LSC Use Only No:	LSC Action-Date:	UWUCC USE Only No.	UWUCC Action-Date:	Senate Action Date:
		02-39e	App 2/4/03	App 2/25/03

Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee

Contact Person Dr. Chris Janicak	Email Address cjanicak@iup.edu
Proposing Department/Unit Safety Sciences	Phone 7-3274

Check all appropriate lines and complete information as requested. Use a separate cover sheet for each course proposal and for each program proposal.

1. Course Proposals (check all that apply)

_____New Course _____Course Prefix Change _____Course Deletion
XXX Course Revision _____Course Number and/or Title Change _____Catalog Description Change

***Current* Course prefix, number and full title**	***Proposed* course prefix, number and full title, if changing**
SAFE 347 Ergonomics	

2. Additional Course Designations: check if appropriate

_____ This course is also proposed as a Liberal Studies Course.
_____ This course is also proposed as an Honors College Course.
_____ Other: (e.g., Women's Studies, Pan-African)

3. Program Proposals

_____Catalog Description Change _____Program Revision
_____New Degree Program _____Program Title Change _____Other
_____New Minor Program _____New Track

***Current* program name**	***Proposed* program name, if changing**

4. Approvals		**Date**
Department Curriculum Committee Chair(s)	La H. Ferguson	10/19/02
Department Chair(s)	La H. Ferguson	10/19/02
College Curriculum Committee Chair		11-22-02
College Dean	Charles C Zoni	25 Nov 02
Director of Liberal Studies *		
Director of Honors College *		
Provost *		
Additional signatures as appropriate: (include title)		
UWUCC Co-Chairs	Gail S. Sechrist	2/4/03

RECEIVED DEC 2 2002 LIBERAL STUDIES

RECEIVED JAN 30 2003 LIBERAL STUDIES

Course Revision: SAFE 347 Ergonomics

Part II. Description of the Curriculum Change

1. A new Syllabus of Record appears in Appendix A.

2. A summary of the proposed revisions:

   The following are the revisions this course:

   - Course content has been revised to include the following topics: cumulative trauma disorders, hand tool selection and design, and assessment techniques to determine cost effectiveness of workplace solutions. In addition, we removed the Systems Safety content from this course which is now covered in the required Systems Safety course.
   - Laboratory exercises were revised to include the above new content areas and to incorporate the use of new ergonomic evaluation equipment that was recently purchased.
   - Course objectives were revised to include the above new content areas.

3. Justification/rationale for the revision:

   The purpose of this revision is to incorporate into this course some aspects of ergonomics and job evaluations which have become important in reducing occupational injuries and illnesses in the workplace. The new material presented in the course lectures has also been incorporated into the laboratory exercises. In addition to the course outline changes, over the past year, ergonomic evaluation equipment has been purchased and incorporated into the laboratory exercises. The changes to the laboratory exercises reflect the use of this new equipment.

   Many of these changes were the result of recommendations and discussions from our Advisory Committee and from a department wide curriculum meeting in the Spring of 2002.

4. The old syllabus of record appears in Appendix B.

5. Liberal Studies course approval form and checklist (if appropriate)

   These changes do not affect the Liberal Studies requirements.

Part III. Letters of Support or Acknowledgement

These course changes will not affect other departments; therefore letters of support from other departments were not obtained.

APPENDIX A: NEW SYLLABUS OF RECORD

I. Catalog Description

SAFE 347 Ergonomics

Prerequisites: BIOL 155 and SAFE 301

2 class hours
3 lab hours
3 credit hours
2c-31-3cr

Explores the principles which control human performance and its effect upon the safety and reliability of systems. Engineering anthropometrics, human perception, biomechanics of motion and work posture, work physiology and human performance measurement are taught in the context of their application in workplace design. Students are instructed in methodologies for analysis of tasks and human performance requirements. Important human limitations and ergonomic hazard evaluations, such as lifting and repetitive motion tasks, are studied in laboratory sessions.

II. Course Objectives

Students completing this course will be able to:

A. Explain the process by which new systems are developed and identify how new systems can be designed which will be suitable from an ergonomic standpoint.

B. Apply rules about human information processing abilities to the presentation of information for system operators.

C. Assess lifting tasks for possible risks to the musculoskeletal system.

D. Assess repetitive motion tasks for possible risks to the musculoskeletal system.

E. Demonstrate an ability to evaluate workplace illumination systems.

F. Evaluate the suitability of workstations and equipment for its anthropometric suitability.

G. Utilize design guidelines to evaluate visual display terminals and computer workstations.

H. Explain the nature of cardiovascular stressors related to work and predict the degree of stress associated with various workplace activities.

