

**FY 2008-2009 KBOR Program Review  
Dean's Response  
BS, MS and PhD in Aerospace Engineering**

College of Engineering Academic Program Review Process Overview

During academic year 2005-2006 the College of Engineering underwent an extensive and inclusive

continuous improvement in the achievement of the college mission and vision. The input in this process is gathered from a College IAB and Student and Faculty Advisory Boards to the Dean. The College IAB

[REDACTED]

The process to ensure the achievement of the program outcomes is repeated every year and involves data collection and analysis by the program Curriculum and Assessment Committee, recommendations of changes from the committee, consideration of those changes by the IAB of the program and approval

implementation of faculty approved changes and modification to the catalog.

*Bachelor of Science in Aerospace Engineering*

*Master of Science and Doctor of Philosophy in Aerospace Engineering*

The mission of the graduate programs, Master of Science (MS) and Doctor of Philosophy (PhD), in AE is to prepare students for careers in aerospace engineering and related field, and for graduate study. There are eight objectives associated with these programs which are supportive of the mission. The department has not identified specific program outcomes to be used to measure the

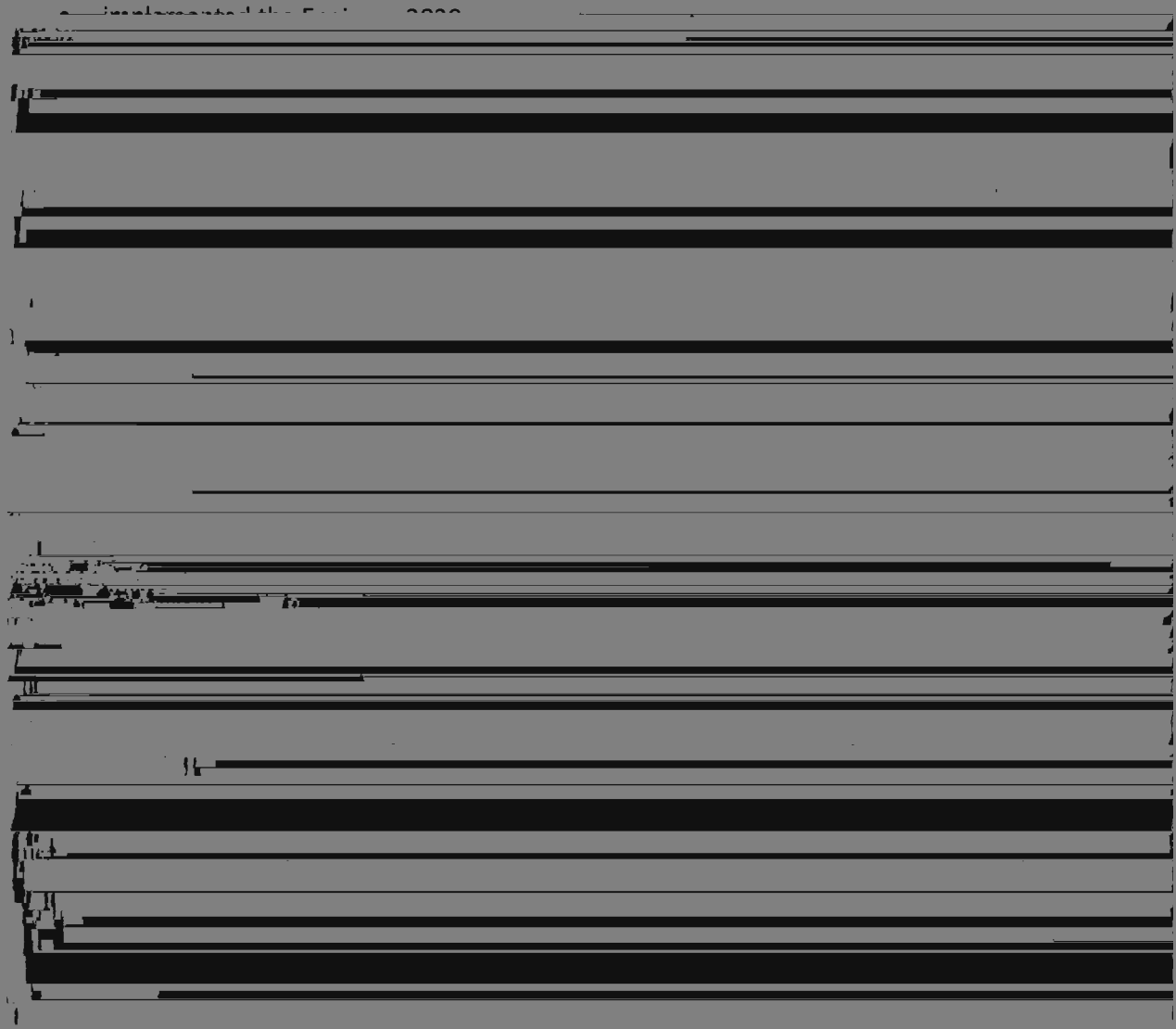
[REDACTED]

The assessment of the graduate programs in the College of Engineering is the responsibility of

[REDACTED]

Table 1. College of Engineering Productivity (Five-Year Average).

Measure\Department	AE	ECE	IME	ME
# of undergraduate students/Faculty	20.13	31.74	6.8	26.24
# of MS students/faculty	5.83	21.05	11.61	10.94
# of PhD students/faculty	1.35	2.12	1.78	1.29
# of journal articles/faculty	0.5	?	1.27	1.18
# of conference proceedings	1.58	?	2.53	2.12
external funds awarded/faculty (\$/year)	\$208,529	\$111,592	\$85,225	\$51,591
Credit hours/faculty	372.16	688.28	420.94	446.73
Degrees awarded/faculty	4.27	15.09	5.84	8.27



and PhD. The productivity of the AE faculty as it is measured by the last five year average for the number of conference proceedings (1.6/faculty member), the amount of funded research (\$300,159

[REDACTED]

The AE Department currently has half of a faculty position unfilled in the area of structures and solid mechanics which will be used for a joint appointment with the National Institute for Aviation Research (NIAR). This position must be filled if the recommendations above are to be implemented successfully. Another potential fiscal implication of implementing the above recommendations is the need for additional information technology and non-information technology laboratory support. The College of

Engineering did have four research assistant positions in the area of structures and solid mechanics which were eliminated in the restructuring process. The College of Engineering is currently conducting a study to determine the need for additional research assistant positions in the area of structures and solid mechanics. The College of Engineering is currently conducting a study to determine the need for additional research assistant positions in the area of structures and solid mechanics.

