INDUSTRIAL AND MANUFACTURING

		2002	2003	2004	2005	2006	2007	2008	Avg-5 year
Section I: Part A: Academic Instruction Expenditures (fiscal year)	1. Salaries/Benefits	$1,102,492.00	$1,048,522.00	$1,033,851.00	$1,031,390.00	$1,115,847.00	$1,180,678.89	$1,174,019.26	
	5 Year Average								$1,107,157.23
	2. Other Operating Exp.	$114,173.00	$71,682.00	$79,587.00	$121,111.00	$107,692.00	$84,990.04	$109,002.73	
	5 Year Average								$100,476.55
	3. Total	$1,216,665.00	$1,120,204.00	$1,113,438.00	$1,152,501.00	$1,223,539.00	$1,265,668.93	$1,283,021.99	
	5 Year Average								$1,207,633.78
Section I: Part B: Student Credit Hour Production (fiscal year)	1. Lower Division	1924	1901	1772	1708	1710	2065	1913	
	5 Year Average								1833.6
	2. Upper Division	1422	1056	853	806	827	810	1202	
	5 Year Average								899.6
	3. Masters	1016	1257	1324	1164	1166	1343	1280	
	5 Year Average								1255.4
	4. Doctoral	116	168	112	136	118	124	193	
	5 Year Average								136.6
	5.Total	4478	4382	4061	3814	3821	4342	4588	
	5 Year Average								4125.2
Section I: Part D: Percentage of Departmental SCH taken by: (fall)	1. Their Undergraduate Majors	16.2	17.2	15.6	19.8	15	15.5	19.6	
	5 Year Average								17.1
	2. Their Graduate Majors	45.5	43.8	39.8	35.2	43.1	35	39.9	
	5 Year Average								38.6
	3. Non-Majors	38.3	39	44.6	45	41.9	49.6	40.5	
	5 Year Average								44.32
Section I: Part E: Departmental Faculty (fall)	1. Tenured/Tenure Track Faculty Head Count	10	11	11	10	10	9	9	
	5 Year Average								9.8
	2. Tenured/Tenure Track Faculty with Terminal Degrees	10	11	11	10	10	8	8	
	5 Year Average								9.4
	3. Total Tenured Faculty	3	6	6	7	7	6	7	
	5 Year Average								6.6
	Total Instructional Faculty FTE in Department	10	11	11	10	10	9	9	
	5 Year Average								9.8
Section I: Part F: Actual Instructional FTE (fall)	1. Tenured/Tenure Track Faculty	9.87	10.08	11	8.75	9.96	10.68	10.8	
	5 Year Average								10.238
	2a. Instructor of Record (IOR)	0.75	1	0.92	0.68	0.92	0.44	1	
	5 Year Average								0.792
	2b. Not Instructor of Record	3.65	3.75	0.88	1.35	1.53	0.2	0.6	
	5 Year Average								0.912
	3. Other Instructional FTE	0.4	2.5	1.5	2	1.75	1.5	1.1	
	5 Year Average								1.57
	4.Total FTE	14.67	17.33	14.3	12.78	14.16	12.82	13.5	
	5 Year Average								13.512
	5. SCH generated by Tenured/Tenure Track Faculty	1715	1623	1495	1262	969	1403	1581	
	5 Year Average								1342
	6. SCH generated by GTA's (IOR)	111	177	273	117	207	210	372	
	5 Year Average								235.8

7. SCH generated by Other Instructional Faculty	56	177	177	285	383	363	195	
5 Year Average								280.6
8. Total SCH	1882	1977	1945	1664	1559	1976	2148	
5 Year Average								1858.4
9. Average SCH per Tenured/Tenure Track Faculty	1018.03	996.83	913.45	1148.34	1008.84	940.82	930.37	
5 Year Average								988.37
10. Average SCH per GTA (IOR only)	1956.00	1467.00	1594.57	2157.35	1594.57	3334.09	1467.00	
5 Year Average								2029.51
11. Average SCH per Other Instructional Faculty	4090.00	654.40	1090.67	818.00	934.86	1090.67	1487.27	
5 Year Average								1084.29
12. Average Overall SCH per FTE	896.46	758.86	919.65	1029.03	928.74	1025.82	974.15	
5 Year Average								975.48

Program Review Department Report

Click here for the Kansas Board of Regents' instructions and definitions for Program Review.

ENGINEERING

INDUSTRIAL AND MANUFACTURING

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

		2002	2003	2004	2005	2006	2007	2008	Avg-5 year
Section I: Part A: Academic Instruction Expenditures (fiscal year)	1. Salaries/Benefits	$1,102,492.00	$1,048,522.00	$1,033,851.00	$1,031,390.00	$1,115,847.00	$1,180,678.89	$1,174,019.26	
	5 Year Average								$1,107,157.23
	2. Other Operating Exp.	$114,173.00	$71,682.00	$79,587.00	$121,111.00	$107,692.00	$84,990.04	$109,002.73	
	5 Year Average								$100,476.55
	3. Total	$1,216,665.00	$1,120,204.00	$1,113,438.00	$1,152,501.00	$1,223,539.00	$1,265,668.93	$1,283,021.99	
	5 Year Average								$1,207,633.78
Section I: Part B: Student Credit Hour Production (fiscal year)	1. Lower Division	1924	1901	1772	1708	1710	2065	1913	
	5 Year Average								1833.6
	2. Upper Division	1422	1056	853	806	827	810	1202	
	5 Year Average								899.6
	3. Masters	1016	1257	1324	1164	1166	1343	1280	
	5 Year Average								1255.4
	4. Doctoral	116	168	112	136	118	124	193	
	5 Year Average								136.6
	5.Total	4478	4382	4061	3814	3821	4342	4588	
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Section I: Part D: Percentage of Departmental SCH taken by: (fall)	1. Their Undergraduate Majors	16.2	17.2	15.6	19.8	15	15.5	19.6	
	5 Year Average								17.1
	2. Their Graduate Majors	45.5	43.8	39.8	35.2	43.1	35	39.9	
	5 Year Average								38.6
	3. Non-Majors	38.3	39	44.6	45	41.9	49.6	40.5	
	5 Year Average								44.32
Section I: Part E: Departmental Faculty (fall)	1. Tenured/Tenure Track	10	11	11	10	10	9	9	
	5 Year Average								9.8
	2. Tenured/Tenure Track	10	11	11	10	10	8	8	
	5 Year Average								9.4
	3. Total Tenured Faculty	3	6	6	7	7	6	7	
	5 Year Average								6.6
	Total Instructional Faculty FTE	10	11	11	10	10	9	9	
	5 Year Average								9.8
Section I: Part F: Actual Instructional FTE (fall)	1. Tenured/Tenure Track	9.87	10.08	11	8.75	9.96	10.68	10.85	
	5 Year Average								10.248
	2a. Instructor of Record (IOR)	0.75	1	0.92	0.68	0.92	0.44	1	
	5 Year Average								0.792
	2b. Not Instructor of Record	3.65	3.75	0.88	1.35	1.53	0.2	0.6	
	5 Year Average								0.912
	3. Other Instructional FTE	0.4	2.5	1.5	2	1.75	1.5	1.08	
	5 Year Average								1.566
	4.Total FTE	14.67	17.33	14.3	12.78	14.16	12.82	13.5	
	5 Year Average								13.512
	5. SCH generated by	1715	1623	1495	1262	969	1403	1581	
	5 Year Average								1342
	6. SCH generated by GTA's	111	177	273	117	207	210	372	
	5 Year Average								235.8
	7. SCH generated by Other	56	177	177	285	383	363	195	

5 Year Average								280.6
8. Total SCH	1882	1977	1945	1664	1559	1976	2148	
5 Year Average								1858.4
9. Average SCH per	173.76	161.01	135.91	144.23	97.29	131.37	145.71	
5 Year Average								130.90
10. Average SCH per GTA (IOR	148.00	177.00	296.74	172.06	225.00	477.27	372.00	
5 Year Average								308.61
11. Average SCH per Other	140.00	70.80	118.00	142.50	218.86	242.00	180.56	
5 Year Average								180.38
12. Average Overall SCH per	128.29	114.08	136.01	130.20	110.10	154.13	159.11	
5 Year Average								137.91

Program Review Program Report

ENGINEERING

INDUSTRIAL AND MANUFACTURING

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

ENGINEERING MANAGEMENT

		2002	2003	2004	2005	2006	2007	2008	Avg-5 year
Section II: Part A: Majors in the Discipline (fall)	1. Freshmen/Sophomores (optional)	0	0	0	0	0	0	0	
	5 Year Average								0
	2. Jrs., Srs., 5th Year Majors	0	0	0	0	0	0	0	
	5 Year Average								0
	3. Masters	11	9	10	10	16	18	17	
	5 Year Average								14.2
	4. 1st Prof / Specialist / Certif.	0	0	0	0	0	0	0	
	5 Year Average								0
	5. Doctoral	0	0	0	0	0	0	0	
	5 Year Average								0
	6. Total	11	9	10	10	16	18	17	
	5 Year Average								14.2
Section II: Part B: ACT Scores of Undergraduate Jrs.,Srs (fall)	1. Average ACT Composite	0	0	0	0	0		0	
	5 Year Average								0
	2. Low ACT	0	0	0	0	0		0	
	5 Year Average								0
	3. High ACT	0	0	0	0	0		0	
	5 Year Average								0
	4. Number Reporting an ACT Score	0	0	0	0	0		0	
	5 Year Average								0
	5. Percent Reporting ACT Score	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
	5 Year Average								0.00%
Section II: Part C: Degrees Conferred (fiscal year)	1. Associate	0	0	0	0	0	0	0	
	5 Year Average								0
	2. Baccalaureate	0	0	0	0	0	0	0	
	5 Year Average								0
	3. Masters	3	3	0	2	4	6	2	
	5 Year Average								2.8
	4. First Prof / Specialist / Certificate	0	0	0	0	0	0	0	
	5 Year Average								0
	5. Doctorate	0	0	0	0	0	0	0	
	5 Year Average								0
	6. Total	3	3	0	2	4	6	2	
	5 Year Average								2.8

