

UNIVERSITY OF ILLINOIS  
AT URBANA-CHAMPAIGN

EP.02.37

Office of the Provost and Vice Chancellor  
for Academic Affairs

Swanlund Administration Building  
601 East John Street  
Champaign, IL 61820



April 25, 2002

R. Linn Belford, Chair  
Senate Committee on Educational Policy  
Office of the Senate  
228 English Building, MC-461

Dear Professor Belford:

Enclosed are copies of a proposal from the Institute of Aviation for the termination of the Master's Degree in Applied Engineering Psychology and the creation of a M.S. in Human Factors.

This proposal has been approved by the Department of Psychology, the Academic Affairs Council, the Executive Committee and the Faculty of the College of Liberal Arts and Sciences, and the Graduate College Executive Committee; it now requires Senate review.

Sincerely,

A handwritten signature in cursive script that reads "Keith A. Marshall".

Keith A. Marshall  
Assistant Provost

KAM/ml

c: C. Livingstone  
R. Buckius  
T. Emmanuel  
N. Few  
E. McCoy  
A. Mester  
E. Shoben  
C. Wickens  
R. Wheeler

**A Proposal to Create a  
Master of Science Degree Program in Human Factors  
in the Institute of Aviation, Aviation Human Factors Division**

SPONSOR: Christopher Wickens, Co-Chair Courses and Curriculum Committee, Institute of Aviation; Phone: 244-8617

**Brief Description:**

The Institute of Aviation is proposing a master's degree program in Human Factors. This program will replace an existing component of the applied master's program within the Department of Psychology, which is one of three components of its current program. The component to be replaced by this proposal is the present engineering psychology master's degree. The other two components would not be affected.

Students will be required to complete a minimum of nine graduate units of study as specified in Appendix A. The program would be expected to be completed by the student within two years. A written master's thesis would be required to be read and approved by two members of the graduate faculty, one of whom is the student's faculty advisor, and at least one of whom is an Institute of Aviation faculty member.

**Justification:**

There is an ongoing demand for trained professionals in the field of human factors engineering, and the closely related field of engineering psychology. As long as the human remains a critical element in complex systems, we forecast with confidence that trained professionals in the study of human-system interaction will continue to be in demand, in both traditional areas such as aviation, manufacturing, and highway transportation, and emerging areas such as health care and information technology, and educational technology.

A master's program in human factors within the Institute of Aviation also provides a logical extension of the existing baccalaureate degree program in aviation human factors, approved by the IBHE in 1998. This program has a high demand (considerably higher than forecast), which is diagnostic of the demand for training in this area. It is also assumed that some of the most talented undergraduates in this major will want to pursue the master's degree within the program just as, in previous years, the most talented graduates of our two year Aviation program, have gone on to attain the applied master's degree in engineering psychology within the Psychology Department.

It has also been the case that all graduates of the engineering psychology master's program in Psychology over the past 10 years, have received job offers within the human factors field – our graduates are in demand – a characteristic that we feel confident will continue. On the basis of these past levels, we anticipate that the demand for a master's program within the Institute of Aviation will continue to allow an acceptance of 3-4 new students/year.

Finally, the need for a graduate program **within the Institute of Aviation**, rather than within Psychology Department is justified by the fact that tenure-track faculty members within the Institute are expected to maintain a program of high quality academic research. Direct access to graduate students with parallel research interests is critical for these faculty members to meet the University expectations of research and publication. For the past six years those faculty with full time Institute of Aviation appointments have conducted this research by advising graduate students in other departments. While such an arrangement has worked acceptably in the past, there is no guarantee that students with appropriate qualifications will always be available in the future. Furthermore, the current system does not allow any full time faculty members at the Institute to have direct input to graduate admissions policies and procedures in these other units.

We propose that the scope of the program will continue to encompass the study of human interaction with a wide variety of systems and not only those related to aviation. The reason for this broader focus is that examination of many of the issues in human-system interaction transcends the particular system domain. It is also consistent with the joint appointments that several Institute faculty hold within the Beckman Institute. Furthermore, such a program would be the only graduate program on campus that accommodates this broader range of domains, in its study of human-systems interactions.