## Review Department Report

Board of Regents' instructions and definitions for

Category	Value
4	4.2
5	5.0
6	9.7



2289	2402	451.8
953.90	1316.88	2102.6
368.00	2184.00	1101.36
797.00	1398.50	2696.77
480.89	1375.39	1516.20
		1191.71

# Program Review Program Report

ENGINEERING

AEROSPACE

Note: Year is fiscal year (summer, fall, spring). If data are from the fall on , it is from the fall of the fiscal year. For example, FY 2008 is Fall 2007 data .

AEROSPACE ENGINEERING

102

92

113.2

297



**Recommendations:** Considering the differences between MS and PhD programs, the

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

# **Graduate Program Review**

## **Self-Study Report**



WICHITA STATE UNIVERSITY

**Department of Aerospace Engineering  
Wichita State University**

November 5, 2008

**Graduate Program Review - Self-Study Report**  
**Department of Aerospace Engineering, Wichita State University**  
**November 5, 2008**

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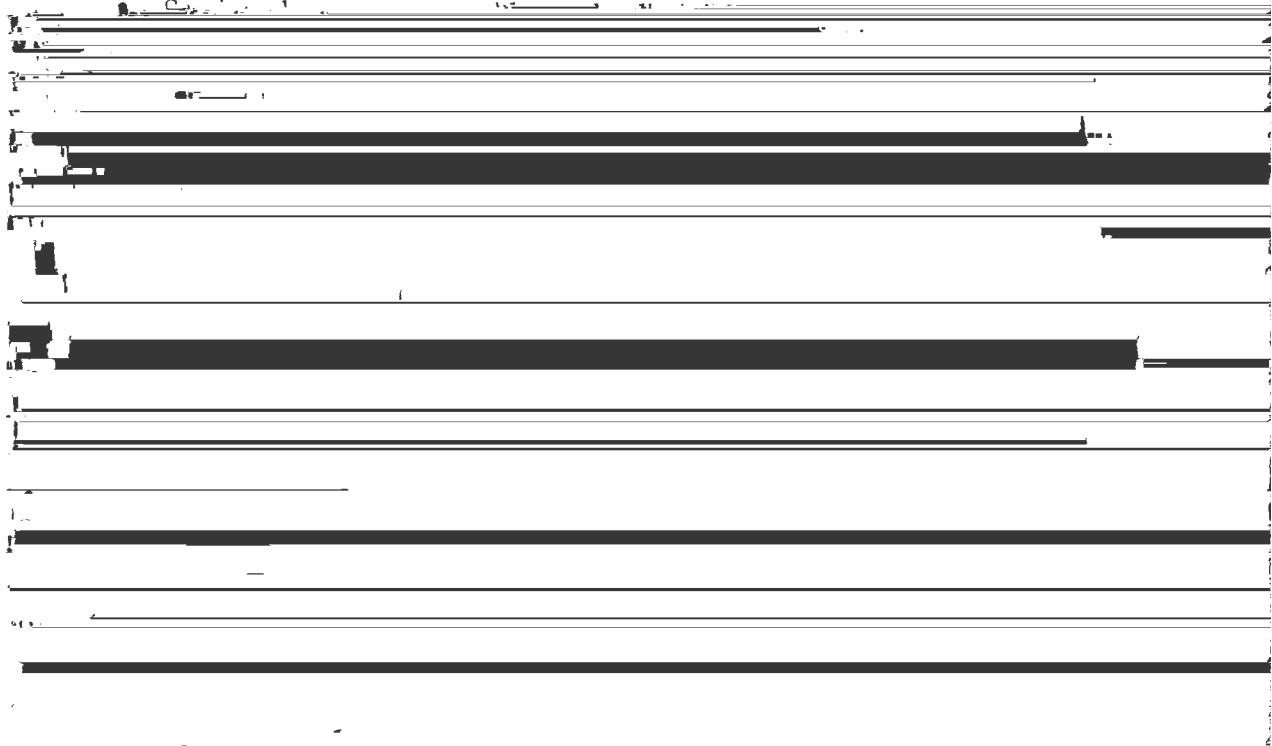
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## Introduction

The purpose of this report is to demonstrate Aerospace Engineering (AE) is delivering a quality graduate program consistent with the department, college, and university mission.

The following criteria are considered:

- Centrality, with respect to fulfilling the WSU mission and goals
- Quality, as assessed by faculty strengths, productivity, and qualifications and the curriculum
- Demonstrated need by students and employers

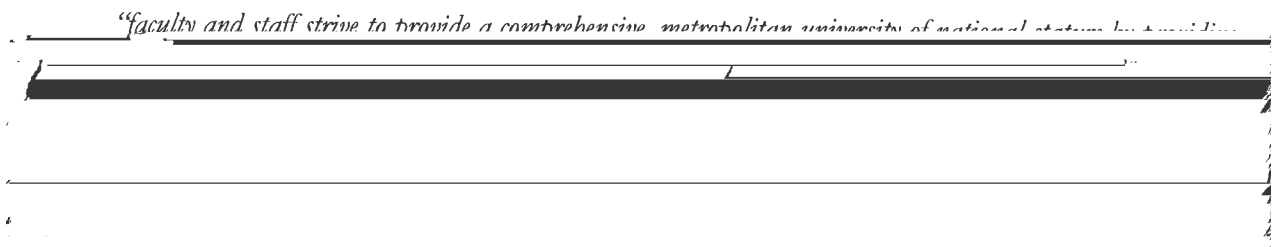


- Cost effectiveness

## Centrality

The subsequent material addresses the Aerospace Engineering program's focus with respect to the college and university mission and goals.

