

Continuing efforts to upgrade the aeronautics curriculum at Jacksonville University

Jerry L. Terrell
Jacksonville University

Juan Merkt
Jacksonville University

Jeffrey Harrison
Jacksonville University

Rhett Yates
Jacksonville University

Abstract

The aviation industry is exceptionally dynamic. Advances in technology have enabled the industry to change drastically in a short period of time. The transition to jet propulsion advances in aerodynamics, avionics improvements, and introduction of revolutionary navigation systems have all occurred within the past 60 years. These advances have prompted corresponding changes in aeronautics education. New technology such as computer assisted training, improved classroom aids, and advanced simulation devices have become the norm. JU has risen to the challenge by updating its aviation curriculum and employing modern aircraft in its flight training. This paper addresses efforts to affect these updates.

Keywords: Aviation, Curriculum, Flight Training, Aviation Management

Introduction

Jacksonville University (JU) is a private institution of higher learning offering degree programs in the traditional liberal arts and sciences along with those in business and professional disciplines. It combines the advantages of a liberal arts college with the strengths of an urban comprehensive university. The university is located on the St. Johns River in the Arlington area of Jacksonville, Florida. Jacksonville is northeast Florida's financial, commercial, industrial, and transportation center and home to over one million people. JU is chartered by the State of Florida as a private, nonprofit and independent institution of higher learning and has formal authority under the laws of the State of Florida to award both bachelor and master degrees. The university houses three colleges: the College of Arts and Sciences, the College of Fine Arts, and the Davis College of Business (Jacksonville University, 2012). The Davis Aviation Center (DAC) is housed in the Davis College of Business (DCOB) and offers two undergraduate degrees with majors in Aviation Management and Aviation Management with Flight Operations. The Aviation Management (AVM) major prepares students for careers as managers in various areas of the aviation industry. The program develops expertise in business management with emphasis on administration of various aviation enterprises. The curriculum includes such areas as business economics, data acquisition and analysis, finance, marketing, and the study of aviation business law and regulation. The degree offers three areas of focus or career tracks, Airline Management, Airport Management, and Air Traffic Control. The Aviation Management and Flight Operations (AVO) major prepares students for careers as professional pilots. The curriculum provides a solid foundation in business management and all required Federal Aviation Administration (FAA) pilot ratings to conduct flight operations in the National Airspace System. Students completing flight courses are awarded certificates and ratings as certified by the FAA. This degree also offers three areas of focus or career tracks, Commercial Pilot, Military-Navy, and Military-Marine Corps (Davis Aviation Center, 2012a). Jacksonville University is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools (SACS), the Davis College of Business by the Association to Advance Collegiate Schools of Business International (AACSB), and the two aviation degree programs by the Aviation accreditation Board International (AABI) (Jacksonville University, 2011a). In 2008, Jacksonville University won the National Intercollegiate Flying Association's Loening Trophy awarded annually to the flight team representing the best all-around collegiate aviation program in the nation.

Furthermore, JU is one of only 36 universities in the United States selected by the Federal Aviation Administration to educate future air traffic controllers under the Collegiate Training Initiative (CTI) (Davis Aviation Center, 2012b).

History

Jacksonville University was founded in 1934 as a two-year community college. After relocating to its present locale in 1950, the institution expanded into a four-year program and became Jacksonville University in 1956. The Davis College of Business was established in 1979. A Division of Business established in the College of Arts and Sciences in 1967 preceded it. The Aeronautics Program came into being in 1983 with an original class of some ten students (Jacksonville University, 2011b). During its first thirteen years, flight training was conducted by various contract flight schools operating at Craig Municipal Airport (since renamed Jacksonville Executive Airport). In 1996 JU signed a contract with Comair Aviation Academy (later renamed

the Delta Connection Academy, ultimately merging with Aerosim to become Aerosim Flight Academy) to bring airline-oriented flight training to its aviation students. In spring, 2007, the Aeronautics Program became the Aeronautics Division, one of three academic divisions within the DCOB (Jacksonville University, 2007). Then, in 2009, the division was renamed the Davis Aviation Center to reflect its expanded role in North Florida's aviation community. Jacksonville University traditionally maintains an undergraduate enrollment of less than 3000, while the aviation programs have at times experienced enrollments well over 200 students. Since its establishment, the now renamed Davis Aviation Center has graduated hundreds of alumni employed in a wide variety of pursuits in the aviation industry. Airline pilots and dispatchers, airport managers, executives in the air carrier, government, and aerospace industry, and military officers number among JU's aeronautics alumni and alumnae.