#### Budgetary and Staff Implications:

The current proposal is somewhat atypical in that it is for creation of a program that will directly duplicate many of the existing functions of the current applied master's program in Engineering Psychology, now residing within the Psychology Department. It is understood that when, and if, the Aviation program is approved, the Engineering Psychology component of the Psychology Department's applied master's program will be terminated. The unusual reason for this re-creation of an existing program in a different unit is based upon the fact that all of the faculty who currently teach, and advise graduate students within the Psychology program, have either joint appointments with the Institute of Aviation, or are fully appointed within the Institute. This situation has emerged over the past 10 years, given the directions that were followed by Henry Taylor, past Director of the Institute. Most of the courses which these faculty members teach, listed in Appendix A, are currently cross listed between the Departments of Psychology, Mechanical/Industrial Engineering, and the Institute of Aviation. It is for this reason that a new program within the Institute can continue to function as effectively as the program within Psychology has done, without requiring the addition of new faculty members, nor the creation of new courses.

A careful analysis of the current situation leads us to conclude that existing resources are sufficient to cover the demands generated by the "new" program, with little or no impact on class size, library resources, or computers and computer time, since this proposal is essentially the "transfer" of a component of the Department of Psychology to the Institute of Aviation.

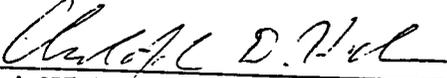
The anticipated impact of the new program on each of the two affected units is as follows:

**Psychology.** There will be a slightly reduced load on graduate admissions and administration, given the removal of 10-15 applicants/year, and 3-4 acceptances per year. There will be a requirement for Psychology to teach the Aviation students in the two course statistics sequence (Psychology 306

and 307). This demand will be no greater than the current demand on these courses, since there will not be corresponding enrollment by psychology students in the engineering psychology master's program.

Aviation. The Institute of Aviation will now need to supervise the applications to the graduate program (approximately 10-15 applicants/year) and oversee the admissions process and provision of financial aid (teaching and research assistantships). The academic office at the Institute of Aviation has expressed willingness to undertake these duties. There will be a financial impact of supporting three teaching assistantships (total: 50%) per year, to staff the undergraduate laboratory course (Aviation 258/Psychology 258/IE 240). This does not present an added financial burden, because such support is currently offered by the Institute of Aviation.

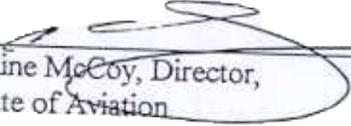
Clearances:

  
Chris Wickens, Co-Chair,  
Courses and Curricula Committee  
and Head, Aviation Human Factors Division

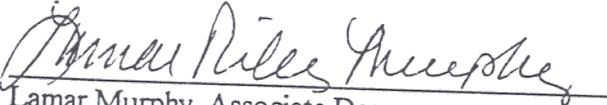
4/8/02  
Date

  
Tom Emanuel, Jr., Co-Chair,  
Courses and Curricula Committee

4/9/02  
Date

  
C. Elaine McCoy, Director,  
Institute of Aviation

4/9/02  
Date

  
Lamar Murphy, Associate Dean  
Graduate College

4/17/02  
Date

Statement for the Programs of Study Catalog:

Master of Science, Human Factors, Institute of Aviation

The Master of Science in Human Factors in the Institute of Aviation is awarded as a terminal degree to candidates who have satisfactorily completed nine units of graduate work in this area and who have completed a thesis.

Effective Date:

## APPENDIX A

### Program Degree Requirements

Students will be **required** to complete a minimum of nine graduate units of study, of which at least three units must be at the 400 level. The following core courses are required:

Psychology 356/Aviation 356 (1 unit)

Psychology 306 (Statistics 1) (1 unit)

Psychology 307 (Statistics 2) (1 unit)

**Either:**

Aviation 347: Human Error (1 unit) **or**

Aviation 355: Aviation Safety and Accident Investigation (1 unit)

Aviation 395: Aviation Psychology (1 unit)

Psychology 427/Aviation 427: Engineering Psychology (1 unit).