The Wichita State University mission statement, provided in Appendix I, declares:



*b. To provide an undergraduate education that prepares capable students to pursue graduate studies in*

In a similar fashion, the following statement outlines the AE department's graduate program mission:

*To prepare students for careers in aerospace engineering and related fields, and for graduate study*

Central to this mission are the following AE graduate program objectives:

- a. To ensure the admission of qualified students into the program each year*
- b. To provide qualified faculty for the program*
- c. To provide appropriate laboratories and access to them for the program*
- d. To provide an appropriate variety of graduate courses for the program*
- e. To enroll a sufficient number of students to support the courses offerings*
- f. To achieve an excellent reputation for the program*



Table 1 Aerospace Engineering Faculty Information

	Degree	Area of Expertise	Institution from which Highest Degree Earned & Year	Years of Experience		
				Industry Practice	Academy	Total
K. Hoffmann						
W. Horn	Prof.	Structures	Univ. of Texas	6	32	25
L.S. Miller	Prof.	Aerodynamics	Texas A&M Univ.	0	21	20
R. Myose	Prof.	Propulsion	Univ. So. Cal.	2	17	17
M.G. Nagati	Assoc. Prof.	Flight Mechanics	Iowa St. Univ.	14	25	25
M. Papadakis	Prof.	Aerodynamics	Wichita St. Univ.	1	22	22
S. Keshavanayana	Asst. Prof.	Structures	Wichita St. Univ.	0	4	4
K. Rokhsaz	Prof.	Flight Mechanics	Univ. Mo. - Rolla	0	23	18
B. Smith	Prof.	Structures	Kansas St. Univ.	2	17	14

**Table 2 AE Faculty Productivity Summary**

<b>Parameter</b>	<b>Yearly Average</b>
Journal Publications	6
Conference Proceedings	19
Contract Reports	12
Other Publications	11
Presentations w/o Proceedings	43
Accepted Proposals	17
Previously Accepted Proposals	9
Rejected Proposals	6
Pending Proposals	4
Funded Research	\$3,601,905
Funded Faculty Release	\$206,521
Match Faculty Release	\$48,267
Funding for Students	\$408,940
M.S. Advising	42
	17
	8
	7
	3
M.S. Directed-Projects Completed	
M.S. Thesis Completed	
Ph.D. Dissertations Completed	

The research emphasis aligns with local, state, and national aerospace (e.g., aviation) interests. Activity is focused chiefly in the areas of structures (especially composites), aerodynamics (applied, computational, and experimental), and flight-mechanics.

Perhaps most important, AE faculty involve graduate students in virtually all aspects of the research they conduct. Besides assisting with the work, graduate students are usually always publication co-authors.

*Additional University research and scholarship efforts enhance faculty teaching and research capabilities.*

## Curriculum

Besides research elements, the AE graduate program curriculum supports fundamental student needs. Course offerings are substantial and timely. As was outlined previously, an AE graduate program objective is to “provide an appropriate variety of graduate courses for the program” (i.e., objective-d. listed previously).

Excluding thesis and dissertation hours, the goal is to provide 10 or more graduate courses each fall/spring semester. The AE department meets or exceeds this target, regularly offering between 10 and 13 graduate-level classes each semester. Furthermore, all courses are offered after 4:00 PM, to assist part-time students who work in the local aerospace industry.

The department utilizes a Graduate School Exit survey to measure student satisfaction with the variety of courses offered by the department. During the 2007-2008 academic year, 88% of the respondents indicated the variety of AE courses offered helped them complete their degree requirements in a timely manner.

## Students

Approximately 15 M.S. and 3 Ph.D. students graduate from the AE program each year. They take about 3 and 7.3 years, respectively for a M.S. and Ph.D., to complete their degree. It's critical to recognize only about 31% of these students have a traditional full-time status. A majority are professional engineers working at local aerospace companies. As such they work at least 40-hours a week and take classes and complete degree requirements during evenings and weekends. Obviously this situation impacts their pace to graduate.

The following sections provide information on AE graduate student demographics. With respect to gender (for the latest 5-years):

- 14% are female
- 13% of the M.S. students are women
- 25% of the Ph.D. students are women

Table 3 outlines the minority student demographic data.

Table 3 - AE Graduate Student Demographics (5 Year Average)

Demographic	Percentage
Female	14%
Minority	0%
Other	0%
International	48%

Applicants for the M.S. degree program are admitted to the graduate program under one of the following categories (if they meet the associated requirements).

- Admission with Full Standing - A minimum Grade Point Average (GPA) of 3.0 on a 4.0 scale during the last two years or sixty credit hours of prior studies, or

- Admission on Probation - A minimum grade point average of 2.75 to 3.0 during the last two years or sixty credit hours of prior studies

International applicants who did not receive prior degrees from an English-speaking country:

Greater than 80% of the M.S.  
with a GPA of 3.0 or higher.

All graduate program

laboratories are critical to offering an excellent graduate program. The related to *objective-c* (i.e., “To provide appropriate laboratories and access to them

- Appropriate technical personnel must be available for department laboratory service and maintenance
- A quality program is administered by the department to ensure quality and

[REDACTED]