ENGINEERING

INDUSTRIAL AND MANUFACTURING

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

INDUSTRIAL ENGINEERING

		2002	2003	2004	2005	2006	2007	2008	Avg-5 year
Section II: Part A: Majors in the Discipline (fall)	1. Freshmen/Sophomores (optional)	18	15	12	6	12	14	26	
	5 Year Average								14
	2. Jrs., Srs., 5th Year Majors	44	43	36	42	38	37	49	
	5 Year Average								40.4
	3. Masters	131	137	121	106	87	81	103	
	5 Year Average								99.6
	4. 1st Prof / Specialist / Certif.	0	0	0	0	0	0	0	
	5 Year Average								0
	5. Doctoral	13	12	14	14	19	19	21	
	5 Year Average								17.4
	6. Total	206	207	183	168	156	151	199	
	5 Year Average								171.4
Section II: Part B: ACT Scores of Undergraduate Jrs.,Srs (fall)	1. Average ACT Composite	22.1	22.1	22.8	23.3	23.8	23.8	23.8	
	5 Year Average								23.5
	2. Low ACT	9	9	12	15	15	13	15	
	5 Year Average								14
	3. High ACT	30	30	32	31	31	27	29	
	5 Year Average								30
	4. Number Reporting an ACT Score	19	20	16	16	16	12	19	
	5 Year Average								15.8
	5. Percent Reporting ACT Score	43.18%	46.51%	44.44%	38.10%	42.11%	32.43%	38.78%	
	5 Year Average								39.17%
Section II: Part C: Degrees Conferred (fiscal year)	1. Associate	0	0	0	0	0	0	0	
	5 Year Average								0
	2. Baccalaureate	8	14	8	11	11	7	13	
	5 Year Average								10
	3. Masters	28	19	35	57	25	34	30	
	5 Year Average								36.2
	4. First Prof / Specialist / Certificate	0	0	0	0	0	11	8	
	5 Year Average								3.8
	5. Doctorate	2	1	2	3	0	4	6	
	5 Year Average								3
	6. Total	38	34	45	71	36	56	57	
	5 Year Average								53

ENGINEERING

INDUSTRIAL AND MANUFACTURING

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

MANUFACTURING ENGINEERING

		2002	2003	2004	2005	2006	2007	2008	Avg-5 year
Section II: Part A: Majors in the Discipline (fall)	1. Freshmen/Sophomores (optional)	4	5	5	2	2	6	4	
	5 Year Average								3.8
	2. Jrs., Srs., 5th Year Majors	8	7	9	7	6	7	13	
	5 Year Average								8.4
	3. Masters	0	0	0	0	0	0	0	
	5 Year Average								0
	4. 1st Prof / Specialist / Certif.	0	0	0	0	0	0	0	
	5 Year Average								0
	5. Doctoral	0	0	0	0	0	0	0	
	5 Year Average								0
	6. Total	12	12	14	9	8	13	17	
	5 Year Average								12.2
Section II: Part B: ACT Scores of Undergraduate Jrs.,Srs (fall)	1. Average ACT Composite	18.6	17.3	20	23	19.5	25	22.5	
	5 Year Average								22
	2. Low ACT	12	12	12	17	14	22	22	
	5 Year Average								17.4
	3. High ACT	25	26	26	26	25	28	23	
	5 Year Average								25.6
	4. Number Reporting an ACT Score	5	4	5	4	2	3	2	
	5 Year Average								3.2
	5. Percent Reporting ACT Score	62.50%	57.14%	55.56%	57.14%	33.33%	42.86%	15.38%	
	5 Year Average								40.85%
Section II: Part C: Degrees Conferred (fiscal year)	1. Associate	0	0	0	0	0	0	0	
	5 Year Average								0
	2. Baccalaureate	0	1	1	2	1	2	1	
	5 Year Average								1.4
	3. Masters	0	0	0	0	0	0	0	
	5 Year Average								0
	4. First Prof / Specialist / Certificate	0	0	0	0	0	0	0	
	5 Year Average								0
	5. Doctorate	0	0	0	0	0	0	0	
	5 Year Average								0
	6. Total	0	1	1	2	1	2	1	
	5 Year Average								1.4

Wichita State University
College of Engineering
FY 2008-2009 KBOR Program Review
Dean's Response
BS, MS and PhD in Industrial Engineering
BS in Manufacturing Engineering
MS in Engineering Management

College of Engineering Academic Program Review Process Overview

During academic year 2005-2006 the College of Engineering (CoE) underwent an extensive and inclusive strategic planning process with input from the College Industry Advisory Board (IAB), leadership, faculty, staff and students. The final outcome of this process was a ten-year strategic plan for the College. From this plan and based on the Wichita State University (WSU) mission, the mission and vision of the College of Engineering, as stated below, were developed and approved by the Wichita State University Provost and Vice President for Academic Affairs and Research.

Vision

The College of Engineering at Wichita State University will be recognized nationally and internationally for its: experience-based undergraduate and graduate degree programs; collaborative efforts with industry; and research programs to support the economic development and global competitiveness of the Wichita metropolitan area, the state of Kansas, and the nation.

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 education.*
- *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 early student recruitment, outreach programs, and the recruitment and development of faculty role-models.*
- *Encourage scholarship in all its dimensions.*
- *Evolve thoughtfully in response to the needs of industry and the changing world.*

The Department of Industrial and Manufacturing Engineering (IME) vision and mission are in complete alignment with the CoE vision and mission above.

College Assessment Process

The purpose of the assessment process at the college level is to ensure that the college follows a strategic direction that serves well all its constituents and that there is a system in place that allows for 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 provides input to the Dean and Chairs at least twice per academic year on college and departments strategic direction matters and overall engineering education issues. In addition, this board assists in the establishment or revision of the college's mission and vision and the evaluation of the achievement of these. The other two boards interact with the dean at least twice a semester to discuss topics such as laboratory infrastructure needs and overall quality of the educational or job experience. An additional tool used by the Dean to gather input from the faculty is the College of Engineering Faculty Survey of Department Chairperson.

Every undergraduate program in the CoE has its educational objectives and outcomes. The program objectives are statements that describe the expected accomplishments of graduates during the first few years after graduation while outcomes are statements that describe what students are expected to know and able to do by the time of graduation.

The primary assessment tools for the program objectives are the Alumni Surveys, Employer Survey and Industrial Advisory Board meetings. There is a process to establish or determine the objectives, how the program ensures that the objectives are achieved, and a system of ongoing evaluation that leads to continuous improvement of the program.

The process for determining and evaluating program objectives involves the program faculty, alums, employers, program or department IAB and the Program Curriculum and Assessment Committee and students. This process is repeated every year in most of the programs.

As part of the process to ensure the achievement of objectives, the Dean's Office administers the Alumni Survey every fall and sends the data gathered to the departments. Every fall the departments analyze the Alumni Survey data from the previous year, along with the Employer Survey data and the input received in the IAB Spring meeting. The Curriculum and Assessment Committee of the program consider this information and revise or update the program objectives and objective target levels and recommends curriculum changes and laboratory upgrades or enhancements. The recommendations are further reviewed by the IAB and approved or modified by the departmental faculty.

The desired outcomes of the academic programs are for the most part observed as attributes of the program graduates. These were developed by the faculty with input from the IAB and the students. The outcomes of every program essentially replicates the (a) through (k) outcomes of criterion 3 of Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering Technology (ABET).

Assessment tools for the program outcomes vary by program but may include: Fundamentals of Engineering Examination, core knowledge exams developed by program faculty, prerequisite exams,

course folders or portfolios, alumni surveys, graduating senior exit surveys and interviews, senior project evaluation by faculty and professional engineers, specific class exam questions and projects and co-op experience evaluation by employers and students. Every outcome is assessed by at least one tool but on the average three tools are used per outcome.

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 of the changes by the departmental faculty. The final step in closing the loop in the process is the implementation of faculty approved changes and modification to the catalog.

Bachelor of Science in Industrial Engineering and Bachelor of Science in Manufacturing Engineering

The Department of IME offers two undergraduate programs: a Bachelor of Science (BS) in Industrial Engineering (IE) and a Bachelor of Science (BS) in Manufacturing Engineering (MfgE). The BS in MfgE program was developed and offered at the request of industries in the city of Wichita and the region. There are three program goals associated with each one of these two programs which resulted from a review process conducted after the College's mission and vision were approved. This process which includes program objectives development, evaluation, assessment and revision is part of the ABET continuous improvement process and it is performed by the IME Department on a regular basis. All program constituents; students, alumni, faculty and employers are involved in the process. There are also eleven outcomes for each one of the two undergraduate programs offered by the IME Department.

The assessment of the undergraduate programs in the College of Engineering is the responsibility of the department offering the program. However, there is a coordinating body at the College level called the ABET Task Force in which each department has at least two representatives; the department chair plus a faculty member. This task force is chaired by the College ABET Coordinator and its charge includes the maintenance and updating of the assessment tools common to all programs (e.g., the Alumni Survey and the Cooperative Education Employer Survey), sharing of information and best practices and review of data collection methods and schedules. The ABET Task Force has been in place at least since the year 2001 but it has been meeting consistently since fall 2005. The Dean of the College of Engineering meets with this task force at least twice a year on regular years and at least four times during the year before an ABET visit.

The success in meeting the IE and MfgE program objectives is a function of how well graduating students master the program outcomes. The mastery of the program outcomes is assessed through multiple tools including but not limited to: Core Competency Exam, Senior Project Presentations and Reports, Graduating Senior Exit Survey, Alumni Survey and Employer Survey. Most of these assessment tools are applied every year. Therefore, the IME Department is assessing the undergraduate students' mastery of the BS in IE and MfgE program outcomes continuously.

In spring 2007, the BS in IE and MfgE programs were subjected to a mock ABET accreditation visit conducted by experienced evaluators who reviewed the self-study report, curriculum content, laboratory facilities, college and institution support for each program, program objectives and

outcomes' review and assessment processes, and faculty size and credentials. Recommendations were provided by the IE program mock visitor on how to present some of the assessment results in the self-study report; everything else associated with this program received high marks in this review. In the case of the MfgE, program recommendations were offered by the mock visitor on how to make the curriculum more attractive to high school students. The actual ABET accreditation visit for both of these programs took place in fall 2007 and the College was informed of the full accreditation of both programs (six years) in August 2008. By the time the KBOR BSIE and BSMfgE program reviews are over, these two programs would have been under some sort of comprehensive review for 24 months. As it is required by ABET, all these program reviews have involved not only the department chair but all the faculty members in the department.

Master of Engineering Management, Master of Science and Doctor of Philosophy in Industrial Engineering

The IME Department offers three graduate programs namely, Master in Engineering Management (MEM), Master of Science (MS) and Doctor of Philosophy (PhD) in Industrial Engineering (IE). The MEM program is aimed at providing engineers and technical professionals to develop operations planning, decision making and managerial skills. There are three goals associated with the graduate programs offered by the IME Department. The department has not identified specific program outcomes to be used in measuring the student mastery of program content or skills developed.

The assessment of the graduate programs in the College of Engineering is the responsibility of the department offering the program. However, there is a coordinating body at the College level called the Graduate Committee (GC) in which each department is represented. This committee is chaired by the College Associate Dean and is in charge of overseeing the development and implementation of the assessment plans for the individual graduate programs, sharing information and best practices on assessment, recruitment and operation of the programs. The GC meets on a regular basis and also handles common challenges and opportunities to multiple graduate programs.

One of the main sources of data for the assessment of the success in meeting the MEM and IE graduate program objectives is the Graduate School Exit Survey which provides feedback on the degree of satisfaction of the graduates with the educational experience they received at WSU.

