

# Aerospace Engineering and Mechanical Engineering

## I. General Purpose

This policy provides a general and detailed description of the educational and research programs of the department of **Aerospace Engineering and Mechanical Engineering (AEEM)**. Within this context, the document describes the overall as well as the short and long-term efforts to support the library material and resource needs of the department and its programs. In general, a systematic effort has been made to acquire major monograph works, relevant proceedings, and core journals that support the primary and secondary research needs of the department and its instructional programs. Among the factors that influence the selection of monographic works are their overall relevance to department programs, potential usage, and state, regional, and national availability. Potential usage is determined by a title-by-title systematic review of Horizon record data in StaffPAC for publications with similar subject coverage. Availability is determined by reviewing the holdings of candidate publications by our state and regional interlibrary loan partners in the OCLC WorldCat database. In addition, ISU interlibrary loan reports are systematically reviewed on a semi-annual basis to identify the current and emerging needs and interests of faculty and staff associated with the department.

A conscious effort has been made to identify electronic forms of key indexes and abstracts, core journals, and technical papers. Through administrative funding, access is provided to the Aerospace Database, the abstract database that provides bibliographic access to basic and applied research in aeronautics, astronautics, and space sciences, as well as other scientific and technological disciplines. In 2000, electronic access to the key journals published by the American Institute of Aeronautics and Astronautics (AIAA), a major professional society and publisher in the field, was acquired. In the short term, an effort will be made to obtain retrospective electronic access to AIAA journals as well as electronic access to the full-text of AIAA technical papers, an important and often requested source.

## II. History

As early as 1929, Iowa State offered courses in Aeronautical Engineering, initially within the Mechanical Engineering department as optional courses for graduate students. In 1933, undergraduate courses on the design of aeronautical structures were available. On November 26, 1941, the Iowa State Board of Education formally authorized the establishment of a separate Aerospace department at Iowa State, under the administration of the Mechanical Engineering Department. Aerospace was established as a separate department in 1943. In the same year, the department graduated its first class. During World War II, emphasis was placed on aeronautical education to support the national training needs of the time.

In the early 1960s, the official departmental name changed from Aeronautics to Aerospace. During the period, departmental enrollment increased to nearly 540, requiring additional classroom and office space. In 1971, Town Engineering was built to accommodate this increased need. Beginning in the early 70s, the department focused on research and development, with support provided by the National Aeronautics and Space Administration (NASA), the National Science Foundation (NSF), and other funding agencies. During this period, the department ability to grant advanced degrees in the field (M.S., M.E., and Ph.D).

In the late 1970s, the Computational Fluid Dynamics Center, one of seven such centers, was established with support from NASA. The mission of the Center is to coordinate research and interdepartmental course offerings in the area of numerical simulation of fluid flow and related physical phenomenon. The CFD Center was officially recognized as a National Aeronautics and Space Administration (NASA) center of excellence in 1980.

AEEM students and faculty are also associated with Spacecraft Systems and Operations Laboratory (SSOL), a “centerplace for students and faculty who share an interest in space systems”; the Iowa Space Grant Consortium, a partnership that includes academic (ISU, the University of Iowa, the University of Northern Iowa, Drake University), governmental (e.g., Ames Laboratory, Iowa Department of Education, Iowa Department of Transportation) and industry (e.g., Rockwell Collins); and the ISU-affiliated Center for Nondestructive Evaluation (CNDE). A local student chapter of the American Institute of Aeronautics and Astronautics (AIAA), the major professional society and publisher in the field, is based at ISU.

Today, the Aerospace Department is housed in Howe Hall within the Engineering Teaching and Research Complex (ETRC). The facility includes:

- A 400-seat auditorium
- A 300-seat auditorium
- High-tech classrooms with multi-media and distance education capabilities
- High-tech lecture halls with computer demonstration and network capabilities, videodata projection systems, and uplink/downlink capabilities.
- Teaching labs for low- and high-speed aerodynamics
- Specialized labs for mechanical vibrations, acoustics, and stress analysis.
- Nondestructive evaluation laboratories

In addition, the AEEM department supports six computer labs containing over 100 high-end Unix workstations and to many systems in research laboratories. Access is also available to a NAS 9180 mainframe computer, a direct-line link to the NASA Cray-2 supercomputer, and a massively parallel machine in the ISU Scalable Computing Laboratory.

### **III. Iowa State University Program**

The department offers work leading to the degrees of Master of Engineering, Master of Science, and Doctor of Philosophy in each of the two major areas: aerospace engineering and engineering mechanics. Faculty research interests include:

- acoustics and noise control
- aerodynamics
- aerospace structures and structural dynamics
- atmospheric and space flight mechanics, optimization and control
- computational fluid dynamics
- computational mechanics
- dynamics and vibrations
- engineering design
- finite and boundary elements
- fluid mechanics
- non-destructive evaluation
- solid mechanics and materials
- ultrasonics
- wave mechanics
- wind engineering.