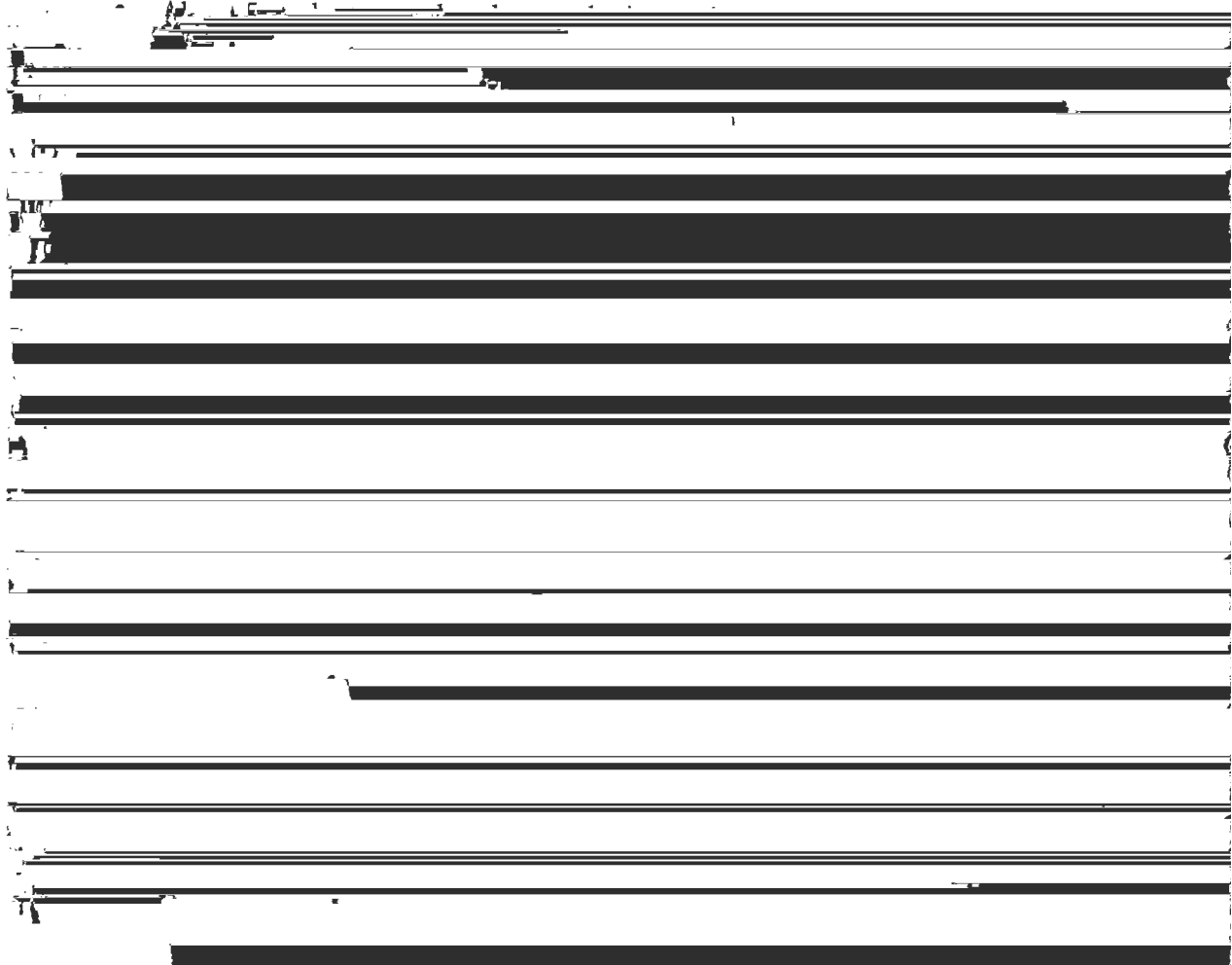
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Relevant *objective-c* outcomes are as follows:

- The College of Engineering employs two full-time technicians to help maintain

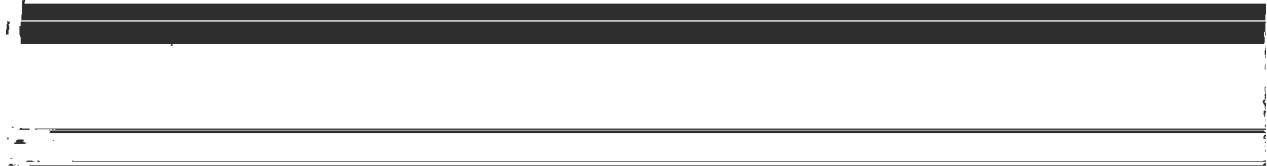
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The following outlines average results (i.e., *objective-b*) for the period from 2003-2008:



- All graduates meet the credit hour and examination requirements
- Graduate students coauthor approximately 3 journal and 11 national conference publications each year

Program Feedback



As mentioned previously, a department Graduate Assessment Committee meets annually to review assessment results and to provide program feedback. This same committee also periodically reviews the program mission, objectives, and outcomes.

Over 69% of the AE program graduate students are part-time, given they are full-time engineers working at local companies. Considering this situation, all graduate-level courses are offered after 4:00 PM. This convenient "worker-friendly" approach meets the needs of engineers who desire promotion opportunities, through further education, as well as the needs of local aircraft companies seeking a skilled work force with up-to-date technical knowledge.

[REDACTED]

The AE department state funded expenditures from 2002 to 2008 averaged \$1,201,302 per year.

Year	Expenditure
2002	
2003	
2004	
2005	
2006	
2007	
2008	

[Redacted text]

[Redacted text]

[Redacted text]

[Redacted text]

[Redacted text]

[Redacted text]

[Redacted text]



## Appendix I - University Mission

Wichita State University is committed to providing comprehensive educational opportunities in an urban setting. Through teaching, scholarship, and public service, the University seeks to equip both students and the larger community with the educational and cultural tools they need to thrive in a complex world, and to achieve both individual and societal goals.

## Appendix II - College of Engineering Mission

The College of Engineering at Wichita State University is committed to:

- Prepare graduates who will engage effectively and responsibly in the practice of the engineering profession in a global economy and in pursuing advanced engineering
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- Conduct applied and basic research to support and contribute to the social and economic well being of citizens and organizations in the Wichita metropolitan area, the state of Kansas and beyond.
  - Cultivate the spirit of entrepreneurship and the connection between engineering and business that encourages technology commercialization.
  - Improve continuously the engineering pedagogical methods employed in delivering its academic programs.
  - Foster and value diversity of ideas and people through
-