Use of Data

In reviewing the five academic programs offered by the IME Department, multiple sources of information and data were used including the report provided by the WSU Office of Institutional Research for Program Review, benchmarking analysis of WSU IME Department and industrial engineering departments of the mid-west region of the United States, faculty activity reports and productivity analysis covering years 2003 to 2007, the assessment data for the BS in IE and MfgE programs as well as the most recent Graduate School Exit Survey results. The assessment data for the BS in IE and MfgE is based on the application of direct and indirect assessment tools. The data comes from surveys, interviews, assessment exams, senior project reports, and faculty as well as employers

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

evaluation of senior design presentations. Different constituents including faculty, students, employers and alumni are sources of input in this assessment process.

The recommendations included below as well as the fiscal implications of these are based on all the data analyzed as part of the program review process and the College of Engineering productivity measures included in Table 1.

Significant Program Changes

The changes implemented by the IME Department within the last five years to close the loop in the continuous improvement process of its academic programs are included as follows.

- The computer graphics software used in the course IME 222 Engineering Graphics was changed to CATIA which is the local industry standard.
- The course IME 258 Manufacturing Processes I content and laboratory experience was significantly revised in order to serve as an exciting introduction to Manufacturing Engineering.
- The main manufacturing laboratory facility was significantly enhanced with the acquisition of equipment improving the quality of students' experiences in several course laboratories.
- The course IME 556 Information Systems content and laboratory experience was significantly revised in order to incorporate the new role of Industrial Engineers as managers of operational and strategic information.
- A new course, IME 576 Composites Manufacturing, was developed along with an extensive laboratory facility. This course is required in the BS in MfgE curriculum and is a popular elective in the BS in IE curriculum.
- A new course, IME 676 Aircraft Manufacturing, was developed and is been offered regularly. This course is required in the BS in MfgE curriculum and is a popular elective in the BS in IE curriculum.
- A new graduate/undergraduate elective course for both IE and MfgE students, IME 778 Machining of Composites, was developed and has been taught on a regular basis.
- An Accelerated BS-MSIE program, a thesis only MSIE program, has been developed for exceptionally qualified and motivated undergraduate students in IE.

- A minor in Manufacturing Engineering, has been developed primarily targeted at AE and ME students wishing to broaden their educational experience.
- Approval was obtained to award up to 3 credits of technical electives for Cooperative Education experience.
- The course MIS 310 VB.NET was added as an alternative to fulfill the computer programming competency requirement.
- In order to address the needs of students transferring into the BS in IE and MfgE formal 2+2 programs have been developed and approved for:
    - Butler Community College
    - Cowley College
    - Universidad de Lima
    - Other regional colleges are in process including Wichita Area Technical College (WATC)
- The Engineer 2020 program was implemented.

The Engineer 2020 program requires that to fulfill the requirements for a BS in IE or MfgE degree at WSU, each student completes at least three of the following: a. Undergraduate Research, b. Cooperative Education or Internship, c. Global Learning or Study Abroad, d. Service Learning, e. Leadership, and f. Multidisciplinary Education. With the Engineer 2020 program the students will:

a) develop

    a. ability to design and conduct experiments, as well as to analyze and interpret data;
    b. ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;
    c. ability to function on multi-disciplinary teams;
    d. ability to identify, formulate, and solve engineering problems;
    e. understanding of professional and ethical responsibility;
    f. ability to communicate effectively; and
    g. ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

b) obtain
    a. the broad education necessary to understand the impact of engineering solutions in a global, economic, environment, and societal context; and
    b. knowledge of contemporary issues.

c) recognize the need for, and an ability to engage in, life-long learning.

Summary and Recommendations

From the data presented in both program reviews, undergraduate and graduate, it is clear that the IME Department faculty size and qualifications are adequate to offer the five academic programs: BS in MfgE; MEM; and BS, MS and PhD in IE. The productivity of the IME faculty as it is measured by the last five year average for the number of journal publications (1.3/faculty member), conference proceedings (2.5/faculty member), the number of MS students/instructional faculty (11.6/faculty member), the number of PhD students/instructional faculty (1.78/faculty member), among others, should be commended. The College of Engineering heavily depends on the release money generated by the faculty

in the College to conduct its operations. Therefore, it is strongly encouraged that the level of research funded research and specifically faculty release generated by the IME be increased.

It is clear that the programs offered by the IME Department supports the WSU mission as an urban research serving institution and contribute to the economy of the city of Wichita, the state of Kansas and the nation. Further, the undergraduate PEOs and the graduate program objectives are being met. There is also evidence that the undergraduate program outcomes are being mastered by the graduates from the IE and MfgE programs. It should be pointed out that the IME Department accomplishments in terms of undergraduate regional and national IE paper contest winners and certification of quality professionals are second to none.

The average number of majors in the MEM program for the last five years as well as the average number of degrees awarded per year by the program has been below the ideal minimum. It is important to note that in the last few years the enrollment in the program has been picking up and that trend is expected to continue. No resources are being dedicated exclusively to this program; it takes advantage of the courses offered by other departments and courses offered to support the other two graduate programs in the IME Department.

The number of MfgE majors and degrees awarded is also below the ideal minimum. Again, no resources are being dedicated to this program. However, most of the funded research being conducted in the IME Department is manufacturing engineering related.

As part of BS in MfgE continuous improvement process it is recommended that:

- The curriculum includes less traditional machining manufacturing processes and more emphasis on new and emerging processes and technologies (e.g., rapid prototyping including design-manufacturing integration issues, manufacturing information systems, trends in micro-processing and green manufacturing).
- Maintain the aggressive student recruitment efforts.
- The system in place to follow up the placement of graduates be expanded. This should be applied to the BS in IE as well.

The graduate programs in the IE Department could benefit from the following:

- A separate set of program objectives and outcomes for each one of the three graduate programs; MEM and MS and PhD in IE.
- An assessment process for student mastery of the program outcomes for each one of the three graduate programs.
- Increase the number of MEM students. A partnership with the School of Business to add more global business content in the program could help with growth in program enrollment.
- Expansion of the system in place to follow up the placement of graduates.

The expansion of the Engineer 2020 program should continue. It is also recommended that as many IME faculty members as possible continue to be involved in the College of Engineering Faculty Enhancement program. The work of the First Year Engineering Program Task Force should also continue with active participation of the IME faculty.

Fiscal Implications of Recommendations

The IME Department is encouraged to maintain its commitment to academic excellence and program objectives as well as the continuous improvement process of its academic programs. The size and qualifications of the current IME faculty are adequate to support these goals and the BS, MS and PhD programs.

The IME Department currently has three faculty positions unfilled including a position that has been allocated to conduct a national search for a department chair. If the recommendations above are to be implemented successfully, these faculty positions should be filled. 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 persons providing support in these areas, however, since summer of 2008 that number went down to two when some of the information technology responsibilities were moved to UCATS. If providing additional technical support becomes an imperative, a combination of resources from research projects and faculty release will be a potential source of funding to cover the cost of such support.

Wichita State University
GRADUATE SCHOOL
KANSAS BOARD OF REGENTS 2009 PROGRAM REVIEW
Doctor of Philosophy in Industrial Engineering
Master of Science in Industrial Engineering
Master of Engineering Management

Review process: The Graduate Council prepared, discussed and reviewed these materials.

Programs: The Industrial and Manufacturing Engineering Program offers three graduate programs, a master's in industrial engineering (MSIE), a master's of engineering management (MEM), and a Ph.D. in industrial engineering (PhDIE). The MEM program was created about ten years ago with a modest popularity but not the growth initially expected. There are also seven certificate programs in Advanced Manufacturing Analysis, Industrial Ergonomics and Safety, Systems Engineering and Management, Lean Systems, Foundations of Six Sigma and Quality Improvement, Composite Materials, and Design for Manufacturing. The program serves three very distinct constituencies: students needing education for careers, the local community which tends to focus heavily on aerospace applications, and the larger profession interested in new research. The program appears to average an enrollment of about 110-140 master's students and 10-20 Ph.D. students, resulting on one of the highest graduate to undergraduate enrollment ratios of peer institutions.

Mission: The Industrial and Manufacturing Engineering the department sees its role as supporting its three main constituencies of students, the profession, and the community, especially given the connection of the program to the local aerospace industry.

Program faculty: There are currently eight full time faculty with Ph.D.s in their fields, with concentrations in ergonomics, engineering systems, manufacturing systems, and facilities planning. Three faculty positions are vacant now and searches are in progress for two. The report does not reveal the age of the faculty and so it is difficult to assess whether the program has a young faculty, an aging faculty, or one in their prime. Therefore, knowing whether major changes due to approaching retirements are an issue is not assessed. The overall number of publications and grant awards seems appropriate for the department, and the department is ahead in the size of grants that their faculty receive compared to their peer colleagues. Grants funded 42 graduate students in FY 2007. Given the size of the program, however, WSU has a relatively higher ratio of students per faculty member on master's levels than regional peer institutions, though comparable to other urban institutions. Ph.D. student levels and the student to faculty ratio, however, are in the mid-range.

Student outcomes and student needs: The program recognizes that many students work part time, resulting in long times for graduation. In response, the department offers the majority if its classes in the evenings and consistently offers required classes each semester. Compared to other regional programs, WSU's program in Industrial and Manufacturing Engineering is one of the largest, with the MSIE by far the largest at between 80 and 140 students. The report shows that the department is well aware of the demographics of their student population, such as that the vast majority of its students are international. After a peak enrollment following 9/11, the

numbers have dropped some but remain stable. The Ph.D and MEM programs have remained relatively stable at around 20-30 each. Graduation rates for MEM track students remain modest but generally consistent, as do Ph.D. graduations. In FY 2003, there was a sharp drop in Master's in Industrial Engineering graduation rates with a rebound and a spike in 2005. In general, graduation rates for that track average between the mid 20s to mid 30s. It is clear that the quality of student performance is high, based on the number of student awards and national recognition of their work. This is an important indicator of the quality of the program, along with the high number of presentations and publications involving one or more students in a variety of professional venues.

Summary/Recommendations: Overall, the programs of the department seem to be functioning well and do not raise major concerns. It does seem that the role and future of the MEM track is one that the department acknowledges and is working on. There is a good balance between teaching and research productivity. Given the demand for graduates to work in both domestic and international markets, the number of faculty should increase to maintain, and enhance, the quality of the program without sacrificing productivity. However, increasing the number of students without increasing the number of faculty would not be recommended.

Submitted by Abu Masud, Associate Dean of the Graduate School
Reviewed and Approved by the Graduate Council on November 20, 2008

Kansas Board of Regents Program Review

Department of Industrial and Manufacturing Engineering

Graduate Programs

Wichita State University

Fall 2008

Table of Contents

1. *A statistical overview of relevant departmental data.*

The university data sheets produced by Institutional Research are included in Appendix A.

2. *A statement that describes how the program relates to the mission and role of the college and university.*

The Industrial and Manufacturing Engineering (IMfgE) Department offers two undergraduate and three graduate degree programs. These are: Bachelor of Science in industrial engineering (BSIE), Bachelor of Science in manufacturing engineering (BSMfgE), Master of Science in industrial engineering (MSIE), Doctor of Philosophy in industrial engineering (PhD), and Master of Engineering Management (MEM). In addition, it also offers Graduate Certificate programs in seven areas: Advanced Manufacturing Analysis, Industrial Ergonomics and Safety, Systems Engineering and Management, Lean Systems, Foundations of Six Sigma and Quality Improvement, Composite Materials and their Processing, and Design for Manufacturing.