Aviation 497HF. Human Factors Proseminar (1 unit). This seminar provides all first year graduate students with in-depth graded instruction on the process of research in human factors. A “practice” master’s thesis is developed as the required student assignment, including literature search/review, experimental design, and data analysis/interpretation. Students are also introduced to research interests of many faculty members teaching human factors-related courses on campus.

Aviation 497ST: Special Topics Seminars (1/2 or 1 unit each). This is the general designation for seminars offered by different faculty members on academic topics of their particular research interests. These seminars will involve required reading, course assignments, and may or may not involve a graded final exam. During the past years, Institute of Aviation faculty have taught equivalent courses either in the Psychology seminar series (Psychology 493), or in the Aviation 397 (undergraduate special topics) series. Topics of such courses have included applied decision making, knowledge-based expert systems, manual control, applied attention theory, human factors in health care (to be offered Fall 02), aerospace physiology, human factors in air traffic control. It is anticipated that some of these seminars, if offered repeatedly, and receiving a strong enrollment, will become permanent 400 level course offerings, following Campus approval. A minimum of 1 unit (two ½ unit courses or one 1 unit course) will be required.

Aviation 499. Master’s Thesis Research (1 unit). A maximum of 1 unit may be counted toward the 9 unit degree requirement, although more than 1 unit may be taken.

In addition to the above 9 units, students may also elect from the following courses taught by Aviation Faculty:

Aviation 347 or 355 (see required courses above).

Aviation 397. Aviation Special Topics Courses (3/4 or 1 unit). Corresponding to the proposed Aviation 497 courses proposed above, these are special topics classes that remain open to upper level undergraduates who satisfy faculty imposed prerequisites. As noted above, several of these

have been taught over past years in such areas as human factors in air traffic control or in aerospace physiology. As with the 497 courses proposed above, some of these, if they have been repeatedly offered and have received high enrollment, may be changed to a permanent course listing, pending Campus approval.

Aviation 490. Non-Thesis Research Credit (1/2 or 1 unit). This option will allow a student to earn credit for research with a faculty other than his or her own advisor, or on topics other than the Master's Thesis.

### **Course Descriptions** (controlling department indicated following course credit)

**Aviation 347. Human Error.** The course will cover both the theoretical underpinnings of human error as well as methods for analysis, modeling, and prediction of human error in various applied settings. Strategies and methods for human error reduction and error recovery will also be investigated. *Prerequisite:* PSYCH 258, AVI 258, or IE 240 or consent of instructor. *3 hours or ¾ or 1 unit. (Aviation)*

**Aviation 355. Aviation Accident Investigation and Analysis.** Fundamental concepts of aviation safety augmentation with emphasis on accident prevention through accident investigation, casualty reduction through crashworthy design, and safety enhancement resulting from litigation; accident investigation techniques and crash survival design factors. *Prerequisite:* AVI 101 or consent of instructor. *3 hours, or ½ or 1 unit. (Aviation)*

**Psychology 356. Human Performance and Engineering Psychology.** Same as AVI 356 and IE 346. Human capabilities and limitations in processing information; models and theories of signal detection, stimulus analysis, short-term memory, choice reaction time, decision-making, attention, and motor performance are evaluated with respect to experimental data; emphasizes theory, although implications for design of man-machine systems are considered. *Prerequisite:* PSYCH 100 or 103 or consent of instructor. *3 hours or 1 unit. (Psychology)*

**Aviation 395. Aviation Psychology.** Same as PSYCH 395. Integrates the disciplines of psychology and aviation, discussing the relevance of the psychology of perception, cognition, learning, stress, decision making, and group processes to a variety of aviation concerns related to topics such as cockpit design, pilot error, pilot training, crew communications, and air traffic control. Field trips will be taken to laboratories at Beckman or to Willard Airport. *Prerequisite:* Introductory Psychology. An upper level course in human factors (PSYCH 258 or 356) is recommended but not required. *3 hours or ¾ or 1 unit.* Aviation experience is useful but not required. *(Aviation)*