Facilities

The Davis Aviation Center is housed in the Davis College of Business building, one of the newest and largest classroom buildings on the JU campus. The general design of the building is with classrooms located in the interior of the building and office spaces around the periphery with windows giving maximum exposure to the outside. Classrooms are all equipped with an array of state-of-the-art training devices such as PC's, VCR's, DVD's, and ceiling mounted projectors. The aviation administrative offices, faculty offices, and most aviation classrooms are located on the first floor. Aviation classes also utilize the computer classrooms located on the second floor. An aviation training room is located in the aviation administrative suite along with an FAA testing facility. Flight training for JU's students is conducted under an exclusive contract with Aerosim Flight Academy at the academy's satellite base facility located at Jacksonville Executive Airport, approximately a 15-minute drive from the main campus. The airport has two hard surface runways with ILS, VOR, GPS, and ASR approaches. An FAA contract control tower operates between 0600-2300 Monday through Friday and 0700-2200 Saturday and Sunday. The airport meets all requirements of 14 CFR Part 141.38 for training airports and for day and night flight operations (Jacksonville University, 2007).

Early Curriculum

The total hours required for the awarding of any degree from JU at the inception of the aeronautics program in 1983 was a total of 128 credit hours, though 130 hours were required to complete all requirements for the AVO major. Since 1987, both the university's core curriculum and the DCOB's core curriculum have evolved into their current form and the total number of credit hours required for the awarding of any JU degree reduced from 128 to 120 credit hours (JU, 2004). Likewise, the curricula for the various aviation majors and tracks have changed as have the number of hours required for completion of the AVM and AVO majors. The curriculum pursued by JU students seeking degrees with an aviation major then and now consists of three major components; (1) the university's core curriculum, (2) the core business curriculum of the DCOB, and (3) aviation courses specific to the major. Unchanged have been the categories identifying various aviation courses. Courses concerned primarily with aviation management were labeled Aviation Management courses with a prefix of AM, courses involving actual flight training were labeled Aviation Operations courses with a prefix of AO, and flight support and technically oriented courses labeled Aviation Science courses with a prefix of AS (Jacksonville

University, 1983). Later, in 2006, course prefixes were changed to AVM, AVO, and AVS respectively to conform to university standards (Jacksonville University, 2006).

The aviation curriculum existent in 1983 reflected flight training subjects generally taught in flight schools and colleges offering non-engineering aviation majors at that time. The emphasis was on teaching subjects appropriate for the operation of small, light single or light twin aircraft with reciprocating engines. Only the airlines and military services taught the operation and maintenance of large jet aircraft in their training program because, by and large, that was the kind of equipment in their inventories. But for civilian pilots, training in Cessna or Pipers was the order of the day. For example, in 1983, the Requirement for graduation with an Aviation Management with Flight Operations (AVO) major were:

Aviation Operations

AO 111	Private Pilot Flight
AO 212	Commercial Pilot A
AO 213	Commercial Pilot B
AO 314	Instrument/Commercial Pilot Course
AO 410	Flight Instructor or Multi-Engine Training

Aviation Science

AS 101	Air Science for Private Pilots
AS 102	Aviation Weather
AS 201	Air Science for Commercial Pilots
AS 202	Air Science for Instrument Pilots
AS 301	Elements of Flight Instruction

Aviation Management

AM 301	Aviation History and Development
AM 302	Economics of Aviation
AM 304	Airport Planning
AM 402	Airport Management
AM 404	Civil Aviation Operations
AM 405	Government Regulation of Aviation
AM 406	Aviation Law

(Jacksonville University, 1983).

With minor alterations to accommodate changing university credit-hour demands and a few specialized aeronautics course offerings these academic requirements prevailed until the mid to late 1990s.

