AVIATION SAFETY COURSES WITHIN THE COLLEGIATE AVIATION CURRICULUM

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RUNNING HEAD: AVIATION SAFETY COURSES

ABSTRACT

A review of current literature that identifies issues in aviation safety that can be addressed by collegiate aviation within the aviation curriculum. A survey of colleges and universities with existing aviation programs was conducted in May and June of 1986 that reveals the extent of aviation safety offerings within the present aviation curriculum. Definitions of aviation safety issues are suggested that identify the issues as individual topics of study that can be developed for inclusion within the aviation curriculum. The conclusion offers recommendations for additional research in the area of aviation safety courses and steps to be taken by collegiate aviation to improve aviation safety study within the collegiate aviation curriculum.

The expansion of aviation in the United States over the past eight years has had significant impact on the industry and on all who are associated with and support the industry. The growth in commercial aviation since passage of the Airline Deregulation Act of 1978 has resulted in increased public use of aviation transportation and an increase in the number of persons who aspire to a career in this growing and exciting field. This has resulted in a concurrent growth in aviation related education programs. Those postsecondary institutions with existing aviation programs have enjoyed increased enrollments and expanding programs while others have taken steps to begin new aviation related offerings.

It is during this time of growth that aviation educators would do well to take the time to examine where their programs are going and to assess the effectiveness of these offerings. By doing so, the mistakes that might otherwise be brought on by the pressures of demand can be avoided and changes in programs and curriculum can be implemented that will insure quality education for our graduates.

This paper examines one part of the aviation curriculum, aviation safety, with the intent of encouraging other educators to do the same. A review of current literature was conducted to identify issues in aviation safety that could appropriately be addressed in aviation program curricula. A survey was conducted of colleges and universities with existing aviation programs to determine what is being offered in the area of aviation safety. Definitions are suggested that delineate the various aviation safety issues as individual topics of study.

Finally, a conclusion is offered that makes recommendations for additional research in the area of aviation safety and for steps that can be taken by collegiate aviation to improve aviation safety study within the collegiate aviation curriculum.

Aviation Safety

The aviation industry is highly visible and open to public scrutiny. The media is quick to publicize even the slightest concern over the role that aviation plays in American society and its impact on the economy and gives even greater attention to issues of aviation safety. Aviation accidents play big on the evening news and newspapers, continually playing up concerns over such issues as the effectiveness of the Federal Aviation Administration's inspector force and the safety of the air traffic control system. Recent changes in the commercial aviation segment brought on by Deregulation seems to have the media concerned that competitive pressures may result in less attention and resources being devoted to the safety of the airlines. Yet, in spite of this, the record proves that all segments of the aviation industry are safer now than they have ever been in history.

Aviation safety statistics published by the National Transportation Safety Board show that the accident rate per 100,000 aircraft hours for all scheduled Part 121 carrier services has dropped from 0.767 in 1974 to 0.230 in 1985. The rate for commuter carriers has gone from 5.13 accidents per 100,000 aircraft hours in 1975 to 1.06 in 1985 while that

for on-demand air taxis has dropped from 6.02 to 4.89 during the same time. The accident rate for general aviation operations has also declined from 15.2 per 100,000 aircraft hours in 1974 to 8.56 in 1985 (see Table 1). (National Transportation Safety Board [NTSB], 1981) The United States Air Force proudly reports the lowest accident rate ever was achieved in 1985 at 1.6 accidents per 100,000 hours flown. This in comparison to a rate of 506 accidents per 100,000 hours in 1922 (the first year records were kept) and rates of 2.9, 2.3, and 1.7 in 1979, 1982, and 1983, respectively. (Rhodes, 1986)

Insert Table 1 About Here

The historical improvement in aviation safety has been the result of advancing technology being applied to every facet of aircraft design, maintenance and operation, as well as improved systems support and government regulation. Considerable resources and large sums of money were spent over the decades to acquire technologically improved aircraft and to establish the traditions of standardization, approval, and modification in the light of operational experiences. (International Civil Aviation Organization [ICAO], 1984) Regulatory bodies such as the Federal Aviation Administration have evolved with the industry and have intensified their surveillance and control of aircraft design, manufacture, maintenance, and operation. The air traffic control facilities and other supporting systems are in a continual cycle of improvement and expansion. Thus, aviation safety has improved to the

TABLE 1

Aviation Accident Rates Per 100,000 Aircraft Hours for Scheduled Part 121 Services, Commuter Carriers, On-demand Air Taxis, and General Aviation from 1974 through 1985.

Year	Scheduled Part 121	Commuter Carriers	Air Taxis	General Aviation
1974	0.767	****	****	15.2
1975	0.572	5.13	6.02	13.9
1976	0.394	3.63	5.07	13.2
1977	0.362	3.83	4.78	12.9
1978	0.348	4.68	5.58	12.1
1979	0.358	4.44	4.34	9.9
1980	0.221	3.23	4.70	9.9
1981	0.380	2.50	5.42	9.5
1982	0.234	2.08	4.08	10.0
1983	0.275	1.23	4.55	9.4
1984	0.190	1.20	****	****
1985	0.230	1.06	4.89	8.56

NOTE: **** indicates data not available. From National Transportation Safety Board, Annual Report to Congress, 1985. June 1, 1985, Place of Publication: Washington, DC

point where the industry as a whole can brag about being one of the safest modes of transportation available to the public.