Wichita State University's mission statement calls for excellence in education at all levels as well as in scholarly activities and service to the community at large. The complete mission statement is available at the university's website, http://www.wichita.edu/online/mission.asp. The mission statement of the College of Engineering is supportive of the university's mission and is available at the following website, http://www.engr.twsu.edu/mission.html.

The Department of Industrial and Manufacturing Engineering's mission is to

1. educate students so that they consistently meet the needs of the employers and readily gain entrance to other graduate programs,
2. further knowledge in Industrial and Manufacturing Engineering, and
3. be responsive to the specific needs of local and regional industries and the community.

The complete vision-mission-belief statement of the department is available at the website http://imfge.wichita.edu/mission.htm. There is a complete congruence between the mission of IMfgE department and those of the college and the university. Table 2.1 below shows how the department's mission supports the institutional mission. The program objectives have been developed by the faculty with input from the students and its Industrial Advisory Council. The demand for graduates from the programs delivered by the Industrial and Manufacturing Engineering Department is illustrated in Figure 21. This shows the ratio of new positions being created by the economy in Industrial and Manufacturing Engineering (IME) to the number of graduates. The economy is generating a demand larger than the current supply. Note that this ratio is significantly higher for IME that it is for any other major engineering discipline. This is due to industry's increased need for efficiency produced by global competition. Our experience indicates that the local demand for IME graduates is at least as great as it is nationally.

Table 2.1. Congruence of Program Mission/Objectives and the Institutional Mission.

Program Mission/Objectives → Institutional Mission ↓	Graduates meet the needs of employers & gain entrance to graduate programs	Further knowledge	Be responsive to the specific needs of local/regional industries and community
Wichita State University: 1. To provide comprehensive educational opportunities in an urban setting.	✓	✓	✓
2. Committed to the highest ideals of teaching, scholarship and public service	✓	✓	✓
College of Engineering: 1. Prepare graduates who will engage effectively and responsibly in the practice of the engineering profession in a global economy and in pursuing advanced engineering education.	✓	✓	
2. 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.		✓	✓
3. Cultivate the spirit of entrepreneurship and the connection between engineering and business that encourages technology commercialization.	✓		✓
4. Improve continuously the engineering pedagogical methods employed in delivering its academic programs.		✓	
5. Foster and value diversity of ideas and people through early student recruitment, outreach programs, and the recruitment and development of faculty role-models.			✓
6. Encourage scholarship in all its dimensions.		✓	
7. Evolve thoughtfully in response to the needs of industry and the changing world.	✓		✓

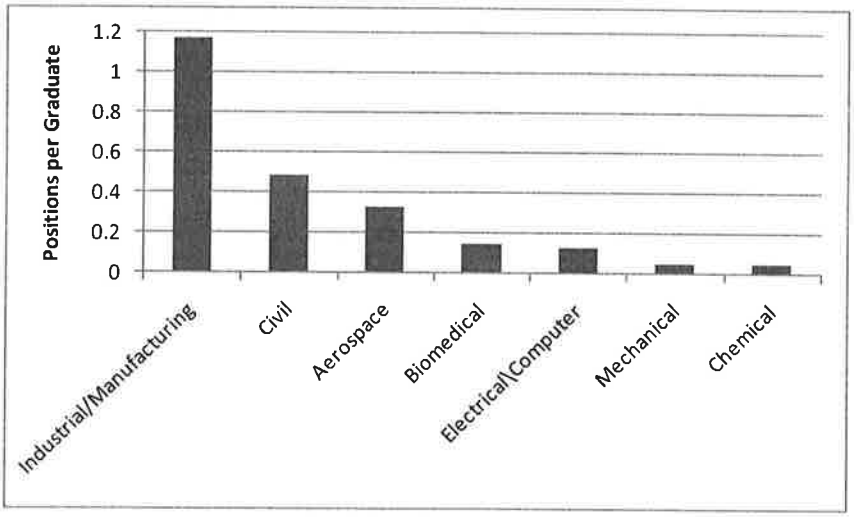

Figure 2.1 Number of new positions generated per number of Industrial Engineering students graduated. Source: The Occupational Outlook Handbook 2008-09 Edition, and Profiles of Engineering and Engineering Technology Colleges. ASEE

3. ***A statement that analyzes the quality of the program as assessed by the strengths, productivity, and qualification of the faculty.***

3.1 Graduate Faculty Status

Each of the current nine faculty members has graduate faculty status and all have PhD chairing status.

3.2. Qualification

The department currently has 11faculty positions of which eight are currently filled. All faculty members in the department hold PhDs in appropriate disciplines for their areas of responsibility. These faculty members have received their PhDs from the following institutions:, University of Florida, University of Pittsburgh, University of Texas at Arlington, Oklahoma State University, Virginia Polytechnic and State University, Ohio State University, Purdue University, University of Central Florida, and Kansas State University.

In addition to their academic credentials, four of the faculty or frequent lectures also possess professional certifications/licenses:

1. Licensed Professional Engineer: Larry Whitman (Texas) and Abu Masud(lecturer) (Kansas)
2. Certified Quality Engineer: Gamal Weheba
3. Certified Manufacturing Engineer: Larry Whitman

Three faculty members, based on their qualification and professional experience, have been appointed by national and regional agencies as evaluators or assessors:

1. Accreditation Board for Engineering and Technology:
    a. Abu Masud (lecturer) (IE Program Evaluator)
    b. Krishna K. Krishnan (IE Program Evaluator)
2. Higher Learning Commission of North Central Association of Colleges and Schools:
    a. Abu Masud (lecturer) (Consultant-Evaluator)
3. Kansas Award for Excellence:
    a. Gamal Weheba (Examiner)
    b. Larry Whitman (Examiner)

Dr. Abu Masud (lecturer) was elected to Fellow in the Institute of Industrial Engineers and Dr. Gamal Weheba was recently awarded Fellow of the American Society for Quality.

3.2.1 Strength.

The areas of teaching and scholarly activities of the faculty members are concentrated around these broad areas:

a) *Ergonomics/Human Factors.* The emphasis in this area is on industrial ergonomics; occupational biomechanics; work physiology; occupational health and safety; ergonomic product design and evaluation; and ergonomics and human factors issues in aviation systems.
b) *Engineering Systems.* The emphasis in this area is on optimization; multi-criteria decision making; modeling and analysis of manufacturing/service systems; management of engineering enterprises; decision analysis; total quality management; and application of intelligent systems and simulation.
c) *Manufacturing Systems Engineering.* The emphasis in this area is in planning, design, modeling, analysis and control of manufacturing systems; supply chain management;

Facilities Planning and Material Handling; CAD/CAM/CIM systems; measurement/ inspection; tolerancing in design and manufacturing; manufacturing processes; forming; tools/jigs design; assembly; free-form surfaces manufacturing; and, rapid prototyping.

Faculty members in the manufacturing systems engineering area are: Larry Whitman, Krishna Krishnan, Vis Madhavan, and Gamal Weheba. In the engineering systems area, faculty members are: Janet Twomey, Don Malzahn, M. Bayram Yildirim, and Gamal Weheba Currently, there is one faculty, Michael Jorgensen, in the area of ergonomics/human factors.

3.2.2 Productivity

The productivity of the faculty members using several measures are discussed in this section.

One measure of faculty productivity is the number of scholarly papers published and scholarly presentations made. Table 3.1summarizes the publication activity of IMfgE faculty members during the most recent five-year period, calendar years 2003 through 2007. On average, every year each faculty member published 1.2 papers in refereed professional journals and presented at and published 2.3 papers in the proceedings of national/international professional conferences. In addition, they made 1.5 other professional presentations.

Table 3.1. Publication/Presentation Productivity.

	CY03	CY04	CY05	CY06	CY07	5-yr Ave.
Faculty Head count (Fall)	10	10	12	11	11	10.8
Refereed Journal Publications, total #	12	10	14	14	12	12.4
Conference Proceedings Publications, total #	30	26	27	21	20	24.8
Other Presentations, total #	10	12	19	20	22	16.6
Refereed Journal Publications, per faculty	1.2	1.0	1.16	1.3	1.1	1.15
Conference Publications, per faculty	3.0	2.6	2.25	1.9	1.82	2.3
Other Presentations, per faculty	1.0	1.2	1.6	1.82	2	1.54

A second measure of faculty productivity is external grant proposal submission and award. Table 3.2 shows a summary of activities in this area for the recent five-year period. During this period, on average, each faculty submitted over three grant proposals per year, of which 56% were funded (a very high rate) and the average amount of grant award received per faculty is about $99,220 per year. This is significantly higher than the regional average of $53,000 per faculty (see Table 3.4).

Table 3.2. Summary of Grant Activity.

	FY03			FY04			FY05			FY06			FY07			AVERAGE		
	#S	#A	$A	#S	#A	$A	#S	#A	$A	#S	#A	$A	#S	#A	$A	#S	#A	$A
Total	38	13	1124	41	23	678	40	25	1870	24	14	858	22	17	903	33.0	18.4	1086.6
Per faculty	3.8	1.3	112.4	4.1	2.3	67.8	3.3	2.1	155.8	2.2	1.3	78.0	2.0	1.5	82.1	3.08	1.7	99.22

#S = number of proposals submitted,
#A = number of proposals funded,

$A = amount (in thousands of dollars) of grant award

A third measure of faculty productivity is the degree and credit-hour generation. This data, for the recent fiscal years is presented in Table 3.3. Data indicates that each faculty produces about 400 credit-hours per year and is responsible for 5.2 degrees awarded.

3.3 Graduate courses taught by faculty

All of the Graduate I and Graduate II level courses taught by the department during the last year have been taught by faculty with full graduate faculty status.

3.4 Teacher/student ratio

Table 3.3. Summary of Credit-hours Generated and Degree Awards.

	FY03		FY04		FY05		FY06		FY07		AVERAGE	
	SCH	#Deg	SCH	#Deg	SCH	#Deg	SCH	#Deg	SCH	#Deg	SCH	#Deg
Total	4,061	46	3,841	75	3,821	41	4,342	52	4,588	52	4,125	53
Per faculty	369	4.2	436	8.6	384	4.1	407	5.0	425	4.8	425	5.2

SCH = student credit-hour generated
#Deg = number of degrees awarded (BS, MS, PhD)

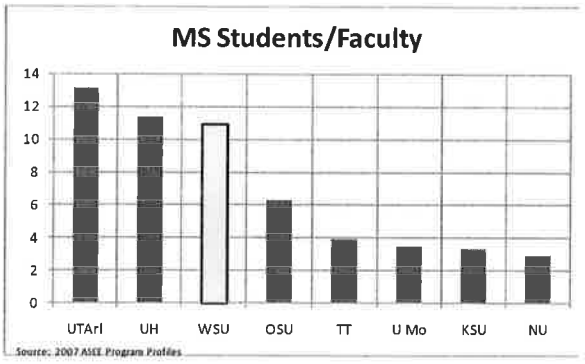

Figure 2.1 MS students per faculty member for regional comparable programs.