The Changing Aviation Industry Environment

Since the end of World War II in 1945, the aviation industry environment has experienced nothing less than revolutionary changes. Jet propulsion and high-altitude, supersonic flight were herald innovations, first in military applications then in civil aviation. Introduction of high-altitude jet airliners in the 1950s opened a new era in air transportation. Advances in navigation technology came early on with development of VHF navigation and communications equipment. With improvements in engine reliability and long-range navigation systems such as INS, OMEGA and VLF, trans-oceanic flight became commonplace. Further improvement in power plant design through the introduction of turbofan engines saw a reduced requirement for redundant propulsion and improved fuel efficiency along with a reduction in

environmental noise pollution. Commensurate improvements in air traffic control and airspace management through development first of RADAR, then later NEXRAD, GPS, WAAS, ADS (B), RVSM, and a whole alphabet soup of myriad new innovations point to an era of “free flight” and “air traffic management” as opposed to “air traffic control” as norms for the future. As recently as February of 2012, the U. S. Congress passed a bill to speed the nation’s switch from radar to an air traffic control system based on GPS technology and open U. S. skies to unmanned drone flights within four years (Associated Press, 2012). These, along with new developments in “glass cockpit” technology such as FMS, AFCS, “fly-by-wire”, and electronic checklists, have demanded revolutionary changes in knowledge and skill requirements of cockpit crews. Commensurate changes in aviation education and training have been mandatory to adapt to the modern aviation environment.

Curriculum Update Initiatives

The opportunity for significant modernization to the aeronautics curriculum occurred in the late 1990s when the director of the Aeronautics Division encouraged aeronautics faculty to develop a new course on the theory and operation of jet aircraft and high-altitude, high-speed flight. Such a course was subsequently prepared and approved for inclusion in the university’s 1999-2000 Academic Catalog as an addition to the aeronautics curriculum (Jacksonville University, 1999). When queried as to the need for the new course by the University Curriculum Committee and later in open forum by members of the Faculty Assembly, the reply was given “We intend to teach our students how to spell Boeing as well as Cessna”. Approval of the new course was unanimous.

Advanced Aircraft Systems

Two aeronautics faculty members, both former airline pilots experienced in the operation of large and heavy transport category turbine aircraft, had been tasked to develop the new course. The new Advanced Aircraft Systems course (AS 402), first offered in the fall of 1999 semester, provided advanced studies of jet aircraft systems and procedures of aircraft currently employed in the airline industry using one type and model as an example. The syllabus included the examination of the design, integration and functioning of aircraft system components along with turbine engine theory. Modern mechanical, hydraulic, pneumatic, and electrical systems were covered. Swept-wing airframe design and high altitude flight characteristics were discussed along with other such operational subjects as pressure refueling, deicing procedures, weight and balance computations, and fuel and navigation planning for operations in the jet airway structure of the National Airspace System. The course description was written to be flexible as to the example aircraft to be used each semester. A commercially published book on basic generic turbine aircraft systems was chosen as the text along with the aircrew Operating Manual for the example aircraft (initially the B-727; as the course evolved, the example aircraft was changed from the B-727 to the B-737-200 and later to the Bombardier CRJ200 Regional Jet). The course was taught using traditional lecture and discussion techniques, with lecture guides, visual aids and chalkboard/whiteboard presentations prepared from the two texts and other supplementary materials. Many in-class written assignments were given such as fuel profile computations and weight and balance worksheets. Testing was done using conventional pencil-and-paper written tests with a comprehensive oral final. Satisfactory completion of the oral final was a requirement

regardless of a student's numerical average on the written tests. A student given an unsatisfactory grade on the oral examination was awarded an "incomplete" on the final course grade and offered a one-time opportunity to retake the oral. If the oral retake was successful, the student was awarded a passing grade in the course with a one-letter-grade penalty.

The course was the herald offering in what was later to be a series of advanced aircraft systems courses offered at JU. Students enthusiastically embraced the course and their interest in and zeal for the subject made low grades and failures rare and extraordinary. Feedback from aeronautics alumni revealed high regard for the usefulness of the course in obtaining aviation jobs and achieving success in their careers.