There is no doubt that today's aviation industry enjoys the best safety record in history. Even the tragic accidents in the U.S. and abroad during 1985 cannot overshadow the fact that a high level of safety has been achieved in all segments of the aviation industry. However, statistics can be misleading. A study of the world fleet of air carrier jet aircraft from 1960 to 1981 by the Flight Safety Foundation, Inc. acknowledges the improvement in accident rates but also points out that the rates have leveled off since the early 1970's. This report states in part that, ". . . there has been a general stabilizing of the accident rate in the past decade of two to four accidents per million departures with the probability that, if no changes are introduced, this rate will remain essentially unchanged." (Bates & Wood, 1982)

This indicates that the traditional approaches to accident prevention, as valuable as they have been, are not enough if further improvements are to be made in aviation safety. The Flight Safety Foundation, Inc. states in their report that, "The data tells us that our airframes systems and powerplants, as well as maintenance, air traffic control, and weather factors have reached a high level of reliability and that the human factor is still the prevalent factor in the existing accident rates. Operator error has remained at over 70 percent." (Bates & Wood, 1982) The International Civil Aviation Organization echoes this statement in their Accident Prevention Manual

where they say, "In the past, the enforcement of regulations to enhance aviation safety was usually successful enough to be considered the only method needed. However, in recent years the accident record has not shown significant improvement. This has led to the belief that additional 'non-regulatory' accident prevention measures are needed." (ICAO, 1984)

Robert Dippi reported in the March-April 1983 issue of Illinois Aviation that ". . . human behavior is the number one cause of flying accidents. Between 1973 and 1977, pilot-in-command errors were the causal, or related, factor in 83 percent of all general aviation accidents and 88 percent of the fatal ones." (Dippi, 1983) The U.S. Air Force also recognizes these facts by stating, "The solution to lowering the aircraft mishap rate even more lies in the operations area, or, more specifically, in the human factors that contribute to accidents." (Rhodes, 1986)

Unfortunately, the study of human factors has been limited and its application to aviation safety is often overlooked. For example, pilots are provided with considerable training in operating an aircraft, the mechanical aspects of the machine, the hazards of weather, etc. But little attention is given to the person's own behavior, attitudes, limitations, vulnerabilities, and motivation. (ICAO, 1984) Federal Air Regulation Part 141 requires that private pilots have 35 hours of ground training that includes, ". . . the safe and efficient operation of airplanes, including high density airport operations, collision avoidance precautions, and radio communication procedures." (Federal

Aviation Administration, 1974) The same regulation sets additional requirements for the more advanced ratings, but none of them specifies the inclusion of human factors training. When human factors are considered, their scope and application is often limited to pilots. (ICAO, 1984) The pilot is only one part of the aviation system and constitutes only one factor in the total human behavior equation. Mechanics, meteorologists, designers, manufacturers, air traffic controllers, and managers all have input to aircraft operations and are subject to the same human behavior factors. Man has succeeded in designing and building highly sophisticated, technologically advanced aircraft capable of achieving impressive safety records, but the limiting safety factor is man himself.

There are other aviation safety issues, some of which are related to human behavior and some that are not. They include design and engineering, systems design and organization, management, safety program management, and accident investigation. Although all are related and none stand alone, each is unique enough to be considered a separate topic.

Human Engineering is the title given to that aspect of aviation safety that deals with design and engineering. The military began to realize the importance of human engineering during World War II. The services were experiencing examples of equipment that was designed in such a way that it became a factor in degradation of performance. The military learned that, in many instances, it was the design of the equipment that was the causal factor in incidents and accidents. This

led to military specifications requiring military equipment contractors to "human engineer" their products and created a job market for human factors specialists. Human engineering is described as, ". . . an interdisciplinary technology . . . its concern is with the systematic adaption of machines, tasks, and environmental conditions to the attributes of people." (Bond, Bryan, Rigney, & Warren, undated)

Systems Design and Organization is a function of management. Its concern is with proper design of a system or organization so as to insure effective lines of communication, command, and control. The recent shuttle disaster has been attributed, at least in part, to poor systems design and organization.