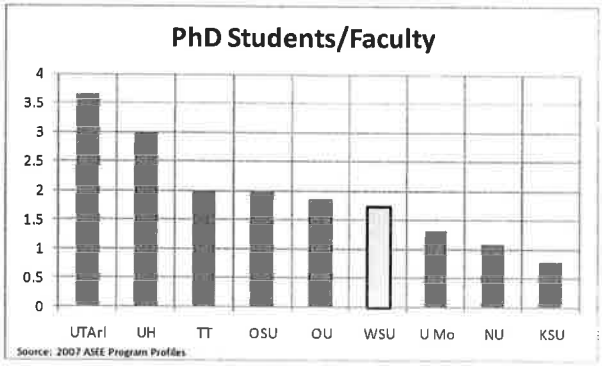

Figure 33.2 PhD students per faculty member for regional comparable programs.

The ratio of Masters students to faculty members is significantly higher than it is for comparable regional programs but is in line with other urban-based programs (University of Texas at Arlington and University of Houston). The PhD ratio is in line with other regional programs.

3.4 Graduate students externally supported

The data for FY2007 indicates that a total of 42 graduate students were funded through externally generated funds. This number does not include students supported though startup funds or undergraduate research assistance.

4. ***A statement that analyzes the quality of the program as assessed by the regularly offered curriculum and the effect of the curriculum on the students***

4.1 Graduate program overview

The department offers three graduate degree programs: Master of Science in Industrial Engineering (MSIE), Master of Engineering Management (MEM) and Doctor of Philosophy in Industrial Engineering (PhDIE). In addition the department offers Graduate Certificate programs in seven areas: Advanced Manufacturing Analysis, Industrial Ergonomics and Safety, Systems Engineering and Management, Lean Systems, Foundations of Six Sigma and Quality Improvement, Composite Materials and their Processing, and Design for Manufacturing. Each certificate program requires the completion of twelve credit hours from a selected list of courses.

The IME graduate programs at Wichita State University are among the largest in the Midwest. Note that the relative size of the PhD program is consistent with other regional programs.

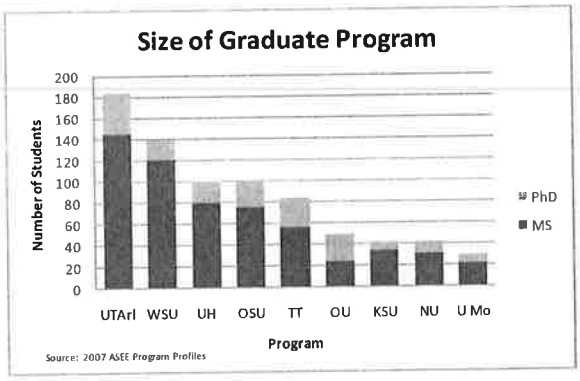

Figure 4.1 Comparison of regional IME program size. (Source ASEE Online Profiles, 2007)

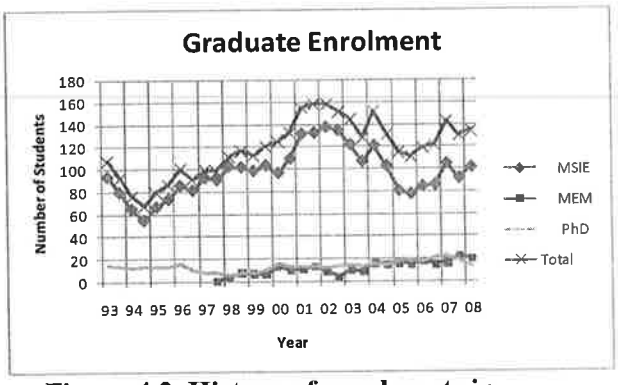

Figure 4.2 History of enrolments in MSIE, MEM, and PhD IE programs.

The MSIE enrolment has varied between 80 and 140 over the past 15 years with a peak of 140 in the period just after the terrorist attacks of 9/11. Many students chose not to complete their dregree's terminal activities in order to stay in the US. The decline in 2003 has been attributed to visa difficulties for international students. There has been a steady increase since 2003 and we expect this to level out at approximately 120 students.

The MSIE program offers concentrations in: Ergonomics/Human Factors, Engineering Systems, and Manufacturing Systems Engineering. It is directed toward both full-time and part-time students with a special emphasis on providing training and experience in performing independent research on topics with theoretical as well as applied interest. The program can be completed with one of three options:

- *Thesis Option* with a minimum of 24 hours of coursework plus 6 hours of thesis,
- *Directed Project Option* with a minimum of 30 hours of coursework plus 3 hours of directed project,
- *All Course Option* with a minimum of 33 hours of coursework plus a written core competency exam.

The MEM program has seen a slow but steady increase in enrolment since its inception ten years ago (Figure 4.2). In 2008 the enrolment is 23. The demand for the degree has not been as great

as was initially expected, but we are now seeing an increase in the number of students who received their BS degrees from WSU in other disciplines (e.g. Aeronautical Engineering, Mechanical Engineering, Mathematics) returning to earn the MEM.

The MEM degree program is geared toward helping engineers/technologists develop planning, decision making and managerial skills while receiving advanced technical knowledge. It is structured for practicing technical professionals. The program can be completed with one of two options:

- *Directed Project Option* with a minimum of 30 hours of course work plus 3 hours of directed project,
- *All Course Option* with a minimum of 33 hours of coursework plus a written core competency exam.

The PhD program has grown to between 20 and 25 students (Figure 4.2). Our objective is to grow to about 30 PhD students. The drop this semester is due to a large number of students graduating (6) this year. PhD IE degrees are offered with specialization in industrial ergonomics/human factors, manufacturing systems engineering, and engineering systems. It requires: at least 60 credit hours of graduate coursework and at least 24 credit hours of dissertation research.

Each graduate program requires the completion of a terminal activity (depending on the degree and the chosen option). The terminal activity involves either the submission of a written report and an oral defense or taking a comprehensive written test. Theses and dissertations are available online to the public through the Shocker Open Access Repository (SOAR) maintained by the Ablah Library. Directed project reports are kept in the Ablah Library of WSU. Theses, dissertations and directed project reports are available to the public for perusal.

4.2 Timely course offerings

All of the required courses for the MSIE degree are offered at least twice a year. All other graduate level courses (other than experimental courses) are offered on a rotating three semester schedule. Given that approximately 60% of the programs' students are part-time (Figure 4.3), the department offers a significant number of its courses after 4:10. The combination of evening offerings and a three semester rotation allows student to complete their programs in a timely manner.

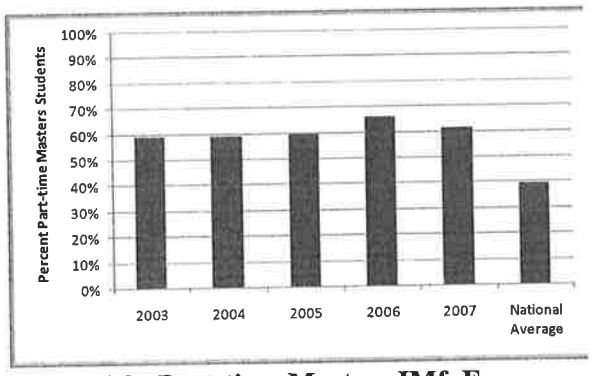

Figure 4.3. Part-time Masters IMfgE Student vs. National Average.

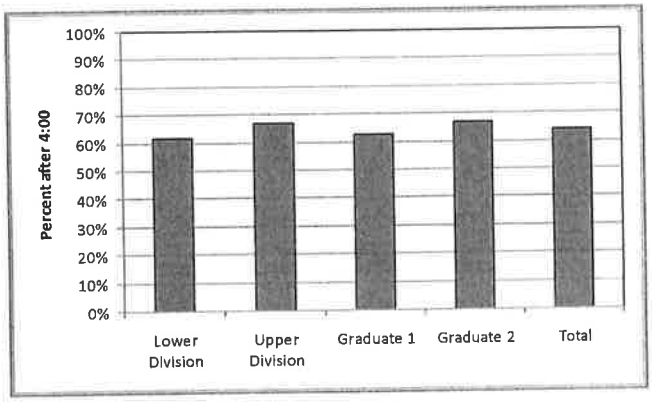

Figure 4.4 Percent of sections offered after 4:00.

4.3 Graduation rates

Table 4.1 presents the graduation rate of the department's programs. The number of graduates with a Masters in Engineering Management is lower than is desirable but the courses offered for this program are popular electives for MSIE students and it addresses a need in the community for technical managers.

Table 4.1 Graduate Degrees Earned.

	2002	2003	2004	2005	2006	2007	2008
Master in Engineering Management	3	3	0	2	4	6	2
Masters in Industrial Engineering	28	19	35	57	25	34	30
Graduate Certificate	0	0	0	0	0	11	8
PhD in Industrial Engineering	2	1	2	3	0	4	6

4.4 Average time to completion.

Given the mix of fulltime and part-time graduate students, the time required for completion is quite varied. The average MEM graduate takes 9 semesters, the average MSIE takes 7 semesters, while the average time for a PhD graduate is 11 semesters. Given the large proportion of part-time graduate students, these times appear reasonable.

4.5 Diversity of admissions

The graduate programs are diverse with 12% female, 79% foreign national, and 3% ethnic minority in 2007.

4.6 Entrance requirements

Admission to the degree program on "Full Standing" is granted when a student meets the following minimum requirements: 3.0 cumulative GPA in last 60 hours of undergraduate courses (or 'First Class' standing for international students) and final evaluation by the Graduate Coordinator. A TOEFL score of 213 (79 on the IBT) is required for all students with English as a second language. Students are required to meet specific pre-requisites (by prior course, or quiz-out exam administered by the department, or completion of a course with 'B' or better). All students admitted on 'Full Standing' meet these criteria.

4.7 Student recognition

The department has an emphasis on encouraging its students to participate in professional activities in a national venue and budgets to support student and student group participation.

- WSU IME graduate students swept the 2007 APICS (The Association for Operations Management) regional paper completion awards with a first, second and third place awards. They also won the Student Case Study competition. Students have consistently done well in these competitions indicating the quality of their education compared with other students across the country.
- In 2007 19 graduate students received Certified Quality Technicians status and two received the Certified Quality Engineer status. More students from WSU IME have achieved quality certification than any other university in the United States.

- In 2007 2 graduate students with an emphasis in ergonomics received the Certified Professional Ergonomist certification.
- Student chapters of the Institute for Industrial Engineers, APICS, Society of Manufacturing Engineers and the American Society for Quality are active in the department and have won numerous awards at the national and regional level.