I. Evaluate vibration, heat, and cold levels in a job task in terms of their effects on human health and performance.

J. Evaluate ergonomic modifications in terms of their cost effectiveness in reducing occupational injuries and illnesses.

K. Assess workplace and job task characteristics according to the Americans with Disabilities Act (ADA).

III. Course Outline

A. The Human Role in System Operation (2 hours)
   1. Manual Systems
   2. Human-Machine Systems
   3. Automatic Systems
   4. Human Interfaces with the Machine System

B. Measurement of System and Human Performance (2 hours)
   1. System Evaluation
   2. Human Performance Measurement
   3. Ergonomic Analysis Methods

C. Information Processing and System Control (2 hours)
   1. Transmission of Sensory Data
   2. Information Processing
   3. Transmission of Motor Signals

D. Introduction to Engineering Anthropometry (3 hours)
   1. Interpretation of Anthropometric Data
   2. Use of Anthropometric Data

Examination # 1 (1 hour)

E. Biomechanics of Motion and Work Posture (3 hours)
   1. Standing Workstations
   2. Seated Workstations
   3. VDT and Computer Workstations
   4. Lifting Evaluations

F. Work Physiology (3 hours)
   1. Physiological Reaction to Exertion
   2. Effects of Overexertion
   3. Work Level Evaluation and Management
   4. Job Strain Indices

G. Cumulative Trauma Disorders (4 hours)
   1. Carpal Tunnel Syndrome
   2. Evaluating Job Tasks Prone to CTD's.
   3. Handtool Design

Examination # 2 (1 hour)

H. Environmental and Other Influences on Human Performance (3 hours)
   1. Environmental Stressors
      a. Chemical
      b. Physical
      c. Heat and cold
   2. Irregular Work Schedules
   3. Illumination Levels
   4. Other Stressors

I. Assessing Cost Effectiveness of Ergonomic Improvements (2 hours)
   1. Quantifying Ergonomic Losses
   2. Establishing Financial Benefits

J. Ergonomics of Disability (2 hours)
   1. Requirements of the Americans with Disabilities Act
   2. Accommodation of Disability in the Workplace

K. Culminating Activity (Examination # 3) (2 hours)

Laboratory Exercises (14 three-hour laboratories)

The following laboratory exercises are an integral part of the course, giving the students an opportunity to observe and become familiar with many of the ergonomic concepts first-hand, at appropriate times during the course.

Laboratory Session	Title of Exercise	Lecture Units Covered
A	Star Tracing/ Effects of Learning on Performance	A, B, C, D
B	Anthropometrics/Workstation Evaluation	A, B, E, F
C	Video Display Terminal Work Station Evaluation	B, D, E
D	Metabolic Demands of Work	B, E, F
E	Effects of Job Tasks Upon Muscle Fatigue	B, E, F
F	Job Strain Indices	B, E,F
G	Lifting Evaluations	B, E, F
H	Cumulative Trauma Disorders and Job Evaluations	E, G
I	Evaluating Illumination Levels	H

J	Evaluating Vibration/Heat/Cold and their Effects Upon Job Tasks	H
K	Hand tool and equipment design	G
M	Cost Justification for Ergonomics	I
L	American's With Disabilities Act Evaluations	J
N	Workstation Redesign Project	All

IV. Evaluation Methods

The faculty person assigned to teach this course could be one of several faculty members within the Department of Safety Sciences. Following is an example of the evaluation methods and weighting used by one of those faculty members.

68% Exams — There will be three (3) written exams consisting of combinations of multiple choice, true/false and matching questions. (3 exams @ 100 points each= 300 points).

32% Lab Reports — Each student will a prepare lab report on each analysis performed. (14 labs @ 10 points each = 140 points).

V. Example Grading Scale:

The grading scale will be based on the following:

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

A grading curve that results in an appropriate distribution of grades may be used as needed.

VI. Course Attendance Policy

Although there is no formal attendance policy for this class, student learning is enhanced by regular attendance and participation in class discussions and the university expects all students to attend class.

VII. Required Textbook

Mark S. Sanders, Ernest J. McCormick. (1993). Human Factors in Engineering and Design, 7th edition. New York: McGraw-Hill Higher Education

VIII. Special Resource Requirements

None

IX. Bibliography

Chapanis, Alphonse. (1996). Human Factors in Systems Engineering (Wiley Series in Systems Engineering). New York: John Wiley & Sons.

Gavriel Salvendy (Editor). (1997). Handbook of Human Factors and Ergonomics. New York: Wiley-Interscience.

Konz, Stephan A. and Steven Johnson. (1999). Work Design: Industrial Ergonomics. Holcomb Hathaway Publisher.