Management, as a topic of aviation safety, is concerned with management procedures and techniques and their effect on the worker's ability to perform appropriately, management decision processes and their effect on aviation safety, and with management attitudes and philosophies. Its concern is with the entire realm of management and supervisory techniques such as motivation, hiring practices, task assignment and evaluation along with decision modeling, authority, and accountability. (Wood, 1979)

Safety Program Management addresses the design and placement within the organization of a staff department or individuals with prime responsibility for researching and advising management on safety issues. It includes research and information gathering systems as well as certain techniques such as safety audits and surveys, safety training, hazard reporting systems, and safety directives. (Wood, 1979)

Accident Investigation is an after the fact process designed to identify causes and make recommendations for prevention. It would be nice if this task were never required, but it does perform a necessary and vital function. As a separate topic of aviation safety it includes pre-accident planning, organizing to investigate, investigative procedures, analysis, findings, recommendations, and reports. (Wood, 1979)

Although human behavior appears to be the prime limiting factor in aviation safety and one deserving of special consideration by the academic community, there is plenty of room for consideration of all of the other aviation safety issues. A particular curriculum, depending on its primary concentration, may properly include any one of all of these issues.

Aviation Safety Course Survey Results

A survey was conducted in May and June of 1986 to determine the extent to which colleges and universities who offer aviation related programs are addressing safety within their curriculum. Survey questionnaires were mailed to approximately 250 institutions and responses were received from 76 of them. The survey instrument and a summary of the responses are included as an Appendix to this paper.

The survey did not ask schools to list elective course offerings in aviation safety but did ask each respondent to list, by course number, the title and credit hours of those courses offered and taught at least

once each academic year that have a content specifically dedicated to aviation safety. Respondents were also asked to provide a course description and course outline for each course listed. Out of 41 two year institutions who responded, 7 of them listed such courses as being required for their aviation related AA or AAS degrees. Responses were received from 35 four year schools. Among these, 13 reported required aviation safety courses and 5 reported elective aviation courses.

Respondents were also asked to indicate their academic offerings by degree and title, if they owned/leased and operated their own aircraft for flight training purposes, and if they owned/leased and operated their own aircraft simulators for flight training. Respondents had been asked to list their required aviation safety courses with the appropriate degree, but only about half of the respondents did so. Therefore, it was impossible to report the data with each aviation safety course as being required for a specific degree. Table 2 is a listing of the aviation safety course offerings as they were reported on the survey by the respondents.

Insert Table 2 About Here

Certain conclusions can be drawn from the data. The most obvious being, of 41 two year schools who responded, only 7 reported offering a course with a content specifically dedicated to aviation safety as a requirement for degree completion. Of the 35 four year schools who responded, only 13 reported offering a required aviation safety course.

Before going any further it should be understood that the data received on the survey does not indicate that our colleges and universities are not teaching aviation safety.

TABLE 2

Aviation Safety Course Offerings as They Were Reported by Respondents to the Aviation Safety Course Survey.

Course Number	Credit Hours	Course Title	Required For:
Two Year Schools			
AT233	3 SH	Aviation Safety	AAS
APT308	3 QH	General Aviation Safety	AAS
AERO40	3 SH	Aviation Safety and Accident Investigation	AA Comm. Pilot
ASC2470	3 SH	Flight Physiology/Psychology	AAS
AERO27	3 SH	Aviation Safety & Human Factors	AAS Comm. Pilot & Air Traffic Controller
AERO210	3 SH	Aviation Safety	AAS
218	3 QH	Human Factors in Flight Operations	AA Pro Pilot
Four Year Schools			
AV349	3 SH	Aviation Safety/Accident Investigation	BS Flight & Adm/Mngmt
205	2 QH	Aviation Physiology & Safety	BS Flight
4010	3 SH	Aviation Safety	BS Flight & Adm/Mngmt
PR&T4050	3 SH	Aviation Safety	BS & MS
CAV372	3 SH	Aviation Safety	BCA

(Table Continued)

TABLE 2 - Continued

Four Year Schools - Continued

Course Number	Credit Hours	Course Title	Required For:
AM405	3 QH	Aviation Safety	BS Prof Flight & Awy Science
AS408	3 SH	Flight Safety	AAS & BS
AS409	3 SH	Aviation Safety	BS
AE308	3 SH	Flight Safety	BS Av Mngmt, Flight, & ATC
BS106	3 SH	Human Factors in the Cockpit	BS Av Mngmt, Flight, & ATC
410	2 SH	Aviation Safety	BS
411	3 SH	Accident Investigation	BS
	2 SH	Aviation Safety	BS Awy Science

Four Year School Electives

205	2 SH	Aviation Safety	BS
307	3 SH	Flight Safety	
AO3040	3 QH	Aviation Safety	BS
AO3041	3 QH	Search, Survival, & Rescue	BS
AVI140	5 QH	Aviation Safety	AS Adm/Mngmt

NOTE: A total of 25 aviation safety courses were reported by a total of 21 schools with some schools reporting more than one course. Seven out of forty-one two year schools reported required aviation safety courses. Thirteen out of thirty-five four year schools reported required courses and five of them reported electives only.

It should also be noted that this paper is not intended to imply that aviation safety is not being taught. Safety has always been an integral part of all aviation related curriculums. A number of comments were received from respondents that indicated their concern with the implications of the survey. These comments are included in the summary of the survey which is included as an Appendix to this paper. The one comment received that probably best describes the safety content of the current aviation curriculum states, "When are we really not teaching safety?"