Jacksonville University enjoys a serendipitous location with many and varied aviation facilities, both governmental and commercial, in close proximity to the campus. Site visits by aeronautics students to the FAA's Air Route Control Center, Terminal Radar Approach Control facility, and airport control towers along with the Jacksonville Airport Authority's four airports are commonplace. Commercial facilities such as local Fixed Base Operators (FBOs) and maintenance, overhaul, and repair (MRO) activities welcome JU students. Finally, U.S. military facilities offer valuable exposure to a spectrum of modern aviation endeavors. As a result of one of these latter site visits, the U.S. Navy's Aviation Depot (known in its present iteration as Fleet Readiness Center Southeast) located at NAS Jacksonville, Florida, donated to JU (on permanent loan) a surplus jet engine assembly with assorted parts as a training device for use in the Advanced Aircraft Systems course.

Advanced Aircraft Systems II

In 1998, the aeronautics division experienced a windfall through the generous donation by the Boeing Aircraft Corporation of Computer Based Training (CBT) software for the B-737 New Generation (NG) aircraft. Programmed instruction in the form of CBT had long been the norm for teaching aircraft systems in the airlines and in military aviation. Acquisition of this new pedagogy presented a valuable adjunct to traditional teaching methods. JU was licensed to use the donated software for the sole purpose of instructing JU students, and the software was limited to use on computers located in a locked classroom and not permitted to migrate into the public domain. A new Advanced Aircraft Systems II course (AS 404) was developed, approved and first taught in the spring semester of 2001 as follow on course to the original advanced systems course, now renamed Advanced Aircraft Systems I (Jacksonville University, 2002). The course was taught entirely in DCOB computer classrooms using the recently donated CBT software supplemented by lectures and classroom discussion. The already established format for student progress evaluation in advanced aircraft systems courses was used consisting of three pencil-and-paper tests during the semester followed by an oral final examination. One new innovation was the use of interactive computer software for the final examination requiring the student to successfully demonstrate the ability to program the flight management computer (FMS) for a flight using planning parameters provided by the examining professor. Classroom learning was augmented during the semester by a site visit to VR-58, a Navy logistics squadron operating C-40 aircraft based at NAS Jacksonville, Florida. The C-40 is the Navy version of the B-737NG that combines features of both the B-737-700 and -800. Students were briefed in detail on preflight and operating procedures, participated in preflight of the plane, and (with ground electrical and hydraulic power connected) sat in the "glass" cockpit and manipulated the various knobs, switches, levers, and other controls used to fly the aircraft. This

hands-on contact with an actual airliner used daily in flight operations transporting personnel and materiel provided invaluable experience to the students and was a superb motivator.

During the late 1990s, a symbiotic relationship had been established between JU and Delta Air Lines (DAL). A connection had already existed between JU and the Delta Connection Academy (a DAL subsidiary) that provided flight training for aeronautics students. Contact between JU aeronautics faculty and DAL employees in Delta's Atlanta flight crew training facility proved to be a fruitful source of assistance for aircraft publications and training software. Delta generously donated DAL-developed CBT software on the B-737-800 and B-777 aircraft. Moreover, DAL donated 30 volumes each of the Aircraft Operating Manual for both aircraft to be used by students as a text while enrolled in advanced aircraft systems courses. The software was used to enhance the Advanced Aircraft Systems II course upgrading it to the B-737-800, and for the use in a later-to-be-developed Advanced Aircraft Systems III. A lending library was also established from which students could check out an Operating Manual for the duration of their enrollment in the respective courses. Finally, Delta invited the two faculty members who were team-teaching Advanced Aircraft Systems I to attend its one-week Pilot Instructor School convened in December of 2000 and provided them thereafter with recurrent training in Delta's full-motion simulators. Throughout the past decade Delta Air Lines' contribution to JU's aeronautics curriculum modernization was invaluable and continues to be up to the present time.

Advanced Aircraft Systems III

Addition of a third course in the advanced aircraft systems series was actually done at the suggestion of the director of the Delta Air Lines pilot training division. With operating manuals and CBT software already in hand, a course showcasing the B-777 would further broaden the coverage of airliners in service by addition of with a wide-body aircraft to the mix. Students would also be exposed to more advanced technology not designed into the B-737-200 and -800 aircraft being taught at the time in the other two courses. For example, B-777 studies would include fly-by-wire flight control systems, completely automatic electronic engine controllers, and automated checklists. The course (AS-432) was developed during the 2002-2003 academic year and first offered in the fall semester of 2003 (Jacksonville University, 2003). It used a classroom format identical to that of the existing Advanced Aircraft Systems II course. Taught in the computer classroom using CBT, lectures, and discussion, three written tests were administered during the semester with an oral final at the end. The following year the CRJ200 aircraft replaced the B-737-200 in the Advanced Aircraft Systems I course, rounding out the three-course series to include a regional jet, a narrow body, and a wide body airliner as example aircraft.