# Undergraduate Program Review

## Self-Study Report



WICHITA STATE UNIVERSITY

## Department of Aerospace Engineering Wichita State University

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November 21, 2008

## Undergraduate Program Review - Self-Study Report

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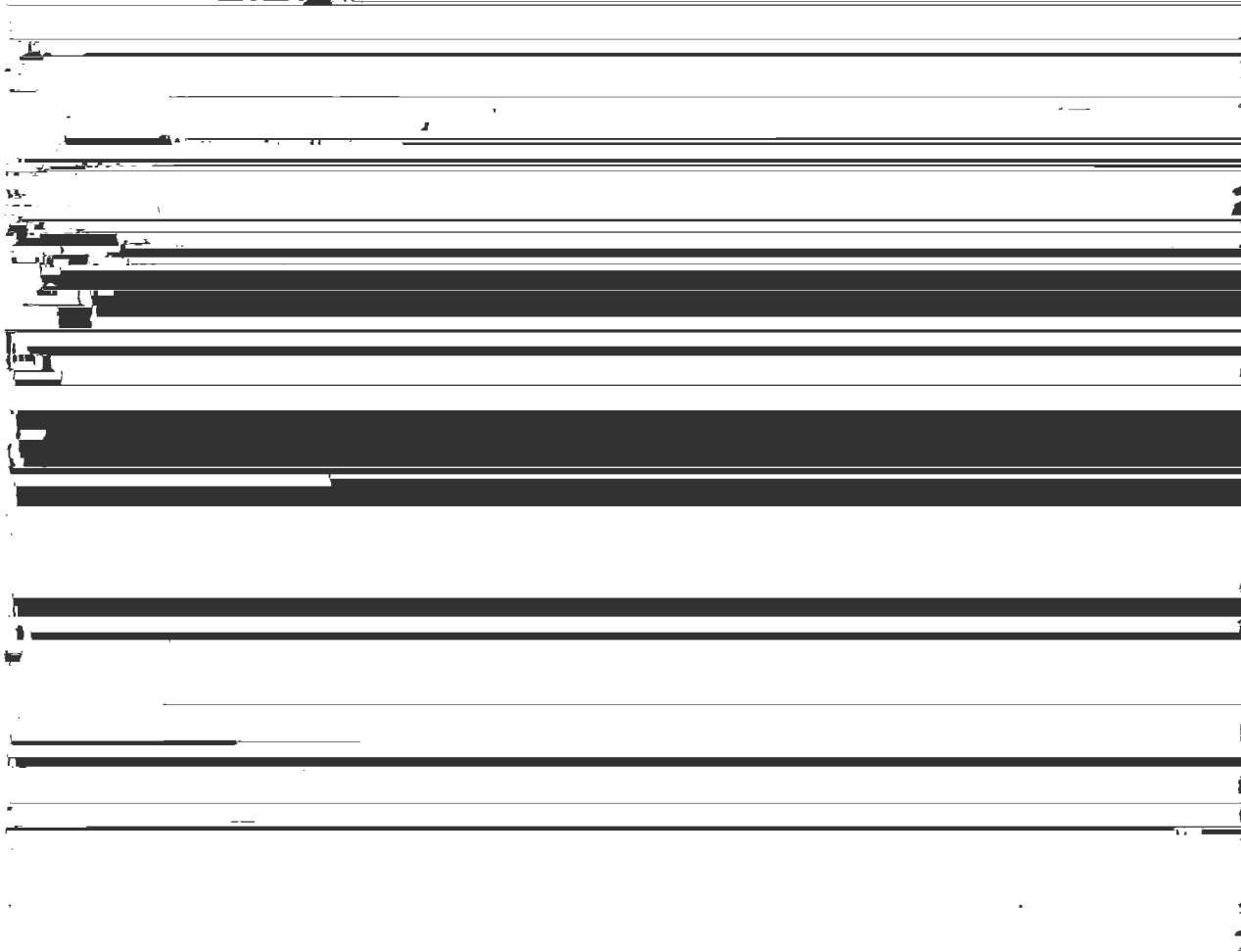
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## Introduction

The purpose of this report is to demonstrate Aerospace Engineering (AE) is delivering a quality undergraduate program consistent with the department, college, and university mission.

The following criteria are considered:

- Centrality, with respect to fulfilling the WSU mission and goals
- Quality, as assessed by faculty strengths, productivity, and qualifications and the curriculum
- Demonstrated need by students and employers



- Cost effectiveness

Much of this report's content is from an accompanying, and continual, effort related to accreditation. Specifically, the AE department also works to meet standards established by the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology (ABET). We simply call it "ABET."

ABET requires accredited undergraduate programs to utilize a comprehensive process of continuous improvement. Programs must establish clear objectives, quantifiably measure progress, achieve minimum outcomes, and effectively identify changes as needed to improve the program.

Constituent (i.e. students, alumni, industry, graduate programs, etc.) needs are recognized and addressed.

*c. Cultivate the spirit of entrepreneurship and the connection between engineering and business that encourages technology commercialization.*

*d. Improve continuously the engineering pedagogical methods employed in delivering its academic programs.*

*e. Foster and value diversity of ideas and people through early student recruitment outreach programs and*

*the recruitment and development of faculty role models.*

**Table 1 Aerospace Engineering Faculty Information**

Name	Rank	Highest Degree	Principle Area of Expertise	Institution from which Highest Degree Earned & Year	Years of Experience		
					Govt./ Industry Practice	Total Faculty	This Institution
K. Hoffmann	Prof.	Ph.D	Aerodynamics	Univ. of Texas	0	19	19
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S. Keshavanayana	Asst. Prof.	Ph.D	Structures	Wichita St. Univ.	0	4	4
K. Rokhsaz	Prof.	Ph.D	Flight Mechanics	Univ. Mo. - Rolla	0	23	18
B. Smith	Prof.	Ph.D	Structures	Kansas St. Univ.	3	47	44
J. Steck	Prof.	Ph.D	Flight Mechanics	Univ. Mo. - Rolla	3	19	19
M. Violette	Asst. Prof.	Ph.D	Structures	Univ. of Texas	10	1	1
C. Yang	Assoc. Prof.	Ph.D	Structures	Louisiana St. Univ.	2	15	11

Table 2 summarizes some measures of faculty productivity based on results from 2003 to 2007. Obviously, the AE faculty is extremely active in student advising, research, and scholarship. The department averages over \$3.6 million in external funding and more than 31 significant publications a year. Clearly, these efforts enhance and demonstrate AE faculty abilities to deliver an outstanding undergraduate program.