One unexpected conclusion of the data is that, of those schools offering one or more of the Airway Science concentrations, they do not all offer a required course dedicated to aviation safety. Since an aviation safety course is required for approval of an Airway Science Curriculum, it can only be assumed that this requirement is being met by including aviation safety as a topic within other courses.

An attempt was made to distinguish between those schools who owned/leased and operated their own aircraft and simulators for flight instruction purposes and those who did not in relation to aviation safety course offerings. As it turned out, a clear majority of the four year schools who reported degree requirements that included a dedicated aviation safety course also reported owning/leasing their own aircraft and simulators. However, the exact opposite was true for two year schools.

A total of 20 required courses specific to aviation safety were reported by the 76 respondents. Of these, 10 were not reported in

relation to a specific degree title. However, of the remaining 10, 9 were reported as being required for completion of a flight degree, 3 were reported as required for an air traffic control degree, and 4 for administration/management degrees. This, along with other comments received on the survey, indicates that most respondents associate aviation safety courses with flight and have not considered them for inclusion in other aviation related programs.

The final conclusion to be drawn is taken from the aviation safety course descriptions and course outlines provided by the respondents. Over half of the courses reported are titled "Aviation Safety" yet a review of the summary of the course descriptions, goals, and course topics indicates considerable disagreement among the respondents as to what is considered as appropriate for a course in aviation safety. A comparison of those courses related to a specific degree title such as flight or air traffic control also reveals disagreement in course descriptions, goals, and topics. This suggests a lack of consensus within collegiate aviation as to a definition for aviation safety courses and the appropriateness of various safety topics to different aviation programs.

There is no doubt that colleges and universities who offer aviation programs include safety as a topic within their programs of study. Some are required to do so by federal regulation such as FAR Part 141. Many of the respondents offered comments to the effect that safety was a prime concern to them and is being emphasized throughout their aviation programs. But there is doubt as to whether or not enough consideration

is being given to individual safety topics of study; especially in light of current aviation safety issues. The human factor issue has been of prime concern to the aviation industry since it was identified as a block to achieving further improvements in the aviation safety record. Other, equally important aviation safety issues have surfaced that should be considered as a prime concern to those who would manage or supervise aviation operations. It should also be recognized that aviation safety is the responsibility of all aviation professionals and not just pilots and air traffic controllers. Finally, collegiate aviation appears to be lacking in guidelines that would help to determine the appropriateness of various aviation issues and topics to each of the aviation areas of concentration and to the various aviation related degree programs.

Aviation Safety Issues and Topics

A review of aviation safety research and literature reveals a number of safety issues that are readily identifiable as individual topics of aviation safety. Nearly all of these topics are broad enough in their scope that each could be developed into individual aviation safety courses and some could be combined to form aviation safety disciplines. Each aviation concentration (flight, maintenance, air traffic control, engineering, etc.) is unique and it would not be appropriate to include all aviation safety issues and topics in every aviation concentration curriculum. However, aviation issues and topics

can be individually defined in such a way as to make them readily distinguishable so that judgements could be made as to their appropriateness for inclusion in each aviation concentration and in a way that would allow tailoring each topic to the specific needs of each concentration.

The following is an attempt to identify at least the more common aviation safety issues and to define them as specific topics. Each definition is intended to be specific as to issue but broad in content so as to avoid specifying their inclusion in any one aviation concentration or to imply judgements as to their appropriateness for inclusion in specific curriculums. Each is also intended to be broad enough in scope that their content could be tailored to meet the needs of a particular aviation concentration if judged to be appropriate for inclusion.

Aviation Safety Regulations - Federal, state, and local regulations designed to control and direct the actions of individuals involved in aviation maintenance, management, and operations in such a way as to insure the safety of the operation. The specifics of the regulation as to content, intent, application, and enforcement are included.

Mechanical Aspects of Aviation Safety - The use and control of tools and machines in a manner that gives consideration to maintenance and operator skills and techniques, mechanical and design limitations, and their appropriate application to task accomplishment in a way that insures the safety of the operation.

Aviation Weather - The atmosphere as an operating medium and those operational skills and techniques necessary to insure safe operations within this medium. The identification and avoidance of atmospheric hazards is included.

Aviation Physiology - The effects of aviation operations on the human body, the biological limitations of the human being as they relate to aviation, and life-style habits that enhance a person's ability to operate in the aviation environment.

Aviation Psychology - Human behavior as it relates to man within the aviation environment. Including, but not limited to, motivation, emotion, self discipline, risk perception, judgement, and decision making. Specifically intended to include all aviation occupations and not limited to flight operations.

Human Relations in Aviation - The interactions among people within the aviation environment. To include team or crew interactions, the supervision and management of people within an organization and concepts such as communications, group dynamics, peer pressure, responsibility, accountability, authority, and discipline.

Aviation Safety Management - Management's responsibility for safety and accident prevention within an aviation organization. The concepts, procedures, and techniques of resource allocation, organizational design, decision modeling, task assignment, delegation of authority and responsibility, establishment of organizational goals and priorities, and risk management are included.