Advanced Aircraft Systems Laboratory

Lacking an appropriate advanced simulator or flight training device on campus to augment academics provided in the classroom, JU sought early on to find a way to alleviate this deficiency. The solution was to seek a partnership with an entity that could provide such training, and such an entity was found in ATOP, Inc., an acronym for Airline Training Orientation Program. A U. S. Transportation Security Administration (TSA) compliant company, ATOP, Inc. is a U. S. corporation that provides on-site airline-type training for aspiring airline pilots utilizing facilities leased from major air lines at their training facilities. It

offers FAA certificated pilots with an interest in an airline career an intensive two-day immersion experience in an FAR 121 training environment. ATOP-training, currently conducted at the American Airlines Flight Academy located in Dallas, Texas, and JetBlue Academy, Orlando, Florida, includes the operation of all major aircraft systems along with normal and emergency procedures. Simulator training includes simulated flight time in a full-motion simulator including takeoffs, landings, and ILS approaches. An FAA "High Altitude Endorsement" is also available (Airline Training Orientation Program, 2012). Intended to supplement the series of courses by melding the capabilities of JU and ATOP, a new advanced Aircraft Systems Laboratory course (AVS 412) was first included in the 2000-2001 Academic Catalog (Jacksonville University, 2000). Individuals attend as a class, performance is graded by ATOP instructors, and one credit hour of academic credit is awarded along with a High Altitude Endorsement in their flight logbooks. A curriculum need was met and students have been universally laudatory regarding this learning experience.

Later Changes to the Advanced Aircraft Systems Series

In November of 2006, the Delta Connection Academy (JU's flight training partner at that time) announced the purchase of Cirrus Aircraft Corporation's new SR-20 aircraft for use throughout its training organization. The new aircraft was introduced into JU's flight training program in Spring 2008. This design incorporates many advanced features for a single-engine general aviation aircraft, the most revolutionary design feature being its use of cockpit electronic displays rather than conventional dials and pointers, a so-called "glass cockpit". Other features include equipping of the airplane with a parachute for spin recovery (the first production general aviation aircraft to do so) in which present operators with a complexity in a training platform not previously experienced.

The accession of this new trainer for JU flight students incorporating new and more modern technological design features prompted a reassessment of priorities for the Advanced Aircraft Systems series. Whereas, before, the series had covered exclusively transport category aircraft (airliners), a need now existed to include the newly introduced Cirrus. Consequently, the first course in the series was modified to cover the SR-20 along with new material on single-engine crew resource management in the single-aviator flight environment. A course description for a new Introduction to Aviation Automation (AVS 103) course was prepared and approved for inclusion in the JU academic catalog in fall 2009 and the old Advanced Aircraft Systems I course (AVS 402) removed (Jacksonville University, 2009). Material previously taught in AVS 402 on "Big Iron" systems and the theory and operation of jet aircraft in high-altitude, high-speed flight was moved to Advanced Aircraft Systems II (AVS 404), the second course in the series. At approximately the same time, new software for the ERJ-145 regional jet was introduced into Advanced Aircraft Systems III. This software, developed by the CpaT company, a world leader in computer-based training for the aviation industry, was generously donated for use in JU's aeronautics courses in the spring of 2009. The three-course series then included material on a sophisticated general aviation trainer, a narrow body airliner, and a regional jet. In the Spring semester of 2011, the B-777 was once again reintroduced into the series replacing the B-737-800 for Advanced Aircraft Systems II. With this latest change, the series of courses once again encompasses a spectrum of aircraft ranging from a sophisticated general-aviation trainer at the low end to a modern wide body at the other.

