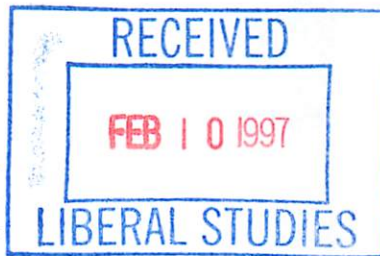


LSC Use Only
Number: _____
Submission Date: _____
Action-Date: _____



UWUCC USE Only
Number: 96-56f
Submission Date: _____
Action-Date: App 4/15/97

Senate App 4/29/97

CURRICULUM PROPOSAL COVER SHEET
University-Wide Undergraduate Curriculum Committee

I. CONTACT

Contact Person Mr. Bob McClay Phone 3018
Department Safety Sciences

II. PROPOSAL TYPE (Check All Appropriate Lines)

COURSE Ergonomics
Suggested 20 character title
 New Course* _____
Course Number and Full Title
 Course Revision SA 347 Ergonomics
Course Number and Full Title
 Liberal Studies Approval+ _____
for new or existing course Course Number and Full Title
 Course Deletion _____
Course Number and Full Title
 Number and/or Title Change _____
Old Number and/or Full Old Title
_____ New Number and/or Full New Title

Course or Catalog Description Change SA 347 Ergonomics
Course Number and Full Title

PROGRAM: Major Minor Track
 New Program* _____
Program Name
 Program Revision* _____
Program Name
 Program Deletion* _____
Program Name
 Title Change _____
Old Program Name
_____ New Program Name

III. Approvals (signatures and date)

[Signature] 3/12/96
Department Curriculum Committee

[Signature] 11/11/96
College Curriculum Committee

+Director of Liberal Studies (where applicable)

[Signature] 11 Nov 96
12 FEB 96
Department Chair

[Signature] 11 Nov 96
College Dean

*Provost (where applicable)

no new resources required

Attachment F

SA 347 Ergonomics

Catalog Description

SA 347 Ergonomics

(2c-31-3sh)

Prerequisites: SA301, BI 155

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 are studied in laboratory sessions.

SYLLABUS OF RECORD (New)

I. Catalog Description

SA 347 Ergonomics

Prerequisites: SA 301, BI 155

3 credits

2 lecture hours

3 lab hours

2c-31-3sh

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 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. Kinesthesia
 - 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
 - a. Chemical
 - b. Physical
2. Irregular Work Schedules
3. 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 and D
B	Learning Part II	B, C and D
C	Video Display Terminal Work Station Evaluation Part I	C, D and E
D	Video Display Terminal Work Station Evaluation Part II	C, D and 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	Visit to Research and/or Manufacturing Site	All

IV. Evaluation Methods

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

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. Required Textbook

Sanders, Mark S. And Ernest McCormick. Human Factors in Engineering and Design. McGraw Hill Publishing Company, New York (1993).

VI. Special Resource Requirements

None

VII. Bibliography

A. Current Titles

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

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

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

- Benderson, Jos. The Symbiosis of Work and Technology. London: Taylor and Francis, 1995.
- Burgess, John H. Designing for Humans: the Human Factor in Engineering. Princeton: Petrocelli Books, Inc., 1986.
- Corlett, Nigel. The Ergonomics of Work Spaces and Machines. London: Taylor and Francis, 1995.
- Fraser, T. Morris. The Worker at Work. London: Taylor and Francis Publishers, 1989.
- Fraser, T. M. and P. J. Pityn. Work Productivity and Human Performance. Springfield: Charles C. Thomas, 1994.
- Grandjean, E. Fitting the Task to the Man: An Ergonomic Approach, 4th edition. London: Taylor and Francis Publishers, 1989.
- Grant, Christin and Mary Brophy, An Ergonomics Guide to VDT Workstations. Fairfax: American Industrial Hygiene Association, 1994.
- Pheasant, Stephen. Bodyspace: Anthropometry, Ergonomics, and the Design of Work. London: Taylor and Francis, 1996.
- Pulat, B. Mustafa, Fundamentals of Industrial Ergonomics. Prospect Heights, IL: Waveland Press, 1996.
- Putz-Anderson, Vern. Cumulative Trauma Disorders: A Manual for Musculoskeletal Diseases of the Upper Limbs. London: Taylor, and Francis, 1988.
- Roebuck, John A. Jr. Anthropometric Methods: Designing to Fit the Human Body, Santa Monica: Human Factors and Ergonomics Society, 1995.
- Waters, T. R. et al. Applications Manual for the Revised NIOSH Lifting Equation. Cincinnati: U.S. Dept. of Health and Human Services, NIOSH, 1994.
- Wilson, John R. and E.N. Corlett. Evaluation of Human Work. London: Taylor and Francis Publishers, 1989.

B. Historic Titles

- Astrand, O. and L. Rodahl. Textbook of Work Physiology. New York: McGraw-Hill Book Co., 1970.
- Davies, D. R. The Psychology of Vigilance. New York: Academic Press, 1982.

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

Fitts, Paul M. and M. I. Posner. Human Performance. Belmont, CA: Crooks/Cole Publishing Co., 1969.

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

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

Poulton, E. C. Environment and Human Efficiency. Springfield, IL: Thomas Publishers, 1970.