Aviation Safety Program Management - The organizational staff function responsible for designing aviation safety programs, conducting safety surveys, inspections and investigations and for advising management on matters related to safety. It includes safety education and training, cost analysis, reports and reporting systems, data collections and analysis, hazard identification and elimination, incentive and award programs, motivational concepts, safety directives and policies, and the techniques for conducting safety audits, surveys, and inspections.

Aviation Accident Investigation - The knowledges, skills, procedures, and techniques employed in aviation accident investigations for the purpose of identifying and making recommendations for the elimination of causes and hazards. Includes pre-accident planning, organizing to investigate, investigative techniques, analysis, findings, and recommendations.

Human Engineering - The knowledge, skills, procedures, and techniques of design and engineering that result in the systematic adaptation of machines, tasks, and environmental conditions to the attributes of people. An interdisciplinary topic that includes, among others, psychologists, anthropologists, mathematicians, physicists, and engineers.

Conclusion and Recommendations

Collegiate aviation has expanded within the last eight years to meet the demands of those who wish to pursue a career in the expanding aviation industry. As colleges and universities implement new programs and expand existing offerings in response to this demand, consideration should be given to the appropriateness and effectiveness of these offerings. One area of study that deserves the attention of the collegiate aviation faculty is aviation safety. Although safety has traditionally been an integral part of the aviation curriculum, current issues in aviation safety suggest that this area of study should be expanded beyond the traditional approaches.

The subject of safety within aviation has expanded beyond compliance with regulations and the proper manipulation of mechanical controls and machines. Advancements in design and technology have resulted in significant improvements in aviation safety, but these approaches appear to have reached their limits for the further elimination of aviation hazards and accidents. The aviation industry is now turning to human factors in the search for additional improvements in the aviation safety record. This concern includes physiology, psychology, human relations, safety management, safety program management, accident investigation and human engineering as well as the traditional approaches to aviation safety. The focus has expanded beyond the air crew as the primary determinants of operational safety to the role of mechanics, meteorologists, designers, manufacturers, air

traffic controllers, managers, and others whose decisions and actions have an effect on the safety of aviation operations.

Survey responses from 76 colleges and universities who offer aviation related programs indicates that collegiate aviation has not given full consideration to aviation safety as a separate topic within the aviation curricula. The responding schools indicate their concern for aviation safety, but few have moved beyond the traditional safety emphasis within their programs. In addition, there does not appear to be a consensus of opinion within collegiate aviation as to the definition of aviation safety topics, nor is there agreement as to the appropriateness of specific topics to the various aviation curriculums.

A review of aviation safety literature reveals a number of aviation safety issues that can be defined as individual topics for the purpose of study and consideration for inclusion within aviation related curriculums. If agreement could be reached on the definition of these individual safety issues, that would serve as a guide to further agreements as to the appropriateness of each topic to existing and new aviation courses of study.

The following recommendations are offered as a means by which collegiate aviation might undertake additional research and studies of aviation safety for the purpose of developing guidelines for the inclusion of aviation safety topics within the various aviation related offerings and curricula. The intent is to encourage the aviation faculty to examine both their own programs of study and collegiate aviation as a whole to determine the appropriateness and effectiveness of current aviation safety courses of study.

The first recommendation is for the University Aviation Association to take the lead in encouraging further reviews and research into aviation safety as a topic of study within the collegiate aviation curricula. One way that this might be accomplished is to form a committee within UAA to undertake a study of aviation safety to further define the aviation safety topics and make recommendations as to their appropriateness to certain concentrations and curriculums. Another would be to encourage individual faculty members to involve themselves in research by coordinating and reporting their efforts.

Once data from individual research efforts has been analyzed and the committee recommendations have been given due consideration, the University Aviation Association could then develop expanded aviation safety course guidelines for inclusion in the UAA's aviation program accreditation requirements. An expansion of aviation safety course accreditation requirements beyond what is currently required for Airway Science Curriculum approval would result in the various safety issues being appropriately addressed throughout collegiate aviation's curriculum.

Certainly, no one can dispute the vital role that safety plays in aviation operations and the aviation industry. Improvements to the aviation curricula in the area of safety could lead to significant improvements in future aviation safety records.

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APPENDIX

Aviation Safety Course Survey. The survey instrument responses to the survey, a summary of reported safety course goals, descriptions, and topics, plus a summary of 'other comments' received on the survey.

AVIATION SAFETY COURSE SURVEY

NAME AND ADDRESS OF INSTITUTION

_____

_____

_____

Total number of respondents = 76

PERSON COMPLETING THIS SURVE

NAME: _____

TITLE: _____

PHONE: _____

Type of Institution. 41__ Two Year ____ Four Year

Credit hour system. 24__ Semester 17__ Quarter

Please indicate by an "X" which of the following aviation related academic offerings are available at your institution.