Table 2 AE Faculty Productivity Summary

Parameter	Yearly Average
Student Credit Hours	2004
Journal Publications	6
Contract Reports	12
Other Publications	11
Presentations w/o Proceedings	43
Accepted Proposals	17
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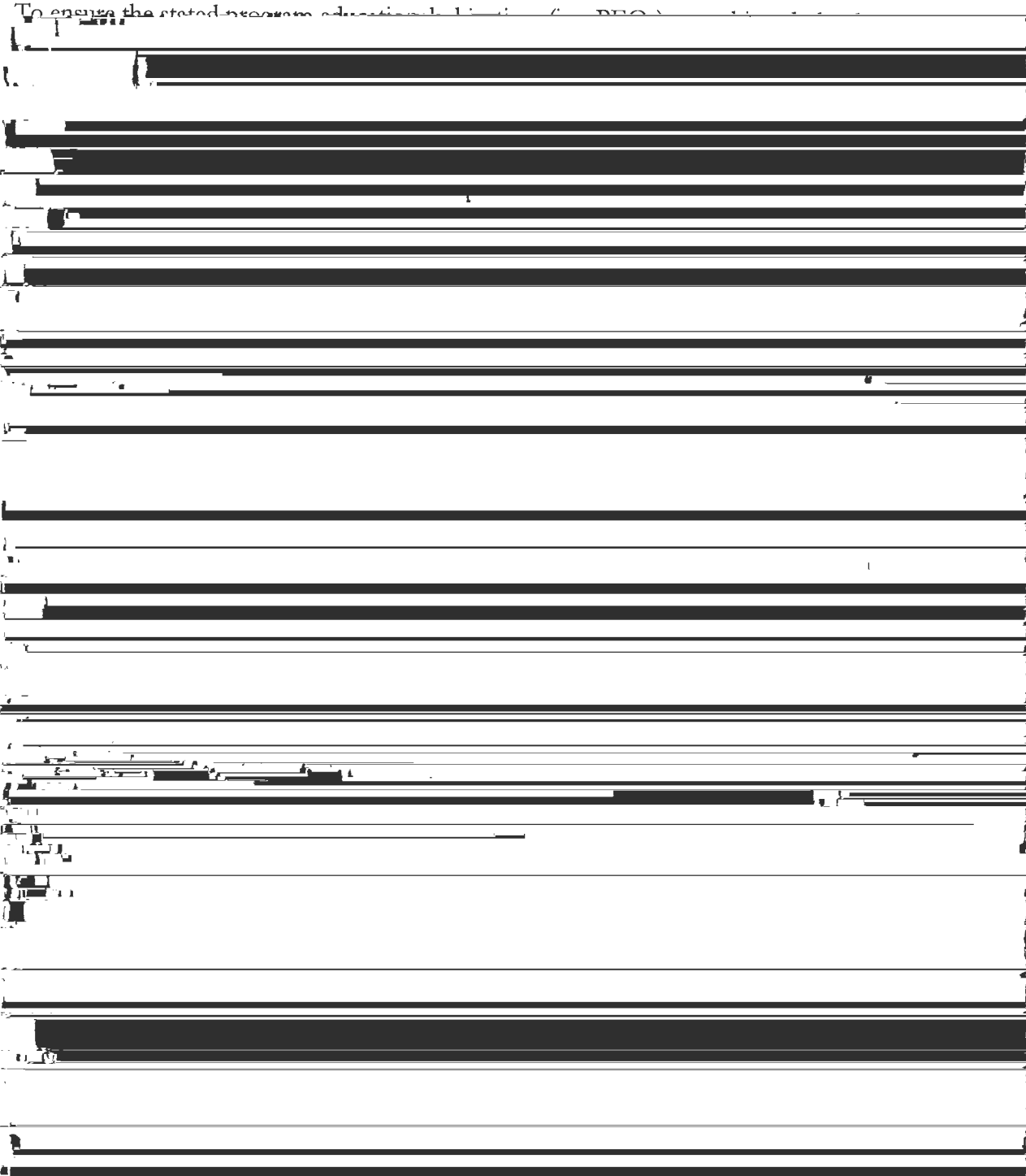
During the 2008 academic year, regular faculty members taught 34 of 47 (i.e., 72%) undergraduate (i.e., 700- or lower) level courses offered. Qualified adjunct-faculty, most with prior academic experience and Ph.D. degrees, are used to meet some teaching needs. On average, only one



advise students, seek external research funds, and to publish at desired levels. Adjustments (e.g., additional faculty or enrollment changes) might be required to sustain overall program quality.

Curriculum

nd refined over time by department faculty, most experience. Input from constituents (i.e., sed to further refine the curriculum content.



## Students

This section of the report provides basic information on students in the AE program.

Table with multiple rows and columns, mostly obscured by heavy black redaction bars. Some faint text is visible in the first few rows, including what appears to be a name and a number.

For convenience, the Department Educational Objectives (PEOs) are:

To provide an undergraduate education that prepares capable students to pursue graduate studies in aerospace engineering and related fields

a. To provide an undergraduate education that prepares capable graduates to pursue graduate studies in aerospace engineering and related fields

b. To provide an undergraduate education that prepares capable students to pursue graduate studies in aerospace engineering and related fields