Table 14.2 Publications and presentations by graduate students in 2007. Students indicated with a *

Author	Title	Venue
Li, Z.J.*, Hamada, M., and Liao, H.T.	"Maintenance Optimization for a Degrading System under Installation Constraints"	13th ISSAT International Conference on Reliability and Quality in Design
Rausch, M.* and Liao, H.T.	"Validation of Method of Moments for Uncertainty Propagation in Reliability Estimation"	13th ISSAT International Conference on Reliability and Quality in Design
Jorgensen MJ, Kittusamy NK and Aedla PB*	Repeatability of a Checklist for Evaluating Cab Design Characteristics of Heavy Mobile Equipment	Journal of Occupational and Environmental Hygiene
Mouzon*, G., Mehmet B. Yildirim, M, and, Twomey, J.	"Operational methods for minimization of energy consumption of manufacturing equipment",	International Journal for Production Research
Cheraghi, S.H., Krishnan, K.K., Bajracharya, B*., and Faisal, K.*,	Determination of Riveting Process Parameters to Ensure Quality of Rivets	IERC Conference
Jithavech, I., Krishnan, K.K., and Liao, H.,	Risk Based Facility Layout Design Approach	IERC Conference
Whitman, L., Kolyesnik, O.* and D. Malzahn	Decision analysis for RFID	International Federation for Automatic Control (IFAC)
Khanna, N.* and L. Whitman	A reusable enterprise ontology for a lean supply chain	Industrial Engineering Research Conference
Deshpande*, A. and Madhavan, V.	Study of heat partition at the primary shear plane using finite element analysis of heat and mass transfer	Transactions of the North American Manufacturing Research Institute of SME,+
Madhavan, V., Yegneswaran*, K., Mahadevan*, D. and Belur-Sheshadri*, A.,	Experimental determination of velocity and strain rate fields in orthogonal cutting	17th US Army Symposium On Solid Mechanics
Saket-Kashani*, M. and Madhavan, V.	Study of Damage distribution over the Primary Shear Zone in Metal Cutting using Nanoindentation	17th US Army Symposium On Solid Mechanics
Saket-Kashani*, M. and Madhavan, V.	he effect of surface tilt on nanoindentation results	Proceedings of 2007 ASME International Mechanical Engineering
J. Ceciliano-Meza*, MB Yildirim and A. Masud	A Model for the Multi-period Multi-objective Power Generation Expansion Problem	IEEE Transactions on Power Systems
A. Masud, M. Yildirim and J. Ceciliano-Meza*	Multi-objective Model of Power Generation Expansion Planning	IIE Conference and Expo
Jose L. Ceciliano Meza*, Mehmet B. Yildirim and Abu S. M. Masud	A Model for the Multi-Period Multi-Objective Power Generation Expansion Problem	IEEE Transactions on Power Systems
Gilles Mouzon*, Mehmet Bayram Yildirim and Janet Twomey	Operational Methods for Minimization of Energy Consumption of Manufacturing Equipment	International Journal of Production research
Asmatulu, R., Yildirim, M. B., Khan, W.*, Adeniji, A.* and Wamocha, H.*	Nanofiber Fabrication and Characterization for the Engineering Education	ASEE 2007 Midwest Regional Conference
Jithavech, I.*, Krishnan, K. and Yildirim, M. B.,	Analysis of Material Handling and Scheduling Using Simulation	Institute of Industrial Engineering Annual Conference and Exposition
Mouzon, G*. and Yildirim, M. B.	Genetic Algorithm to Solve a Multi-Objective Scheduling Problem	3rd Annual GRASP Symposium

4.8 Program goals

- All students will demonstrate expertise in at least one of the following core areas of Industrial Engineering: a) Manufacturing Systems Engineering, b) Engineering Systems, c) Ergonomics/Safety.

- Objective met. All students are required to select one of core areas and they are required to prove their proficiency in that area by completing a thesis, project, or an exit exam in the core area.

- All students in thesis or project option will demonstrate the ability to carry out independent research.
  - Objective Met. All students in the thesis or project option have completed independent research. They defend their work orally and submit their report as part of the defense.
- All students will demonstrate expertise in the core areas of production control, ergonomics, statistics and probability, and optimization.
  - Objective Met. All students in the MSIE program are required to get a C or better in the core areas of production control, ergonomics, statistics and probability, and optimization.

4.9 Assessment, improvement and compliance

The Department's system of regular and comprehensive assessment of its programs as they respond to the needs of constituencies provides the basis for continuous improvement. Exit surveys by departmental head are used to correct the departmental deficiencies identified by graduate students in terms of lab needs. The graduate school exit survey is used by the department's graduate committee to adjust departmental corrections to faculty availability and attitude. The departmental graduate committee also reviews the program outcomes and requirements each semester and recommends changes. Data collection and corrective action is performed by the graduate committee. The effectiveness of this approach has been demonstrated.

5. ***A statement that addresses student needs, employer demands, and how well the program prepares the students for their goals.***

5.1 Information on student/employer needs

Students and employers form two of the three constituencies of the Industrial and Manufacturing Engineering (IMfgE) department. The third constituent is the faculty. These constituencies were identified in the self assessment process developed as part of the accreditation review of the undergraduate programs. The department feels that these are also the appropriate constituencies for the graduate programs. The program objectives for each of the programs administered by the IMfgE department have been formulated, and continue to be refined, with input from students, alumni and employers. As listed earlier in Section 3 of this report, the program objectives for all the programs include preparing the students well for professional practice in specific well-defined areas for each program and for graduate education, fully utilizing the real-world educational opportunities offered by the metropolitan setting of WSU. Owing to the involvement of students and employers in the formulation of the program objectives and since these objectives figure prominently in all our recruitment efforts, it can be assumed that the program objectives for each program are aligned well with student needs and employer demands. These objectives are regularly reviewed and recalibrated, if necessary, as part of the overall assessment process in place.

5.2 Student Satisfaction

Various outcomes of the educational process required for achieving the program objectives have been identified and the IMfgE department actively brings to bear all its resources on a plan (educational process) aimed at achieving the outcomes, assessing the success annually and modifying the plan using the feedback received to ensure achievement of the desired outcomes.

Having established that the goals of the programs in the IMfgE department are aligned well with those of the students and employers and that there is a well established process to ensure that the goals are met, we can look at some individual statistics that highlight how well the programs prepare the students for their goals.

One of the missions of WSU is to offer educational opportunity to those employed in local industries. To fulfill this goal, IMfgE department offers more than 66% of its courses 4:00 p.m. so that those who work in the local companies can further their education. As a result, IMfgE department has proportionately more part-time students (those who 20-hours or more per week) than the national average (of engineering students). The high portion of part-time students demonstrates the Department's responsiveness to the needs of industry and students in the community.

6. ***A statement that describes the service the program provides to the discipline, other programs at the university, the metropolitan area or Kansas, or other matters as appropriate.***

All faculty members in the IMfgE department are actively involved in research, as outlined in the earlier section on faculty productivity. This translates into service to the discipline in the form of editorships, organizing conference symposia, refereeing journal and conference publications and proposals, serving on proposal review committees, etc. Table 6.1 summarizes the contribution of the IMfgE faculty in these aspects.

Table 6.1. IMfgE Faculty Professional Service Record.

Category	2005	2006	2007
Seminars/Short Courses/workshop	36	21	20
Consultancies*	2	0	5
Other Speaking Engagements+	24	11	3
Board/Committee Service**	1	1	3
Attendance at conferences	#	#	9

* does not include reviewing of conference/journal papers or professional certification
\+ does not include conference presentations
** does not include WSU service
\# missing data

Dr. Abu Masud serves as an evaluator for two accrediting agencies (ABET and NCA). Dr. Krisnan serves as an evaluator for ABET. Dr. Gamal Weheba and Dr. Larry Whitman are Examiners for The Kansas Award for Excellence.

The aviation industry dominates the economy of Kansas, particularly that of Wichita. Not surprisingly, a good fraction of the research being carried out in the IMfgE department is funded by the local aviation industries. Many of the projects are in manufacturing.

7. ***An assessment of the program's cost effectiveness as measured by such matters as cost per credit hour, peer comparisons, and other indicators.***

Table 7.1 Cost per credit hour for IME.

	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	5 Year Weighted Average
Cost/SCH	$271.70	$255.64	$274.18	$302.18	$320.21	$284.03

The cost per credit hour is presented in Figure 7.1. The cost includes salaries and operating expenses.

The size of the program offered by the IMfgE department is also a measure of its productivity. Using data from the ASEE data on college profiles the size of Industrial and Manufacturing Engineering programs were compared for state schools in the central United States. Figure 7.2 indicates that the IME department is above average in the number of students. Data from the same source indicates that the number of faculty is equal to the mean of the region.

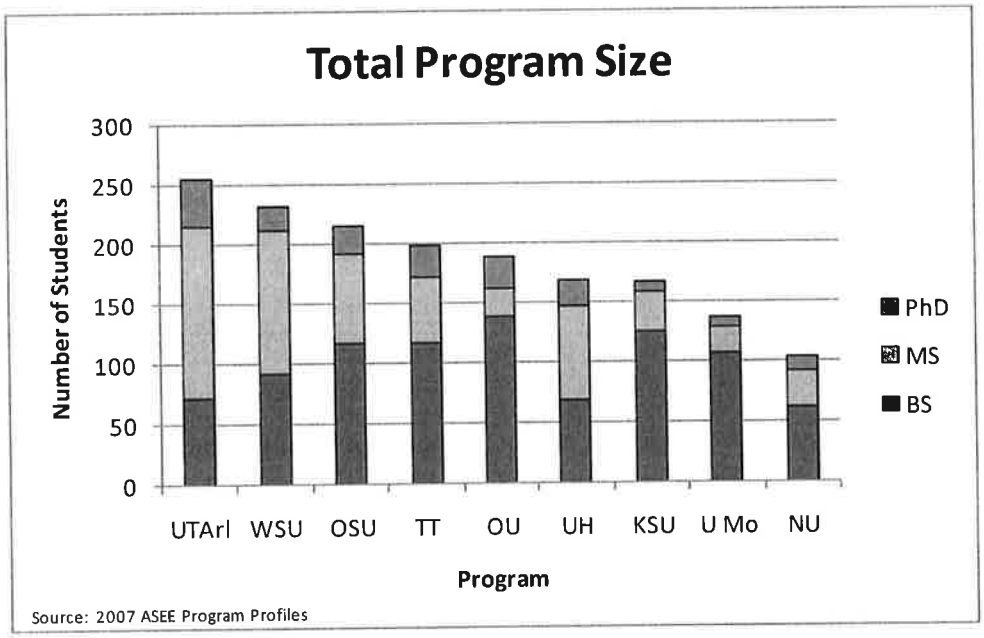

Figure 7.2 Total program size compared with regional Industrial Engineering programs.