	ASSOCIATE DEGREE	BACCALAUREATE MINOR	BACCALAUREATE MAJOR	MASTERS DEGREE	MASTERS CONCENTRATION	PHD
A & P	_20___	_____	_____	_____	_____	___
AVIONICS	_4____	_____	_____	_____	_____	___
FLIGHT	_26___	_____	_____	_____	_____	___
AIRPORT MNGMT	_7____	_____	_____	_____	_____	___
ADM/MNGMT	_13___	_____	_____	_____	_____	___
AIR TRAFFIC CONTROL	_6____	_____	_____	_____	_____	___
FLIGHT ATTENDANT	_5____	_____	_____	_____	_____	___
ENGINEERING	_5____	_____	_____	_____	_____	___
AV SAFETY__	_1____	_____	_____	_____	_____	___
AERO EDUC__	_1____	_____	_____	_____	_____	___
AV DESIGN	_1____	_____	_____	_____	_____	___
AV COMPUTERS	_1____	_____	_____	_____	_____	___
AV ELECTRONICS	_1____	_____	_____	_____	_____	___

Which of the following Airway Science concentrations are offered by your institution ? _3__ Airway Science Management _2__ Airway Computer Science ____ Aircraft Electronics Systems ____ Aircraft Systems Management ____ Aviation Maintenance Management

Please list by course number, title, and credit hours those courses offered by your institution and taught at least once each academic year that have a content specifically dedicated to aviation safety. Also, please indicate, by title, if the course is required for program completion.

COURSE NUMBER	CREDIT HOURS	COURSE TITLE	REQUIRED FOR (specify AA, AAS, BA, BS, Minor, or Concentration and Title)
____7 schools reported offering aviation safety courses.		_____	AA = 2 AAS = 6_____
_____	_____	_____	_____
_____	_____	_____	_____

IF POSSIBLE, PLEASE ATTACH A COPY OF THE COURSE DESCRIPTION AND COURSE OUTLINE FOR EACH COURSE LISTED ABOVE.

Please use the following space to give a general description of the structure and requirements of each course listed above

(SEE NOTE 4)

_1____ (Y/N) If your institution does not now offer a course with a content that is specifically dedicated to aviation safety, are there plans to offer such a course within the next academic year ?

Y = 12; N = 29 - 26 out of 41 report offering flight.

_____ (Y/N) Does your institution own/lease and operate its own aircraft for the purpose of flight training ? (As opposed to contracting with an outside agency).

Please indicate the number and type of aircraft available for flight training through your institution. Include those available through contracts with outside agencies.
(SEE NOTE 1)

12/9_ Single Engine 6/7__ Twin Engine 0/0_ Turbo-Prop 0/1_ Jet
Other(specify) 1/0 Helo _____ _____ _____ _____ _____ _____

Y = 25; N = 16 - 26 out of 41 report offering flight.

_____ (Y/N) Does your institution own/lease and operate its own aircraft simulators for flight training ? (As opposed to contracting with an outside agency).

Please indicate the number and type of aircraft simulators available for flight training through your institution. Include those available through contracts with outside agencies. _____ _____
_____ _____(SEE NOTE 2)_____ _____ _____
_____ _____ _____ _____

Please check the flight ratings available through your institutions flight training offerings.
(SEE NOTE 3)

12/9 Private Pilot 12/9 Commercial 12/9 Instrument 12/6 CFI
10/6 CFI-I 4/1_ ATP Other(specify) 5/1 ME 2/2 ME-I _____
2/0 Rotorwing 1/1 SEA 1/0 AG Training

NOTE 1 Numbers indicate; Those who reported that they DO own/lease and operate their own aircraft for the purpose of flight training/Those who DO NOT.

NOTE 2 The numbers and type of simulators listed were; 4 - ATC710; 5 - ATC510; 6 - ATC610; 1 - ATC810; 3 - Flightmatic 206; 1 - Flightmatic 204; 8 - GAT-I; 2 - AST300; 5 - Frasca 101; 1 - Frasca 100; 1 - Frasca 122

NOTE 3 Numbers indicate; Those who reported that they DO own/lease and operate their own aircraft for the purpose of flight training/Those who DO NOT.

NOTE 4 Course descriptions and other comments are summarized on a separate page.

AVIATION SAFETY COURSE SURVEY

NAME AND ADDRESS OF INSTITUTION

_____

_____

_____

Total number of respondents = 76

PERSON COMPLETING THIS SURVEY
NAME: _____
TITLE: _____
PHONE: _____

Type of Institution. ____ Two Year 35__ Four Year
Credit Hour System. 28__ Semester 7___ Quarter

Please indicate by an "X" which of the following aviation related academic offerings are available at your institution.