Several AEEM faculty are formally associated with the Center for Nondestructive Evaluation (CNDE), National Science Foundation Industry/University Cooperative Research Center based at ISU.

See Appendix A for a compendium of current faculty and their specific research interests.

### **IV. Subject Boundaries**

The research interests of some departmental faculty are more the focus of other ISU departments or programs. A conscious effort is made to purchase publications that support these other research efforts from other appropriate funds or to refer these candidates to the appropriate bibliographer. The major overlapping programs or subject areas and their respective bibliographer are:

- Automotive engineering / Kris Stacy-Bates
- Center for Nondestructive Evaluation (CNDE) / Lorrie Pellack
- Computer Science / Gerry McKiernan
- Material Science and Engineering / Lorrie Pellack
- Mechanical Engineering / Gerry McKiernan
- Military aircraft and aviation / Ed Goedeken

Representative textbooks are considered and selectively acquired, particularly those that are a latter edition of titles owned by the ISU library and that have documented use. Proceedings are selectively acquired.

## V. General Collection Guidelines

### A. Linguistic

English is the primary collection language.

### B. Geographical Areas

Nearly all selected material is published in United States or Europe. As with the linguistic parameter, the content of the publication is the basis for considering its selection rather than its geographical origin.

### C. Types of Materials Collected

Monographs, serials, and technical reports form the core of the collections that support this program. Significant national and international conference proceedings are also included. Bibliographies and dissertations are very selectively collected.

### D. Format of Materials Collected

The collection is almost entirely paper. A significant number of government publications relevant to the departmental programs (e.g., NASA) are received in microfiche as part of our participation in the federal depository program. A very select number of journal are available in electronic formats. A World Wide Web-based abstract and index database is available.

## VI. Specific Collection Guidelines

In general, a conscious effort is made to acquire the monographic, serial, and technical report literatures that supports the broad and specific research interest of departmental faculty.

## VII. Detailed Subject Areas

The following is a topical listing that characterizes the range and scope of the materials selected and purchased during the past three fiscal years from the department fund (AER):

AIAA monographs	Aircraft systems and technologies	Aerodynamics / Astrodynamics	Boundary layer
Commercial	Computational	Engines	Engineering

<b>aircraft</b>	<b>fluid dynamics</b>		<b>Mechanics</b>
<b>Finite elements</b>	<b>Flight</b>	<b>Flow</b>	<b>Fluid mechanics</b>
<b>Fuel</b>	<b>Helicopters / Rotorcraft</b>	<b>Leisure collection</b>	<b>Lubricants</b>
<b>Navigation, guidance, and control</b>	<b>Nondestructive evaluation</b>	<b>Private aircraft and piloting</b>	<b>Reference monographs</b>
<b>Rocketry</b>	<b>Propulsion systems</b>	<b>Satellites</b>	<b>Solid mechanics</b>
<b>Space flight</b>	<b>Space exploration and travel</b>	<b>Space materials and structures</b>	<b>Space program</b>
<b>Space systems and technologies</b>	<b>Space station</b>	<b>Turbulence</b>	<b>Vibration</b>

### VIII. Other Resources Available

**Databases: Aerospace Database ; EiVillage2: Compendex ; Mechanical Engineering Abstracts ; NTIS (National Technical Information Service) ; ACM Digital Library ; IEEE Xplore (IEL) ; SciFinder Scholar ; Composites Industry Abstracts ; Computer and Information Systems Abstracts ; Engineering Materials Abstracts ; MathSciNet ; Science Citation Index ; American Society of Mechanical Engineers (ASME) electronic journals ; ScienceDirect.**

Among the factors that influence the selection of monographic works are state, regional, and national availability. Availability is determined by reviewing the holdings of candidate publications by our state and regional interlibrary loan partners in the OCLC *WorldCat* database.

### IX. Cross-references to Collection Policies

The following subject areas or programs overlap part of the research focus of the AEEM department:

- **Automotive Engineering / Kris Stacy-Bates**
- **Center for Nondestructive Evaluation (CNDE) / Lorrie Pellack**
- **Computer Science / Gerry McKiernan**
- **Material Science / Lorrie Pellack**
- **Mechanical Engineering / Gerry McKiernan**
- **Military aircraft and aviation / Ed Goedeken**

### X. Creation date

**August 17, 2001**

### XI. Revision History

**XII. LC Class(es), if applicable.**

**TL 500 – TL 4050**

**XIII. Bibliographer name**

**Gerry McKiernan**

**FINAL WORKING DRAFT**