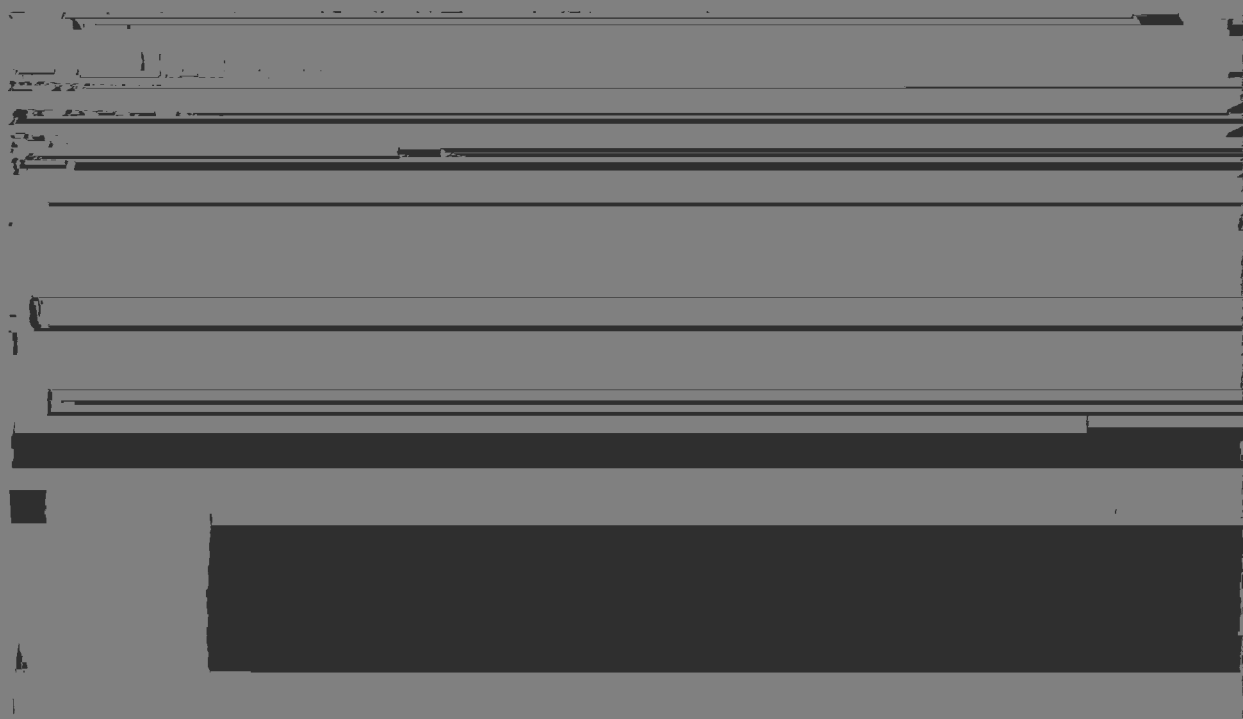
Interestingly, these objectives are not static. Department faculty utilize program-related input, from students, employers, and graduates, to regularly review the Program Educational Objectives. Hence, a mechanism to change or update the PEOs exists.

**Table 4 Relationship Between Assessment Activities and Program Outcomes**

Assessment Activity	Program Outcomes										
	1	2	3	4	5	6	7	8	9	10	11
Curriculum											
General Education Program	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Design Throughout Curriculum						✓	✓	✓		✓	
Capstone Design & Laboratory Courses	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
ABET Department Assessment Exams	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Alumni Survey	✓	✓			✓						
Cooperative Education Survey											

The following paragraphs provide additional information on each assessment activity.

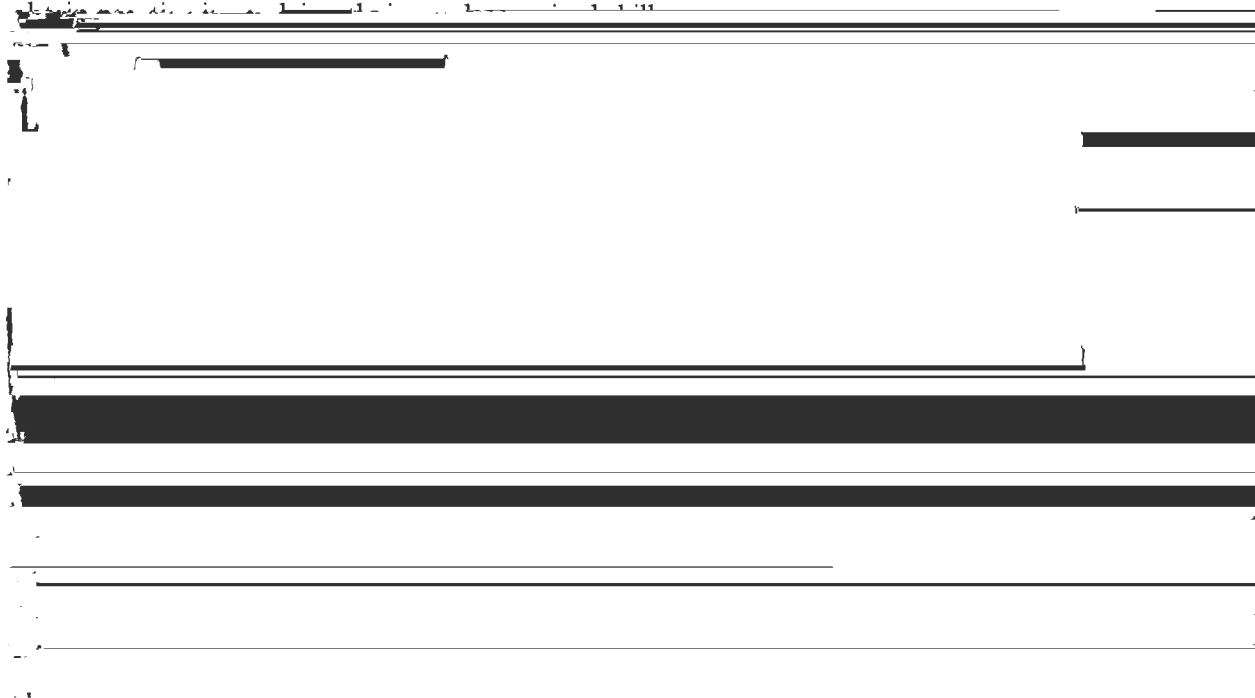
The program curriculum technical aspects are designed to ensure that students are exposed to a broad range of fundamental topics in science and aerospace engineering. The curriculum is consistent with requirements specified in ABET Program Criteria for aerospace programs.