Pheasant, Stephen. (1996). Bodyspace: Anthropometry, Ergonomics, and the Design of Work. London: Taylor and Francis.

Pulat, B. Mustafa. (1996). Fundamentals of Industrial Ergonomics. Prospect Heights, IL: Waveland Press, 1996.

Wickens, Christopher D., Sallie E. Gordon, Yili Liu. (1997). An Introduction to Human Factors Engineering. Addison-Wesley Pub Co.

Historic Titles

Adams, Jack. (1987). Human Factors Engineering. New York, NY: Macmillian.

Astrand, O. and L. Rodahl. (1970). Textbook of Work Physiology. New York, NY: McGraw-Hill Book Co.

Babur, Mustafa Pulat, Alexander, David. (1991). Industrial Ergonomics Case Studies. Norcross, GA: Institute of Industrial Engineering..

Benderson, Jos. (1995). The Symbiosis of Work and Technology. London: Taylor and Francis.

Burgess, John H. (1986). Designing for Humans: The Human Factor in Engineering. Princess: Petrocelli Books, Inc..

Corlett, Nigel. (1995). The Ergonomics of Work Spaces and Machines. London: Taylor and Francis.

Davies,. D.R. (1982). The Psychology of Vigilance. New York: Academic Press.

Eastman Kodak Company. (1983). Ergonomic Design for People at Work, 1, 2. New York: Van Nostrand Reinhold.

Fraser, T. M. and P.J. Pityn. (1994). Work Productivity and Human Performance. Springfield: Charles C. Thomas.

Fraser, T. Morris. (1989). The Worker at Work. London: Taylor and Francis Publishers.

Grant, Christin and Mary Brophy. (1994). An Ergonomics Guide to VDT Workstations. Fairfax, VA: American Industrial Hygiene Association.

Gradjean, E. (1989). Fitting the Task to the Man: An Ergonomic Approach, 4th edition. London: Taylor and Francis Publishers.

Guilford, Surrey. (1994). Applied Ergonomics Handbook. Business Press Ltd.

Hockey, Robert. (1983). Stress and Fatigue in Human Performance. New York, NY: Wiley Interscience.

Kantowitz, Barry H. and Robert D. Sarkin. (1983). Human Factors. New York, NY: John Wiley and Sons.

Putz-Anderson, Vern. (1988). Cumulative Trauma Disorders: A Manual for Musculoskeletal Diseases of the Upper Limbs. London: Taylor and Francis.

Roebuck, John A. Jr. (1995). Anthropometric Methods: Designing to Fit the Human Body, Santa Monica, CA: Human Factors and Ergonomics Society.

Waters, T.R., et al. (1994). Applications Manual for th Revised NIOSH Lifting Equation. Cincinnati, OH: U.S. Dept of Health and Human Services, NIOSH.

Wickens, Christopher D. (1984). Engineering Psychology and Human Performance. Columbus, OH: Charles Merrill Publishing Co.

Wilson, John R. and E.N. Corlett. (1989). Evaluation of Human Work. London: Taylor and Francis Publishers.

APPENDIX B: OLD SYLLABUS OF RECORD

I. Catalog Description

SA 347 Ergonomics
Prerequisites: SA 301, BI 155

3 credits
2 lecture hours
3 lab hours
2c-31-3cr

An exploration of the principles which control human performance and its effect upon the safety and reliability of systems. Engineering anthropometry, human perception, biomechanics of motion and work posture, work physiology and human performance measurement are covered in the context of their application in workplace design. Students will be instructed in methodologies for analysis of tasks and human performance requirements. Important human limitations and ergonomic hazard evaluations, such as lifting and repetitive motion tasks, are studied in laboratory sessions.

II. Course Objectives

Students completing this course will be able to:

A. Explain the process by which new systems are developed and identify how new systems can be designed which will be suitable from an Ergonomic standpoint.

B. Utilize knowledge about human perceptual limitations to evaluate existing and new workplace designs.

C. Demonstrate an ability to evaluate workplace illumination systems.

D. Apply rules about human information processing abilities to the presentation of information for system operators.

E. Understand and measure the influence of learning on motor skill development.

F. Assess lifting and hand-wrist repetitive motion tasks for possible risks to the musculoskeletal system.

G. Evaluate the suitability of a workstation for its anthropometric suitability using Link Analysis and other techniques.

H. Utilize design guidelines to evaluate Visual Display Terminal (VDT) workstations.

I. Explain the nature of cardiovascular stressors related to work and predict the degree of stress associated with various workplace activities.