Recent Updates to the Flight Training Curriculum

The introduction of the technically advanced SR-20 Cirrus aircraft into the training curriculum in 2008 (as mentioned in the previous paragraph) presented several unique opportunities as well as some challenges for the Jacksonville University program. The primary change to the flight syllabus involved combining the Private and Instrument ratings into one extended course and bringing the program in line with the new FAA training initiative called FAA Industry Training Standards (FITS). This training initiative emphasizes scenario-based training along with increased emphasis on simulators and computer based training. Basic instrument training is introduced earlier in the sequence and the four-stage course culminated with a student being issued a Private Pilot certificate with an Instrument Rating. The Private and Instrument ground schools remained separate to keep them in line with the trimester system (Jacksonville University, 2010).

After one semester's experience with SR-20, it became clear that our beginning students would need some additional classroom instruction to address the sophistication and technically advanced nature of the aircraft. The previously mentioned AVS 103 (Introduction to Aviation Automation) fulfilled this need along with providing the opportunity to introduce subjects such as risk management, aeronautical decision making and single pilot resource management. This course has proven to be very successful in enhancing the students' ability to master the advanced systems in the new aircraft as well as preparing them for the Crew Resource Management course offered later in the curriculum.

In the spring of 2011, DAC and Aerosim Flight Academy did an in depth assessment of the combined Private/Instrument course in the SR-20 aircraft. It was determined that, even though the majority of the students were able to successfully complete the expanded course, many of them experienced some difficulty early in their training due to the advanced nature of the Cirrus. In the fall semester of 2011, the Private /Instrument course reverted back into two separate courses and the Cessna 172 Skyhawk was reintroduced as the training aircraft for the Private Pilot course (Jacksonville University, 2011c). This allowed our new students to have a more positive experience early in their training as well as allowing them to get the reinforcement of earning a Private Pilot Certificate earlier in their training pipeline.

The adoption of the FITS training initiative also prompted a change to the flight and ground school curriculum in the case of Commercial and Multi-engine training. Basically, the scenario-based concept allowed these two courses to be combined into one flight course and one ground school course (Jacksonville University, 2011c). The flight course is primarily accomplished in the PA-44 Seminole twin-engine aircraft with a short single engine add-on in the SR-20. This concept has proven to be very successful and has the added benefit of freeing up credit hours that can be applied to other areas of the curriculum.

Acquisition of a Regional Jet Flight Training Device

Following advice from aviation industry representatives, including the Aviation Accreditation Board International (AABI), the university has placed an order for a Level 5 Regional Jet CRJ700 Flight Training Device (FTD) for our program. The new Regional Jet Simulator is scheduled to be delivered in August of 2012. Virtually all of the regional airlines now expect applicants for a pilot position with their organizations to have completed some sort of jet transition course. This course should include items such as crew resource management,

abnormal and emergency procedures, speed calibration, energy management and stall characteristics, cockpit flows, adverse flight conditions (ice, turbulence, wind shear, severe weather avoidance, approach at or below minimums) plus operations in high-density air traffic areas. The CRJ700 was the model of choice due to the fact that many regional airlines operate some version of this aircraft. The JU program had already taken a huge step forward with regard to this requirement with the introduction of the advanced aircraft systems series of courses and the improved crew resource management course. Now on the drawing board is the creation of a “culminating experience” or capstone course for our seniors that involves practical application of these advanced academic concepts in a sophisticated flight training device. The capstone course will not only better prepare our graduates to meet the demands of a professional career in aviation but could also serve as a valuable assessment tool in determining how well we are meeting our teaching and learning objectives. Moreover, acquisition of a Regional Jet Simulator would solidify DAC’s status in the aviation education establishment and reinforce its AABI accreditation.

An additional consideration with regard to the jet transition course is the proposed regulation that would require all pilots operating under Part 121 of the Federal Aviation Regulations (commercial air carriers) to hold an Airline Transport Pilot rating (Federal Aviation Administration, 2012). This rating requires that a pilot have a minimum of 1500 flight hours in addition to some other qualifications. However, the proposal under consideration would reduce the 1500 hour requirement if a pilot holds a degree from an AABI accredited collegiate program and has completed a legitimate jet transition course.

Finally, acquisition of a Regional Jet Simulator would enhance DAC’s status in the hierarchy of aviation education establishments and reinforce its position vis-a-vis ABBI accreditation.