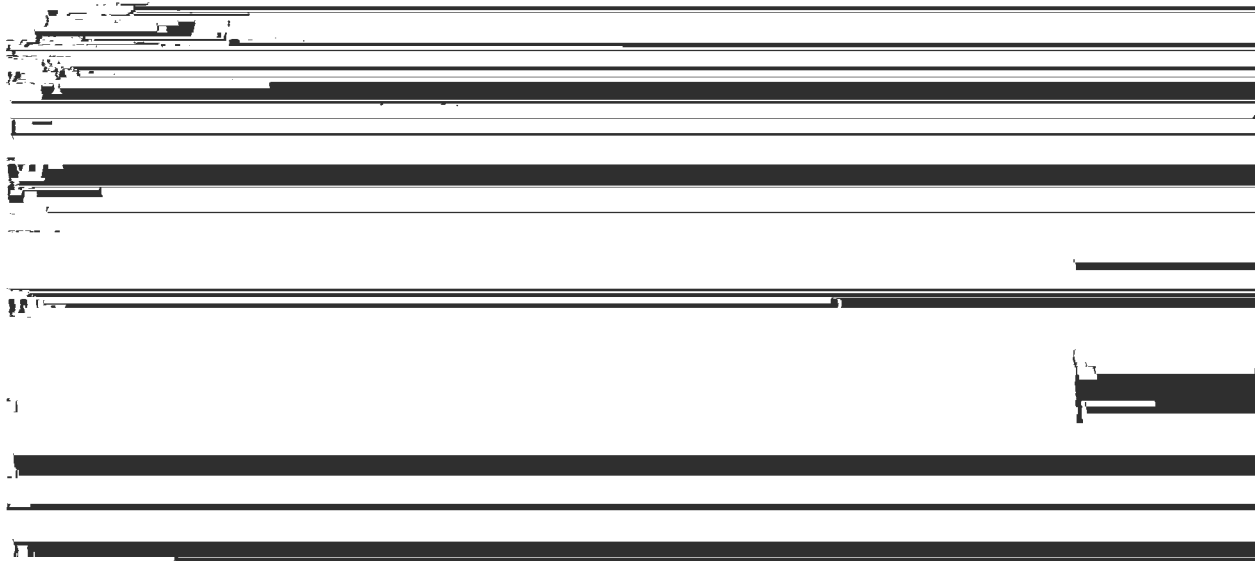
In this process, a three-year cycle addresses the Introductory, Further Studies, and Issues and Perspective courses. Assessment of the program beyond the Basic Skills courses (English I, English II, and Communication 111) is accomplished through the following:

- Program monitoring
- Tracking student outcomes
- Other institutional feedback

The General Education Committee is developing a matrix showing within which general education courses students apply their library research, mathematical, and written and oral communication skills. Students and advisors will use this matrix when planning courses of study to ensure students



Instructors are responsible for measuring student outcomes with respect to the general education



satisfaction with their educational experience while at WSU and serves as a diagnostic tool for faculty members in delivering the Program Educational Objectives.

The alumni survey, with elements common to the College of Engineering and questions that produce Aerospace Engineering Program-specific responses, is mailed to all living Aerospace Engineering Program graduates every two years. In this survey, alumni are asked a variety of questions, many of which are directly related to program outcomes.

While this is not a cooperative education program, many numbers participate in the university's cooperative education program. Students are asked to complete a survey (Employment, skills, communication skills, technology skills, and asked to review the frequency of outcomes activities).

Specific assessment results are too extensive to present in the current document. Perhaps most importantly, students and alumni respectively indicated an 82% and 86% favorable rating of the AE program. Cooperative education employers gave their student workers an 80.2% rating. Although these results are acceptable, the faculty is eager to make improvements.

All of the assessment results provide valuable information and feedback for the department. Indeed, a summary of recent changes is provided in the following table (Table 5).

**Table 5 A Summary of Assessment Related Program Actions and Changes (2008)**

Basis	Actions and Changes
<p>[REDACTED]</p>	<ul style="list-style-type: none"> <li>• Increased the availability and use of CAD software in the program</li> </ul>
<p>[REDACTED]</p>	<ul style="list-style-type: none"> <li>• [REDACTED]</li> <li>• [REDACTED]</li> <li>• [REDACTED]</li> </ul>
<p>Exit Interviews</p>	<ul style="list-style-type: none"> <li>• Advanced computer tool use is now more continuous in the program</li> <li>• A materials testing machine (e.g., a MTS) was purchased and a small wiffle-tree test fixture was built for class and project use</li> <li>• An experimental structures component was added, on a trial basis, to AE 512</li> </ul> <p>More AE courses now include C-or-better grade prerequisites</p>

The WSU AE program completed an ABET visit in the fall of 2007. The EAC ABET completed their review in the summer of 2008, awarding the AE program full accreditation.

### Demonstrated Need

The WSU AE program is a highly competitive program that attracts students from across the state of Kansas. The program is currently facing a demonstrated need to increase enrollment, given the projected growth of the aerospace industry in the state.



In 2007, faculty members organized 3 sessions at technical conferences. In addition, they collectively taught 5 workshops and made 12 invited presentations.

Every year, faculty review papers for leading journals (e.g., AIAA Journal, Journal of Aircraft, and SAE Transactions Journal of Aerospace). Over 30 papers were reviewed in 2007 alone.

Recruitment activities are quite important by the department.





## Conclusions

The Aerospace Engineering undergraduate program fulfills the mission and goals of the university, college, and department. In summary:

- Student credit hour production has increased significantly since the program's inception.

[REDACTED]

[REDACTED]

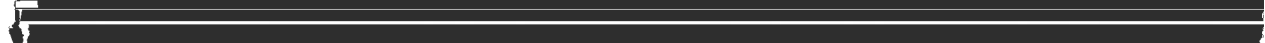
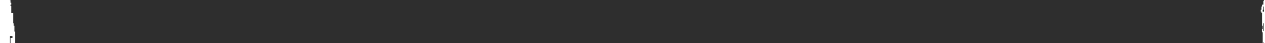
[REDACTED]

[REDACTED]

- The faculty is extremely productive and qualified to teach the program.

# Appendix I - University Mission

Wichita State University is committed to providing comprehensive educational opportunities in an



## Appendix II - College of Engineering Mission

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engineering profession in a global economy and in pursuing advanced engineering education.

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- Cultivate the spirit of entrepreneurship and the connection between academia and