	ASSOCIATE DEGREE	BACCALAUREATE MINOR	BACCALAUREATE MAJOR	MASTERS DEGREE	MASTERS CONCENTRATION	PHD
A & P	5	2	4			
AVIONICS	3	2	2			
FLIGHT	8	9	17			
AIRPORT MNGMT	6	4	7	1		
ADM/MNGMT	1	4	12	2	2	
AIR TRAFFIC CONTROL	1	2	5			
FLIGHT ATTENDANT						
ENGINEERING	3	3	11	8	1	5
AV SAFETY	1			1		
AERO EDUC	1	1	1	2		1
MAINT MNGMT		2	1			
AIR TRANSPORT ENGINEERING				1	1	

Which of the following Airway Science concentrations are offered by your institution ? _9__ Airway Science Management _7__ Airway Computer Science _4__ Aircraft Electronics Systems _12_ Aircraft Systems Management _6__ Aviation Maintenance Management

Please list by course number, title, and credit hours those courses offered by your institution and taught at least once each academic year that have a content specifically dedicated to aviation safety. Also, please indicate, by title, if the course is required for program completion

COURSE NUMBER	CREDIT HOURS	COURSE TITLE	REQUIRED FOR (specify AA, AAS, BA, BS, Minor, or Concentration and Title)
____18 schools reported offering aviation safety courses. (SEE NOTE 1)			_____
_____	_____	_____	REQUIRED AAS = 2 BS = 22 _____ BCA = 1 MS = 1
		ELECTIVES	
_____	_____	BS = 5 _____	_____

IF POSSIBLE, PLEASE ATTACH A COPY OF THE COURSE DESCRIPTION AND COURSE OUTLINE FOR EACH COURSE LISTED ABOVE.

Please use the following space to give a general description of the structure and requirements of each course listed above

(SEE NOTE 4)

_1____ (Y/N) If your institution does not now offer a course with a content that is specifically dedicated to aviation safety, are there plans to offer such a course within the next academic year ?

Y = 16; N = 19 - 26 total flight programs reported amoung 35 schools

_____ (Y/N) Does your institution own/lease and operate its own aircraft for the purpose of flight training ? (As opposed to contracting with an outside agency).

Please indicate the number and type of aircraft available for flight training through your institution. Include those available through contracts with outside agencies.
(SEE NOTE 2)

16/4_ Single Engine 14/4_ Twin Engine 3/0_ Turbo-Prop 0/0_ Je
Other(specify) 1/0 Glider 0/1 Aerobatic_____ _____ _____ ____

Y = 20; N = 15 - 26 total flight programs reported amoung 35 schools

_____ (Y/N) Does your institution own/lease and operate its own aircraft simulators for flight training ? (As opposed to contracting with an outside agency).

Please indicate the number and type of aircraft simulators available for flight training through your institution. Include those availabl through contracts with outside agencies. _____ _____
_____ _____(SEE NOTE 3)_____ _____ _____
_____ _____ _____ _____

Please check the flight ratings available through your institutions flight training offerings.
(SEE NOTE 4)

17/7 Private Pilot 17/7 Commercial 17/7 Instrument 15/7 CFI
17/7 CFI-I 7/1_ ATP Other(specify) 5/0 ME 6/0 ME-I _____
1/0 B727 FE

NOTE 1 Respondents were not asked to list elective courses; only those required for degree completion. Course descriptions are summarized on a separate page.

NOTE 2 Numbers indicate; Those who reported that they DO own/leas and operate their own aircraft for the purpose of flight training/Those who DO NOT.

NOTE 3 The numbers and type of simulators listed were; 2 - ATC710; - ATC610; 1 - AST300; 3 - GAT; 2 - AST201; 1 - Vista Matic; 3 - ATC810; 3 - Frasca 141; 1 - Pacer; 1 - Frasca 1026; 1 - Frasca 1036; - ATC510; 1 - IFR Flight Synthetics; 1 - DC-8; 1 - B-727; 1 - B-707.

NOTE 4 Numbers indicate; Those who reported that they DO own/lease and operate their own aircraft for the purpose of flight training/Those who DO NOT.

NOTE 5 Course descriptions and other comments are summarized on a separate page.

The following is a summary of the responses recieved on the Aviation Safety Course Survey to the question, "Please use the following space to give a general description of the structure and requirements of each course listed above" and to the request for "a copy of the course description and course outline for each course listed above".

FOUR YEAR INSTITUTIONS:

Goals/Course Descriptions;

To introduce students to Aviation Safety...review of accident reports to understand the major cause factors and methods of prevention.

To provide an opportunity to research and prepare a comprehensive safety program for an aviation business.

The effect of flight on human physiology, including hypoxia, barotrauma, vertigo, fatigue, drugs, vision and preventive medicine with a review of accident reports and other materials related to causal factors in aviation accidents and aviation safety.

... an introduction to significant elements involved with the safe operation of aircraft and associated equipment both in flight and on the ground. ...safety philosophies, programs, research and agency roles.

To develop a knowledge of contributing factors affecting aviation safety and fostering control methods and techniques to reduce accidents related to aircraft and the aviation field.

...to develop desired habits and attitudes in regard to aviation safety.

To develop safety consciousness in students preparing for jobs in the aviation field and produce safer workers.

...preparation of individuals as safety specialists and leaders...

Trends in aviation safety practices with an emphasis on future safety enhancement.

