able to understand the pressure, velocity, drag, resistance, friction, and other concepts of fluid systems for aircraft.
- (13) Course-specific Required Materials:

**Required Textbooks:**  
Ian Moir, Allan Seabridge, Aircraft Systems –Mechanical, electrical, and avionics subsystems integration, 3rdEdition, John Wiley and Sons, Ltd., Chichester, West Sussex, England, UK, 2008.

**Optional Materials:**  
Anon, Airframes and Systems, JAA ATPL Training, Edition 2, Book 4 (JAR Ref. 021 01), Atlantic Flight Training, Ltd., Sanderson Training products, ISBN 0-88487-454-0, Jeppesen GmbH, Neu-Isenburg, Germany, 2007.  
Thomas W. Wild, Transport Category Aircraft Systems, ISBN 0-88487-232-7, Jeppesen, Englewood, 1996.
- (14) Course Content:

Students will be required to undertake and complete three project (two individual and one groups). Each project contributes 10% of the total final grade. Group project is made in groups of 3 students and covers description of the important systems of a large T-category aircraft certified under FAR/CS part 25. Grading is based on two individual projects, one group project, two intermediate exams, and the final comprehensive exam contributing all together 100% of the final grade. The final exam is especially critical contributing almost one-third of the grade.

**Assessment:**

Exam I	20.00%	120 points
Exam II	20.00%	120 points
Exam III (Final)	30.00%	180 Points
Project I	10.00%	60 points
Project II	10.00%	60 points
Project III (Group)	10.00%	60 points
TOTAL	100.00%	600 points

**Schedule:**

<u>Week</u>	<u>Topic</u>
1	Flight Control Systems
2	Engine Control Systems
3	Hydraulic Systems
4	Electrical Systems
5	Pneumatic Systems
6	Exam 1 and Environmental Control Systems
7	Emergency Systems
8	Rotary Wing Systems
9	Advanced Systems
10	Exam 2 and System Design and Development
11	Avionics Technology
12	Environmental Conditions
13	Project Work
14	Project Work
15	Project Presentations
16	Final Exam

(15) Grading Scale and Policies:

Grading Scale:

- A= 90-100%
- B= 80-89%
- C=70-79%
- D=60-69%
- F=59% or below

(16) Final Exam Schedule: Monday, December 13, 2021 at 8:00 AM in PB201.

(17) Optional Additional Course Information:

Aircraft Systems is a course for aspiring professional pilots in airplanes and/or helicopters and students of aeronautics and aerospace engineering who need to become familiar with the large transport-category aircraft systems. The electrical, hydraulic, pneumatic, environmental control, flight controls, fire protection, power plant, auto flight, APU, and many other auxiliary systems are covered in detail. The operation and design of major components and subsystems is explained using real aircraft examples. The philosophy and the practice of system engineering and the design of complex systems are explored. New industry standards and shift toward more electric airplane (MEA) are covered and discussed. Also, the fundamental principles of operation for various mechanical and electrical systems are reviewed, e.g., gas-laws, Pascal law, electricity and AC/DC currents, mechanical advantage and force, torque, current transformation/amplification, etc. Examples of systems were demonstrated, illustrated, and explained using several large transport-category airplanes, such as, EMB 170/175/190/195, CRJ 200/700/900, B737, B757/767/777/768, B747, MD80 series, L1011, A319/320/321, A330/340/350/380, etc.

The Flight Engineer FAA FE-Turbojet written test (FE) can be passed based on the knowledge acquired in this course. Understanding aircraft systems is essential for the pilots aspiring to fly large transport-category airplanes and aircraft operators.

- Attendance & Student Behavior: Class attendance for all classroom and flight lab courses is expected.
- Any airport activities such as a flight lesson or cross-country flight scheduled by the student are not valid reasons for missing class or exams or arriving late for class.
- Students enrolled in FAA Part 141 Commercial Pilot ground school must make up all absences, excused or not, via a one-on-one ground session with a Certified Flight Instructor (CFI). This will be at the student's expense, and it must be completed before the exam. [Note: this is an FAA requirement]

Course Goals:

- To introduce and explain system of units. Both SI (International system of units) and the old obsolete English/American Engineering system of units are described.
- To understand the basic physics and theory of operation of mechanical systems. Work, Energy, Power, Newton laws of classical mechanics, and other basic mechanic terms are described, and many examples solved.
- To understand the basic theory of electricity, electric current flow and resistance, generation of electric energy as well as its use to power various electric motors, switches, electromagnetic induction and relays/solenoids.
- To understand the basic theory of fluid flow. Pressure, velocity, drag, resistance, friction, and flow rates are described and flow through pipes and channels is covered in sufficient detail.
- Hydraulic systems of large transport-category airplanes are explained. All the major components and subsystems are covered, and its function explained. The advantages and disadvantages of hydraulic systems are discussed.
- Aircraft flight controls are discussed, and the basic theory of operation is covered. Also, the new strategies in flight control design and use is discussed. AFCS (Automatic Flight Control System) and FD (Flight Directors) are introduced.