Recently, a benchmarking assessment was performed by our department with the industrial (and manufacturing) engineering departments of the following universities in the mid-west region: University of Nebraska at Lincoln (NU), Kansas State University (KSU), University of Missouri at Columbia (UM), University of Oklahoma (OU), Oklahoma State University (OSU), University of Texas at Arlington (UTArl),, University of Houston (UH) and Texas Tech University (TTU). Note that, except for UT at Arlington and University of Houston, none of the programs could be considered urban serving research universities like Wichita State. This study was done for academic year 2006-2007. Table 7.2 presents a comparison of the productivity of the programs. Note that the Department of Industrial and Manufacturing Engineering compares very favorably

with these programs with higher than average MS degrees per faculty and higher externally funded research per faculty.

Table 7.2. Summary of Productivity for Comparable Programs in Midwest.

University	Students/Fac			Degrees/Fac			External Funding
	BS	MS	PhD	BS	MS	PhD	
NU	6.2	3.0	1.1	1.6	1.1	0.0	$49,400
KSU	12.5	3.3	0.8	2.6	1.4	0.1	$54,900
U Mo	17.8	3.5	1.3	3.2	1.2	0.2	$30,333
OU	9.9	1.6	1.9	1.5	1.1	0.4	$137,714
UTArl	6.5	13.1	3.6	1.1	6.7	0.5	$17,636
TTU	8.3	3.9	2.0	1.8	1.9	0.4	$35,000
OSU	9.7	6.3	2.0	2.1	4.8	0.3	$45,250
Average	**10.1**	**6.7**	**1.8**	**2.0**	**1.3**	**0.5**	**$52,891**
WSU	**8.4**	**10.9**	**1.7**	**1.3**	**3.2**	**0.5**	**$99,220**

Source: ASEE Online Profiles

Another measure of a graduate program's productivity is the combined effect of both the graduate educational component and the research productivity component. If one plots both measures on a graph, then more productive programs would those along the upper right extremes. In Figure 7.3, OU, WSU, and UTArl are at this extreme and the "most productive" program depends on the relative importance placed on research funding compared with number of students. For a higher value on research, OU may be perceived as more productive, for a higher value on student numbers, UTArl may be perceived as more productive. WSU IME is superior to each one of these on one aspect (and all other programs on both) indicating a balance between funded research and teaching.

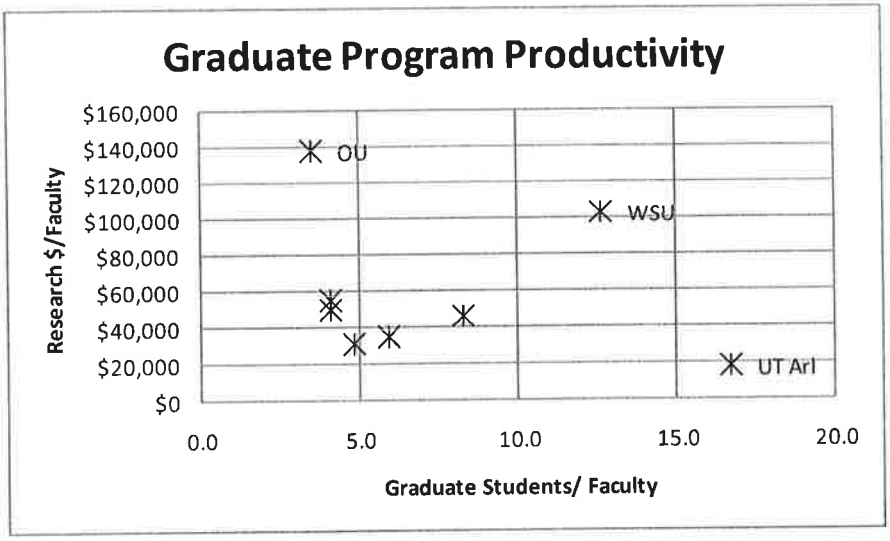

Figure 7.3 Relative productivity of regional IME programs as measured by research funding and number of students in program. Source ASEE Online Profiles

In summary, the programs offered by the Industrial and Manufacturing Engineering Department at Wichita State University have demonstrated effectiveness in responding to the needs of its constituencies by providing high quality programs, offered at convenient times, to a large number of students, by a high quality faculty. The cost data indicates that all of the programs are also very cost effective.

APPENDIX A: Statistical Data

Section I: Part A: Academic Instruction Expenditures

DESCRIPTION	2002	2003	2004	2005	2006	2007	2008
1. Salaries/Benefits	$1,102,492	$1,048,522	$1,033,851	$1,031,390	$1,115,847	$1,180,679	$1,174,019
2. Other Operating Exp.	$114,173	$71,682	$79,587	$121,111	$107,692	$84,990	$109,003
3. Total	$1,216,665	$1,120,204	$1,113,438	$1,152,501	$1,223,539	$1,265,669	$1,283,022

Section I: Part B: Student Credit Hour Production

DESCRIPTION	2002	2003	2004	2005	2006	2007	2008
1. Lower Division	1,924	1,901	1,772	1,708	1,710	2,065	1,913
2. Upper Division	1,422	1,056	853	806	827	810	1,202
3. Masters	1,016	1,257	1,324	1,164	1,166	1,343	1,280
4. Doctoral	116	168	112	136	118	124	193
5.Total	4,478	4,382	4,061	3,814	3,821	4,342	4,588

Section I: Part D: Percentage of Departmental SCH taken by:

DESCRIPTION	2002	2003	2004	2005	2006	2007	2008
1. Their Undergraduate Majors	16.2	17.2	15.6	19.8	15	1	1.9
2. Their Graduate Majors	45.5	43.8	39.8	35.2	43.1	0	0
3. Non-Majors	38.3	39	44.6	45	41.9	99	98.1

Section I: Part E: Departmental Faculty

DESCRIPTION	2002	2003	2004	2005	2006	2007	2008
1. Tenured/Tenure Track Faculty Head Count	10	11	11	10	10	9	9
2. Tenured/Tenure Track Faculty with Terminal Degrees	10	11	11	10	10	8	8
3. Total Tenured Faculty	3	6	6	7	7	6	7
Total Instructional Faculty FTE in Department	10	11	11	10	10	9	9

Section I: Part F: Actual Instructional FTE

DESCRIPTION	2002	2003	2004	2005	2006	2007	2008
1. Tenured/Tenure Track Faculty	9.87	10.08	11	8.75	9.96	10.68	10.8
2a. Instructor of Record (IOR)	0.75	1	0.92	0.68	0.92	0.44	1
2b. Not Instructor of Record	3.65	3.75	0.88	1.35	1.53	0.2	0.6
3. Other Instructional FTE	0.4	2.5	1.5	2	1.75	1.5	1.1
4.Total FTE	14.67	17.33	14.3	12.78	14.16	12.82	13.5
5. SCH generated by Tenured/Tenure Track Faculty	1,715	1,623	1,495	1,262	969	1,403	1,581
6. SCH generated by GTA's (IOR)	111	177	273	117	207	210	372
7. SCH generated by Other Instructional Faculty	56	177	177	285	383	363	195
8. Total SCH	1,882	1,977	1,945	1,664	1,559	1,976	2,148
9. Average SCH per Tenured/Tenure Track Faculty	173.76	161.01	135.91	144.23	97.29	131.37	146.39
10. Average SCH per GTA	148.00	177.00	296.74	172.06	225.00	477.27	372.00

(IOR only)							
11. Average SCH per Other Instructional Faculty	140.00	70.80	118.00	142.50	218.86	242.00	177.27
12. Average Overall SCH per FTE	128.29	114.08	136.01	130.20	110.10	154.13	159.11

Section II: Part A: Majors in the Discipline Engineering Management

DESCRIPTION	2002	2003	2004	2005	2006	2007	2008
1. Freshmen/Sophomores (optional)	0	0	0	0	0	0	0
2. Jrs., Srs., 5th Year Majors	0	0	0	0	0	0	0
3. Masters	11	9	10	10	16	18	17
4. 1st Prof / Specialist / Certif.	0	0	0	0	0	0	0
5. Doctoral	0	0	0	0	0	0	0

Section II: Part A: Majors in the Discipline, Industrial Engineering

DESCRIPTION	2002	2003	2004	2005	2006	2007	2008
1. Freshmen/Sophomores (optional)	18	15	12	6	12	14	26
2. Jrs., Srs., 5th Year Majors	44	43	36	42	38	37	49
3. Masters	131	137	121	106	87	81	103
4. 1st Prof / Specialist / Certif.	0	0	0	0	0	0	0
5. Doctoral	13	12	14	14	19	19	21

Section II: Part A: Majors in the Discipline Manufacturing Engineering

DESCRIPTION	2002	2003	2004	2005	2006	2007	2008
1. Freshmen/Sophomores (optional)	4	5	5	2	2	6	4
2. Jrs., Srs., 5th Year Majors	8	7	9	7	6	7	13
3. Masters	0	0	0	0	0	0	0
4. 1st Prof / Specialist / Certif.	0	0	0	0	0	0	0
5. Doctoral	0	0	0	0	0	0	0

Section II: Part B: ACT Scores of Undergraduate Jrs.,Srs Industrial Engineering

DESCRIPTION	2002	2003	2004	2005	2006	2007	2008
1. Average ACT Composite	22.1	22.1	22.8	23.3	23.8	23.8	23.8
2. Low ACT	9	9	12	15	15	13	15
3. High ACT	30	30	32	31	31	27	29
4. Number Reporting an ACT Score	19	20	16	16	16	12	19
5. Percent Reporting ACT Score	43.18%	46.51%	44.44%	38.10%	42.11%	32.43%	38.78%

Section II: Part B: ACT Scores of Undergraduate Jrs.,Srs Manufacturing Engineering

DESCRIPTION	2002	2003	2004	2005	2006	2007	2008
1. Average ACT Composite	18.6	17.3	20	23	19.5	25	22.5
2. Low ACT	12	12	12	17	14	22	22
3. High ACT	25	26	26	26	25	28	23
4. Number Reporting an ACT Score	5	4	5	4	2	3	2

5. Percent Reporting ACT Score	62.50%	57.14%	55.56%	57.14%	33.33%	42.86%	15.38%

Section II: Part C: Degrees Conferred Engineering Management

DESCRIPTION	2002	2003	2004	2005	2006	2007	2008
1. Associate	0	0	0	0	0	0	0
2. Baccalaureate	0	0	0	0	0	0	0
3. Masters	3	3	0	2	4	6	2
4. First Prof / Specialist / Certificate	0	0	0	0	0	0	0
5. Doctorate	0	0	0	0	0	0	0

Section II: Part C: Degrees Conferred Industrial Engineering

DESCRIPTION	2002	2003	2004	2005	2006	2007	2008
1. Associate	0	0	0	0	0	0	0
2. Baccalaureate	8	14	8	11	11	7	13
3. Masters	28	19	35	57	25	34	30
4. First Prof / Specialist / Certificate	0	0	0	0	0	11	8
5. Doctorate	2	1	2	3	0	4	6

Section II: Part C: Degrees Conferred Manufacturing Engineering

DESCRIPTION	2002	2003	2004	2005	2006	2007	2008
1. Associate	0	0	0	0	0	0	0
2. Baccalaureate	0	1	1	2	1	2	1
3. Masters	0	0	0	0	0	0	0
4. First Prof / Specialist / Certificate	0	0	0	0	0	0	0
5. Doctorate	0	0	0	0	0	0	0

Kansas Board of Regents Program Review

Department of Industrial and Manufacturing Engineering

Undergraduate Programs

Wichita State University

Fall 2008

1. A statistical overview of relevant departmental data.

The university data sheets produced by Institutional Research are included in Appendix A.