Singleton, W. T., editor. Measurement of Man at Work. London: Taylor and Francis Publishers, 1971.

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.

Course Revision: SA 347 Ergonomics

Part II Description of the Curriculum Change

1. New catalog description

SA 347 Ergonomics	3 credits
Prerequisites: SA 301, BI 155	2 lecture hours
	3 lab hours
	2c-3l-3sh

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 the analysis of tasks and human performance requirements. Important human limitations and ergonomic hazard evaluations are studied in laboratory sessions.

2. Old catalog description

SA 347 Ergonomics	3 credits
Prerequisites: SA 301, BI 155	2 lecture hours
	3 lab hours
	2c-3l-3sh

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

3. Old and new Syllabi of Record are attached.

4. Summary of proposed changes

a. Course modifications

Because of a proposed curriculum change which would require both SA 345 and SA 347, the elements which have been common to both courses are being removed from one or the other. Previously, SA majors were required to complete either SA 345 or SA 347. The specific changes to this course are:

- i. Elements of the course outline that address System Safety Analysis concepts will be removed from this course.
- ii. More time will be devoted to important Biomechanical topics that impact workers in industry.

b. Modification of objectives

Actually the objectives for the course have not changed significantly. The single objective stated in the earlier syllabus has been broken out into several more detailed objectives. The unstated objective for students to become familiar with system safety analysis techniques has been eliminated altogether.

c. Justification

The justification for this change is that ABET Accreditation Standards require all students to complete a course in ergonomics and currently this course is optional. Students may currently elect to complete SA 345 Systems Safety Analysis which provides very cursory coverage of ergonomics topics. The SA Department is proposing to make both courses required which will allow us to remove system safety topics from SA 347 and increase coverage of ergonomics concepts.

5. Liberal Studies

This is an existing course which is not listed as an elective under the Liberal Studies program. This will not change. Course modifications will not affect any Liberal Studies requirements.

6. Letters of Support

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

SYLLABUS OF RECORD

I. Catalog Description

SA 347 Ergonomics

2c-31-3sh

Prerequisites: SA 301, BI 155

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

II. Course Objective

The objective of this course is to provide the students with a good, fundamental understanding of ergonomic concepts and principles as they affect occupational safety and health.

III. Course Outline

- A. The Human Role in System Operation (3 hours)
- B. Ergonomic Analysis Methods (2 hours)
- C. Measurement of Human Performance (3 hours)
- D. Human Sensory Processes (5 hours)
- E. Information Processing and System Control (5 hours)
- F. Introduction to Engineering Anthropometry (2 hours)
- G. Biomechanics of Motion and Work Posture (4 hours)
- H. Basic Aspects of Work Physiology (3 hours)
- I. Environmental Effects on Human Performances (3 hours)
- J. Introduction to System Safety Analysis (2 hours)
- K. Laboratory Exercises

The followings 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.

1. Learning
2. Video Display Terminal Work Station Evaluation
3. Reaction Time
4. Biomechanics
5. Human Physiology, Part I
6. Human Physiology, Part II
7. Evaluation of Repetitive Motion Tasks
8. Link Analysis
9. Task Analysis
10. Visit to Research and/or Manufacturing Site (as available)

V. Evaluation Methods

The final grade will be determined by using any combination of at least four(4) of the following evaluation methods within the range of weights shown as determined by the individual faculty member and which must total 100%.

0-60% Exams

There will be a minimum of two written exams consisting of combinations of multiple choice, true/false, matching, completion, and essay questions; or other interactive exams. Make-up exams are at the discretion of the individual faculty member.

0-25% Quizzes

Periodic quizzes will be given. Some individual faculty members may utilize unannounced quizzes. Make-up quizzes are at the discretion of the individual faculty member.

0-15% Homework

Periodic out-of-classroom assignments will be given.

0-40% Term Papers/ Projects

Each student will prepare formal papers or projects on a topic approved by the individual faculty member.

0-20% In-Class Writing

Each student will prepare various assignments in class utilizing

free-style writing techniques as scheduled by the individual faculty member.

- 0-25% Presentations Each student will participate in an oral presentation topic approved by the individual faculty member.
- 0-20% Participation Each student will provide active engagement in the classroom.
- 0-25% Group Activity Students will be assigned various activities requiring a collaborative effort with other students.

Extra credit can be assigned to any one of the above evaluation methods at the discretion of the instructor.

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.

VI. Required Textbooks, Supplemental Books and Readings

Sanders, Mark S. and Ernest J. McCormick. Human Factors in Engineering and Design. McGraw-Hill Publishing Company, New York (1993).

Putz-Anderson, Vern, editor. Cumulative Trauma Disorders: A Manual for Musculoskeletal Diseases of the Uccer Limbs. Taylor & Francis, Bristol, PA (1988).

McClay, R.E., editor. Readings in System Safety Analysis, 6th edition. IUP (1994).

VII. Special Resource Requirements

None

VIII. Bibliography

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

Burgess, John H. Designing for Humans: the Human Factor in Engineering. Petrocelli Books, Inc. Princeton, NJ (1986)

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

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

Fitts, Paul M. and M.I. Posner. Human Performance. Crocks/Cole Publishing Co., Belmont, CA (1969)

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

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

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

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