- Pneumatic systems and environmental control systems (ECS) are covered in detail. The physics of operation, major components and subsystems as well as the advantages and disadvantages of the pneumatic systems are discussed.
- Electrical systems and the new concepts in designing MEA (More Electric Airplane) are covered and discussed. Generation of electric power and its use of it to power various aircraft components and subsystems are covered. Integration of electrical systems with hydraulic and pneumatic systems is discussed.
- To understand the basic operation and construction of aircraft power plants/engines (reciprocating turbine). Especially aircraft turbine engines (turbojet, turbofan, turboprop, turboshaft) are covered. Basic elements of engine designs are covered with explanation of how each system works.
- Aircraft fuel systems are covered. Mostly we deal with the airframe fuel system and not part of the engine fuel systems which are covered in the engine subsystems part.
- Engine control systems are covered. Special attention is given to engine performance and health monitoring systems (HMS) as well as to the FADEC (Full Authority Digital Engine Control).
- Dedicated and specialized rotorcraft-helicopter systems are covered (hydraulic, pneumatic, electrical, environmental, flight controls, etc.). Helicopter AFCS and SAS (Stability Augmentation Systems) are covered in sufficient detail.
- Auxiliary aircraft systems, such as, starting systems, engine lubrication, fire, rain, and ice protection and removal, etc., are covered.

(18) **Academic Honesty** – Southeast Missouri State University expects all students, faculty and staff to operate in an honest and ethical manner. Academic dishonesty is a very serious offense because it undermines the value of your education and the education of others. Students who engage in academic dishonesty face significant penalties. Forms of academic dishonesty include, but are not limited to, plagiarism, cheating, contract cheating, misrepresentation, and other actions you take. Some of these are defined below:

- Plagiarism means passing off someone else’s work as your own, whether it is intentional or unintentional.
- Cheating includes copying from another person or source of information to meet the requirements of a task.
- Contract cheating is paying someone else or a company to do your work.
- Misrepresentation means you are posing as someone else or someone else is posing as you to complete a task.
- Collusion means working with one or more people to cheat. If you help someone cheat or plagiarize you will face the same penalties.

For more information, visit the Responsible Redhawks Code of Conduct

<http://www.semo.edu/responsiblerehawks/code-of-conduct.html> or the Faculty Handbook Section (D) on Academic Honesty <http://www.semo.edu/facultysenate/handbook/5d.html>

(19) **Accessibility** – Southeast Missouri State University and Disability Services are committed to making every reasonable educational accommodation for students who identify as people with disabilities. Many services and accommodations which aid a student’s educational experience are available for students with various disabilities. Students are responsible for contacting Disability Services to register and access accommodations. Accommodations are implemented on a case by case basis. For more information, visit <http://www.semo.edu/ds/> or contact Disability Services at 573-651-5927.

- (20) **Civility** – Your university experience is purposely designed to introduce you to new ideas, help you think effectively, develop good communication skills, evaluate information successfully, distinguish among values and make sound judgements. Doing this well requires respectful and courteous discussion among and between students and the instructor. Together, we must create a space where we acknowledge and respect others have different experiences, perspectives and points of view. Disagreements are likely. Mutual respect for one another and a willingness to listen are important. Remember, you are responsible for your behavior and actions. There is a no tolerance policy on bullying or harassment of any kind. Additional information on student conduct may be found at: <http://www.semo.edu/pdf/stuconduct-code-conduct.pdf?ver=1.0> and [http://www.semo.edu/pdf/Conduct Faculty Resource Guide.pdf](http://www.semo.edu/pdf/Conduct_Faculty_Resource_Guide.pdf)
- (21) **Mandatory Reporting** – I will keep information you share with me confidential to the best of my ability, but as a professor I am legally required to share information about sexual misconduct and crimes I learn about to make our campus and community safe for everyone.
- (22) **Student Success** – This course uses SupportNET, Southeast’s student success network, to improve communication between students, faculty and staff on campus. You’ll get emails through SupportNET with information about resources or concerns. Please read these emails—they are sent to help you succeed! You can access SupportNET through your portal, Moodle or directly at [supportnet.semo.edu](http://supportnet.semo.edu) to see any academic alerts, ask for help and to access resources to support your success at Southeast.

\*Definition of ‘blended’ to be added.