J. Compare and contrast the influence of various environmental stressors on human health and performance.

K. Perform a Task Analysis to identify possible causes of and effects from human error in a workplace task.

III. Course Outline

A. The Human Role in System Operation (1 hour)
   1. Manual Systems
   2. Human-Machine Systems
   3. Automatic Systems
   4. Human Interfaces with the Machine System

B. Measurement of System and Human Performance (3 hours)
   1. System Evaluation
   2. Human Performance Measurement
   3. Ergonomic Analysis Methods

C. Human Sensory Processes (3 hours)
   1. Visual
   2. Auditory
   3. Tactile
   4. Chemical
   5. Kinesthesis
   6. Orientation

D. Information Processing and System Control (4 hours)
   1. Transmission of Sensory Data
   2. Information Processing
   3. Transmission of Motor Signals

E. Introduction to Engineering Anthropometry (2 hours)
   1. Interpretation of Anthropometric Data
   2. Use of Anthropometric Data

F. Biomechanics of Motion and Work Posture (6 hours)
   1. Standing Workstations
   2. Seated Workstations
   3. Repetitive Hand-Wrist Motion
   4. Repetitive Lifting

G. Work Physiology (3 hours)
   1. Physiological Reaction to Exertion
   2. Effects of Overexertion
   3. Work Level Evaluation and Management

H. Environmental and Other Influences on Human Performance (4 hours)
   1. Environmental Stressors
      i. Chemical
      ii. Physical
   2. Irregular Work Schedules
   5. Other Stressors

I. Ergonomics of Disability (2 hours)
   1. Requirements of the Americans with Disabilities Act
   2. Accommodation of Disability in the Workplace

Laboratory Exercises (14 three-hour laboratories)

The following laboratory exercises are an integral part of the course, giving the students an opportunity to observe and become familiar with many of the ergonomic concepts first-hand, at appropriate times during the course.

Laboratory Session	Title of Exercise	Lecture Units Covered
A	Learning Part I	B, C, D
B	Learning Part II	B, C, D
C	Video Display Terminal Work Station Evaluation Part I	C, D, E
D	Video Display Terminal Work Station Evaluation Part II	C, D, E
E	Reaction Time Part I	D
F	Reaction Time Part II	D
G	Biomechanics Part I	F
H	Biomechanics Part II	F
I	Biomechanics Part III	F
J	Human Physiology Part I	G
K	Human Physiology Part II	G
L	Link Analysis	E
M	Task Analysis	B
N	Visiting to Research and/or Manufacturing Site	All

IV. Evaluation Methods

The faculty person assigned to teach this course could be one of several faculty members within the Department of Safety Sciences. Following is an example of the evaluation methods and weighting used by one of those faculty members.

45% Exams	There will be three (3) written exams consisting of combinations of multiple choice, true/false and matching questions.
30% Laboratory	Written reports will be required on all laboratory exercises.
15% Quizzes	Periodic quizzes (3 or 4) will be given. Quizzes are announced and consist of several essay questions.
10% Homework	Out-of-class work involving prepared workstation designs or problem solving will be assigned occasionally (3 or 4).

The grading scale will be based on the following:

A	90-100%
B	80-89%
C	70-79%
D	60-69%
F	< 60%

or, at the discretion of the faculty member a grading curve that results in a normal distribution of grades.

V. Special Resource Requirements

None

VI. Bibliography

A. Current Titles

Adams, Jack. Human Factors Engineering. New York: Macmillian, 1987.

Applied Ergonomics Handbook, Guilford, Surrey: Business Press Ltd., 1994.

Babur, Mustafa Pulat, Alexander, David. Industrial Ergonomics Case Studies. Norcross Georgia: Institute of Industrial Engineerings, 1991.

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A. Historic Titles

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New York: Van Nostrand Reinhold, 1983.

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Hockey, Robert. Stress and Fatigue in Human Performance. New York: Wiley Interscience, 1983.

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Tichauer, E.R. The Biomechanical Basis of Ergonomics. New York: Wiley Interscience, 1978.

Wickens, Christopher D. Engineering Psychology and Human Performance. Columbus: Charles Merrill Publishing Co., 1984.

APPENDIX C: CATALOG DESCRIPTION

SAFE 347 Ergonomics (2c-31-3cr)

Prerequisites: BIOL 155 and SAFE 301

Explores the principles which control human performance and its effect upon the safety and reliability of systems. Engineering anthropometrics, human perception, biomechanics of motion and work posture, work physiology and human performance measurement are taught in the context of their application in workplace design. Students are instructed in methodologies for analysis of tasks and human performance requirements. Important human limitations and ergonomic hazard evaluations, such as lifting and repetitive motion tasks, are studied in laboratory sessions.