Providing an opportunity for students to develop a body of information and training which will aid them in safe flight practices.

...the principles and application of flight safety.

...management's responsibilities for flight safety programs.

...aircraft operator's responsibility for flight safety.

...principles involved in aircraft accident investigation.

...identifying major problem areas, evaluate safety programs

and recognize the value and ultimate impact of the accident prevention program. Human factors...government agencies...

...procedures which would enhance safe revovery of aircrew and passengers in the event of an aircraft crash...search grids and methods...survival and first aid...rescue procedures...

Pilot performance as influenced by attitude, motivation and perception. Ideal and practical, personal and organizational safety goals and procedures.

Aviation safety for non-flying students...program evaluation, impact of accidents on industry...

...the purpose of installing before-the-fact attitudes in pilots...a self-philosophy that accidents constitute a needless waste of human and material resources which can be prevented.

...a basis for aviation managers to develop responsible professional attitudes, and understand processes of risk management in flight operations.

...identify operational areas of greatest vulnerability.

...behavioral guidelines essential in professional airmanship.

Safety Course Topics;

Safety education...ground and flight safety...weather...safety programs...federal safety legislation...NTSB/FAA authority and responsibility...aircraft accident investigation...pre-accident planning...field investigation...investigative techniques...human factors engineering...safety engineering...philosophical approach to aviation safety...psycology of copilot assertiveness...command judgement...responsibility, authority, and capability...discipline... fatigue...pilot error...stress management...aircraft automation... line crew training...misfueling...shop safety...crash/fire/rescue... airport hazards and controls...accident prevention programs... the Air Traffic Control system...ultralight safety...risks in flying... crashworthiness...human factors...history...aircraft maintenance...hazardous material handling...safety organizations...aeromadical factors...aircraft design...life support equipment and procedures ...post crash factors...accident investigation...flight safety and its application to the space age...basic aerodynamics...aircraft performance...fear of flying...accident statistics...fire safety...wind shear...defensive flying...memory...decision making...the role of flight simulators

TWO YEAR INSTITUTIONS:

Goals/Course Descriptions;

the evaluation and interpretation of their indications...weight and balance problems...Federal Aviation Regulations appertaining to safe flight, including the use of the Airman's Information Manual. Medical facts and discussion of accident reports.

...become familiar with the causes of aircraft accidents, and understand techniques and procedures to prevent this from happening.

Major causes of aircraft incidents, non-fatal accidents and fatal accidents. Covers primary and causal factors which contribute to aircraft accidents.

...to provide the student with a study of the fundamentals essential to the safety of flight. It includes the A.I.M. Exam-O-Grams, Advisory Circulars, local safety bulletins, a study of accident reports, accident reporting procedures, and good flight planning practices.

...course taught by an FAA Inspector...

The major goal is...the hope that each student will develop an improved attitude towards the maintenance of body and mind as applied to the safe operation of an aircraft.

...to prepare the pilot for safe flight by presenting certain physiological and psychological facts which have critical bearing on the operation of an aircraft.

Evaluation and analysis of factors which lead to preventable aircraft accidents. Includes the study of aircraft accident cause factors, with emphasis on human behavior as it relates to the environment of the pilot and air traffic controller.

...enhance the pilot/air traffic controller's ability to conserve life and property.

...increase the student's knowledge and awareness of the relationship between man and aircraft.

...the practice and factors relating to the preparation of aircraft for safe operation including moving, operating, and servicing an aircraft on the ground; and properly loading for flight.

Safety Course Topics;

FAA Act of 1958...emergency landings...weather...stall and spin recovery procedures...spatial disorientation...aviation medicine...winter flying...mountain flying...hazardous materials...icing...static electricity...propeller operation and care...NTSB responsibilities...human factors...physical and psychological factors...crash survival...mishap investigation...hypoxia...hyperventilation...oxygen equipment and use...visual illusions...vertigo...pilot attitudes which will contribute to safe flight...night flying...systems and mechanical concepts...midair

collisions...mechanical failure...FAA's certification programs and research concepts...alcohol and drugs...perceptions in aviation...human engineering

A SUMMARY OF "OTHER COMMENTS" RECIEVED ON THE SURVEY

Ground schools contain a unit on safety.

(this course is) not required but makes every time offered -- each semester.

(safety is) integrated in all aspects of other program subjects/courses.

When are we really not teaching safety ?

Although no one course is devoted primarily to safety - the private, commercial and instrument ground schools devote at least one section to safety. NTSB reports, handling airborne emergencies, etc. The Aviation Management course also devotes one chapter to safety procedures for airport operations...all are required for the degree program.

Our program is dedicated to safety. We do not feel we can teach private pilots, commercial, instrument, navigation, meteorology, aircraft and engines without an emphasis on safety.

Safety included in classes.

We stress safety in all courses offered.

If a specific course on just safety were developed we would be interested in the course outline and referance materials.

...working with Department of Health and Safety on ... courses as a cognate area for our Aviation Administration program.