**Aviation 397. Special Topics.** This designation is used for special topics courses open to graduate students, as well as upper level undergraduates. Typical offerings have included Air Traffic Control Human Factors, Aerospace Physiology, Knowledge based Systems. *2 or 3 hours, or ½ or 1 unit. (Aviation)*

**Psychology 427. Engineering Psychology.** Same as AVI 427. Experimental psychology applied to the study of man-machine systems; considers research issues, methodological matters, and

principles of design and training in terms of contemporary aircraft, highway, industrial, and health-care systems. *Prerequisite:* PSYCH 258 or 356, or consent of instructor. *1 unit. (Psychology)*

**Aviation 490. Non-Thesis Research.\*** *½ or 1 unit.*

**Aviation 497HF. Human Factors Proseminar.\*** The three purposes of this seminar is to provide the first year student in the human factors graduate program with: (1) an introduction to the research interests of faculty on campus in the human factors area. (2) a survey of human factors research methods. (3) in depth instruction and exercise on the process of scientific research in the human factors area, including literature search, experimental design, statistical analysis and scientific report writing. *Prerequisite:* Graduate standing. *½ unit. (Aviation).* [Note. The current version of this course is listed as Psychology 493HF. It is not listed as Aviation 497, as the Institute of Aviation currently does not possess a graduate program].

**Aviation 497ST. Special Topics Seminar.\*** This seminar will be taught by various faculty members on topics of their interest. In past semesters this has either been taught as an Aviation 397 special topics seminar, or as a Psychology 493 or 396 special topics seminar. Course offerings in the past have included **applied decision making, knowledge based systems, applied attention theory, manual control.** Upon approval of the Master of Science in Human Factors program, this seminar will be given an Aviation 497 designation. *Prerequisite:* Graduate Standing. *½ or 1 unit (Aviation)*

**Aviation 499. Thesis Research.\*** Individual direction of research and master's thesis writing under the supervision of members of the faculty. *0 to 4 units. (Aviation)*

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\*These courses to be offered pending approval of the Master of Science in Human Factors in the Institute of Aviation.

UNIVERSITY OF ILLINOIS  
AT URBANA-CHAMPAIGN

Department of Psychology  
College of Liberal Arts and Sciences  
603 East Daniel Street  
Champaign, IL 61820



March 5, 2002

Professor Christopher D. Wickens  
Aviation Research Lab  
Willard Airport  
CAMPUS

Dear Chris:

I write to confirm that Psychology supports the transfer of our applied masters program in engineering psychology to the Institute of Aviation. This transfer will be accomplished by terminating the engineering psychology component of our applied masters degree program in the Psychology Department and by the approval of the Masters of Science in Human Factors Degree at the Institute of Aviation.

Given the changing nature of our two units, it appears clear that such a change is not only in the best interests of our units, but also is in the best interest of the students in the program.

I hope that approval of this change can be painless and swift and all of us here in Psychology hope that the applied master's in Human Factors flourishes out at the Institute.

Sincerely yours,

A handwritten signature in cursive script, appearing to read 'EJ'.

Edward J. Shoben  
Professor and Head

EJS/nr

UNIVERSITY OF ILLINOIS  
AT URBANA-CHAMPAIGN

Department of Mechanical and Industrial Engineering

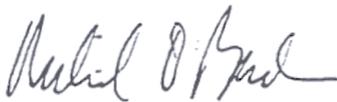
College of Engineering  
140 Mechanical Engineering Building, MC-244  
1206 West Green Street  
Urbana, IL 61801



217 333-1079      *ROB, tel*  
217 244-6534      *ROB, fax*  
buckius@uiuc.edu      *ROB, email*

TO: Christopher D. Wickens

FROM: Richard Buckius  
Professor and Head



DATE: March 4, 2002

SUBJECT: Human Factors Masters Degree

Thank you for providing the Department of Mechanical and Industrial Engineering a draft of your proposed Masters of Science Degree in Human Factors. This degree has been extensively discussed by our Graduate Policy Committee.

Our department supports this Masters of Science Degree in Human Factors and looks forward to working with the Institute of Aviation to further increase the synergy between our units.