Principles of Flight Energy Management Course

The Davis Aviation Center will offer, ‘*Principles of Flight Energy Management*’ as a special topic course in the spring of 2012. The new course brings a unique energy-based, top-down approach to the study and practice of flight, incorporating *safety* (flight control) and *efficiency* (aircraft performance) aspects of energy management.

Energy management models have been applied in a wide range of disciplines dealing with motion, from aerospace engineers designing energy-based automatic flight control systems, and military strategists predicting the energy maneuverability of fighter aircraft during air combat, to physiologists measuring the energy cost of animal locomotion. This is believed to be a “first”, since principles for the management of aircraft performance and control are not known to have been incorporated into any other basic pilot training curricula. A significant number of fatal commercial aircraft accidents are associated with poor energy management or awareness by the flight crew. At the same time, wasted energy costs millions of dollars annually since fuel consumption is the second major cost to the airlines. Thus, part of the course will explore the role of energy crises in aircraft accidents, examine strategies to avoid dangerous energy traps, and consider ways to conserve energy in all phases of flight.

Updates to the Aviation Management Curriculum

In recent years the aviation management curriculum has undergone major updates to keep abreast of the ever changing business environment. On the advice of its aviation advisory board, the Davis Aviation Center has instituted new theories and practices. These updates include the implementation of the “Triple Bottom Line” theory, sustainability management principles, and active research in specific fields and disciplines.

These themes help shape all aviation management coursework. The Triple Bottom Line theory is a thread underlying every aviation management course. Relating people, profits and the planet to each specific course is essential to DAC’s effort. Sustainability runs hand and hand with the Triple Bottom Line theory. Finally, research plays a key role for students to actively participate in current issues and to hone their skills in writing and presenting their findings to an audience.

The Airport Planning & Management course applies the Triple Bottom Line theory to actively engage students with airport-specific related topics. For example, “people” would include employees of the airport, the general public using the airport and the employees of businesses using the airport. Since most airports in the US do not make money, “profit” is a key component to airport management. The curriculum explores options to increase revenues not only at General Aviation Airports but also at major International Airports. To incorporate earth-friendly issues (“planet”), students in this course in recent years have been helping contribute research for the first stand-alone Sustainability Management Plan fully funded by the FAA. Students from multiple sections have contributed to this field research.

The Airline Management course also encompasses the Triple Bottom Line theory as an underlying theme. Each part of this theory is applied with airline-specific material. The major component of this course lies within the airline management simulation. This simulation allows students to compete against each other in running their own airlines. It helps the student understand the ebbs and flows of an airline’s revenue management system. The simulation also facilitates student incorporation of modern theories and techniques to which they have been exposed in their DCOB coursework.

In the Aviation Economics course, the Triple Bottom Line theory is applied on a much broader scale. Students focus on the principles related to both local, US and international markets. This course relies on significant research applied to airlines, airports, and aviation industry economic impacts. Presentations are used to help students perfect their skills in public speaking. In recent years, research from this course has contributed to business plans for a number of start-up airlines.

Proposed Future Curriculum Changes

The most recent proposed change to the Aviation Management & Flight Operations (AVO) curriculum include designating AVM 407 (Crew Resource Management) as a capstone course for all AVO majors for the purpose of fulfilling accreditation requirements and to better assess the entire program. AVM 407 is a senior course suitable to assess multiple learning outcomes. Upon arrival of the Regional Jet FTD, a lab experience will be added to the course. Additional proposed changes involve the Aviation Management (AVM) curriculum. Two new courses will be added; Intro to Aviation Management and Weather (AVM 102), and Strategies in Aviation Management (AVM 432). AVM majors currently only receive limited amount of

weather knowledge in AVS 101 (Aviation Science for Private Pilot) so a more extensive weather class, AVM 102, is being added. This course will serve as the introductory Aviation Management class for AVM majors, where currently there is none. The other new course, AVM 432, will become the culminating experience as a capstone course for AVM majors. Currently the culminating experience for AVM majors is an internship (AVM 490) or independent study project (AVM 487/488). However, it is difficult to standardize learning outcomes for accreditation and assessment purposes through internships and independent studies. Introduction of the new course will correct this shortcoming.

Myriad other innovations and changes are currently envisioned for the Davis Aviation Center's aviation degree programs, all building on the dynamic legacy of progress experienced during the recent past.

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