2. A statement that describes how the program relates to the mission and role of the college and university.

2.1 Undergraduate Degree Programs

The Industrial and Manufacturing Engineering (IME) Department offers two undergraduate and three graduate degree programs. These are: Bachelor of Science in industrial engineering (BSIE), Bachelor of Science in manufacturing engineering (BSMfgE), Master of Science in industrial engineering (MSIE), Doctor of Philosophy in industrial engineering (PhD), and Master of Engineering Management (MEM). In addition, it also offers Graduate Certificate programs in seven areas: Advanced Manufacturing Analysis, Industrial Ergonomics and Safety, Systems Engineering and Management, Lean Systems, Foundations of Six Sigma and Quality Improvement, Composite Materials and their Processing, and Design for Manufacturing. Both the Industrial Engineering and the Manufacturing Engineering programs were accredited by the Accreditation Board for Engineering and Technology in 2008.

Wichita State University's mission statement calls for excellence in education at all levels as well as in scholarly activities and service to the community at large. The complete mission statement is available at the university's website, http://www.wichita.edu/online/mission.asp. The mission statement of the College of Engineering is supportive of the university's mission and is available at the following website, http://www.engr.twsu.edu/mission.html.

The Department of Industrial and Manufacturing Engineering's mission is to

1. educate students so that they consistently meet the needs of the employers and readily gain entrance to other graduate programs,
2. further knowledge in Industrial and Manufacturing Engineering, and
3. be responsive to the specific needs of local and regional industries and the community.

The complete vision-mission-belief statement of the department is available at the website http://imfge.wichita.edu/mission.htm. There is a complete congruence between the mission of IME department and those of the college and the university. Table 2.1 below shows how the department's mission supports the institutional mission. The program objectives have been developed by the faculty with input from the students and its Industrial Advisory Council.

The demand for graduates from the programs delivered by the Industrial and Manufacturing Engineering Department is illustrated in Figure 2.1. This shows the ratio of new positions being created by the economy in Industrial and Manufacturing Engineering (IME) to the number of graduates annually nationally. The economy is generating a demand larger than the current supply by a factor of almost 20%. Note that this ratio is significantly higher for IME that it is for any other major engineering discipline. This is due to industry's increased need for efficiency produced by global competition. Our experience indicates that the local demand for IME graduates is at least as great as it is nationally.

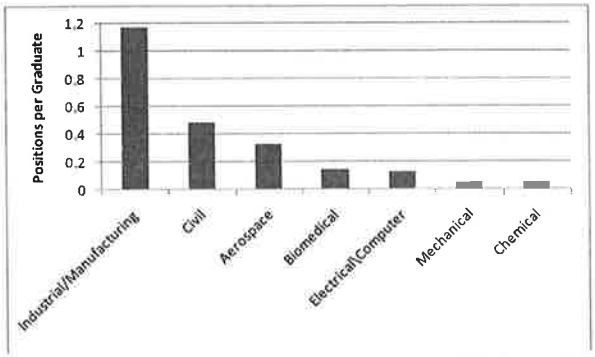

Figure 2.1 Number of new positions generated per number of Industrial Engineering students graduated. Source: The Occupational Outlook Handbook 2008-09 Edition, and Profiles of Engineering and Engineering Technology Colleges. ASEE

Table 2.1. Congruence of Program Mission/Objectives and the Institutional Mission.

Program Mission/Objectives → **Institutional Mission ↓**	**Graduates meet the needs of employers & gain entrance to graduate programs**	**Further knowledge**	**Be responsive to the specific needs of local/regional industries and community**
Wichita State University: 1. To provide comprehensive educational opportunities in an urban setting.	✓	✓	✓
2. Committed to the highest ideals of teaching, scholarship and public service	✓	✓	✓
College of Engineering: 1. Prepare graduates who will engage effectively and responsibly in the practice of the engineering profession in a global economy and in pursuing advanced engineering education.	✓	✓	
2. 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.		✓	✓
3. Cultivate the spirit of entrepreneurship and the connection between engineering and business that encourages technology commercialization.	✓		✓
4. Improve continuously the engineering pedagogical methods employed in delivering its academic programs.		✓	
5. Foster and value diversity of ideas and people through early student recruitment, outreach programs, and the recruitment and development of faculty role-models.			✓
6. Encourage scholarship in all its dimensions.		✓	
7. Evolve thoughtfully in response to the needs of industry and the changing world.	✓		✓

3. A statement that analyzes the quality of the program as assessed by the strengths, productivity, and qualification of the faculty.

3.1. Qualification

The department currently has 11faculty positions of which eight are currently filled. All faculty members in the department hold PhDs in appropriate disciplines for their areas of responsibility. These faculty members have received their PhDs from the following institutions:, University of Florida, University of Pittsburgh, University of Texas at Arlington, Oklahoma State University, Virginia Polytechnic and State University, Ohio State University, Purdue University, University of Central Florida, and Kansas State University.

In addition to their academic credentials, four of the faculty or frequent lectures also possess professional certifications/licenses:

1. Licensed Professional Engineer: Larry Whitman (Texas) and Abu Masud(lecturer) (Kansas)
2. Certified Quality Engineer: Gamal Weheba
3. Certified Manufacturing Engineer: Larry Whitman

Three faculty members, based on their qualification and professional experience, have been appointed by national and regional agencies as evaluators or assessors:

1. Accreditation Board for Engineering and Technology:
    a. Abu Masud (lecturer) (IE Program Evaluator)
    b. Krishna K. Krishnan (IE Program Evaluator)
2. Higher Learning Commission of North Central Association of Colleges and Schools:
    a. Abu Masud (lecturer) (Consultant-Evaluator)
3. Kansas Award for Excellence:
    a. Gamal Weheba (Examiner)
    b. Larry Whitman (Examiner)

Dr. Abu Masud (lecturer) was elected to Fellow in the Institute of Industrial Engineers and Dr. Gamal Weheba was recently awarded Fellow of the American Society for Quality.

3.1.1 Strength.

The areas of teaching and scholarly activities of the faculty members are concentrated around these broad areas:

a) *Ergonomics/Human Factors.* The emphasis in this area is on industrial ergonomics; occupational biomechanics; work physiology; occupational health and safety; ergonomic product design and evaluation; and ergonomics and human factors issues in aviation systems.

b) *Engineering Systems.* The emphasis in this area is on optimization; multi-criteria decision making; modeling and analysis of manufacturing/service systems; management of engineering enterprises; decision analysis; total quality management; and application of intelligent systems and simulation.

c) *Manufacturing Systems Engineering.* The emphasis in this area is in planning, design, modeling, analysis and control of manufacturing systems; supply chain management; facilities planning and material handling; CAD/CAM/CIM systems; measurement/ inspection; tolerancing in design and manufacturing; manufacturing processes; forming; tools/jigs design; assembly; free-form surfaces manufacturing; and, rapid prototyping.

Faculty members in the manufacturing systems engineering area are: Larry Whitman, Krishna Krishnan, Vis Madhavan, and Gamal Weheba. In the engineering systems area, faculty members are: Janet Twomey, Don Malzahn, M. Bayram Yildirim, and Gamal Weheba Currently, there is one faculty, Michael Jorgensen, in the area of ergonomics/human factors.

3.1.2 Productivity

The productivity of the faculty members using several measures are discussed in this section.

One measure of faculty productivity is the number of scholarly papers published and scholarly presentations made. Table 3.1 summarizes the publication activity of IME faculty members during the most recent five-year period, calendar years 2003 through 2007. On average, every year each faculty member published 1.2 papers in refereed professional journals and presented at and published 2.3 papers in the proceedings of national/international professional conferences. In addition, they made 1.5 other professional presentations.

Table 3.1. Publication/Presentation Productivity.

	CY03	CY04	CY05	CY06	CY07	5-yr Ave.
Faculty Head count (Fall)	10	10	12	11	11	10.8
Refereed Journal Publications, total #	12	10	14	14	12	12.4
Conference Proceedings Publications, total #	30	26	27	21	20	24.8
Other Presentations, total #	10	12	19	20	22	16.6
Refereed Journal Publications, per faculty	1.2	1.0	1.16	1.3	1.1	1.15
Conference Publications, per faculty	3.0	2.6	2.25	1.9	1.82	2.3
Other Presentations, per faculty	1.0	1.2	1.6	1.82	2	1.54

A second measure of faculty productivity is external grant proposal submission and award. Table 3.2 shows a summary of activities in this area for the recent five-year period. During this period, on average, each faculty submitted over three grant proposals per year, of which 56% were funded (a very high rate) and the average amount of grant award received per faculty is about $99,220 per year. This is significantly higher than the regional average of $53,000 per faculty (see Table 3.2).

Table 3.2. Summary of Grant Activity.

	FY03			FY04			FY05			FY06			FY07			AVERAGE		
	#S	#A	$A	#S	#A	$A	#S	#A	$A	#S	#A	$A	#S	#A	$A	#S	#A	$A
Total	38	13	1124	41	23	678	40	25	1870	24	14	858	22	17	903	33.0	18.4	1086.6
Per faculty	3.8	1.3	112.4	4.1	2.3	67.8	3.3	2.1	155.8	2.2	1.3	78.0	2.0	1.5	82.1	3.08	1.7	99.22

#S = number of proposals submitted,
#A = number of proposals funded,
$A = amount (in thousands of dollars) of grant award

A third measure of faculty productivity is the degree and credit-hour generation. This data, for the recent fiscal years is presented in Table 3.3. Data indicates that each faculty produces about 400 credit-hours per year and is responsible for 5.2 degrees awarded.

3.2 Teacher/student ratio

Table 3.3 summarizes the average student credits hours generated by each faculty and the number of degrees produced per faculty member. The total numbers of credit hours and degrees generated are presented because of the relatively large graduate programs supported by the department.

Table 3.3. Summary of Credit-hours Generated and Degree Awards.

	FY03		FY04		FY05		FY06		FY07		AVERAGE	
	SCH	#Deg	SCH	#Deg	SCH	#Deg	SCH	#Deg	SCH	#Deg	SCH	#Deg
Total	4,061	46	3,841	75	3,821	41	4,342	52	4,588	52	4,125	53
Per faculty	369	4.2	436	8.6	384	4.1	407	5.0	425	4.8	425	5.2

SCH = student credit-hour generated
#Deg = number of degrees awarded (BS, MS, PhD)

If we examine the size of the IME undergraduate programs in comparison to regional and comparable urban programs (Figure 2.1), they appear to be reasonably sized. Undergraduate student density is only slightly less than the University of Houston and slightly greater than the University of Texas at Arlington, other urban serving programs. The relatively larger programs at University of Missouri and Kansas State have much smaller graduate programs.

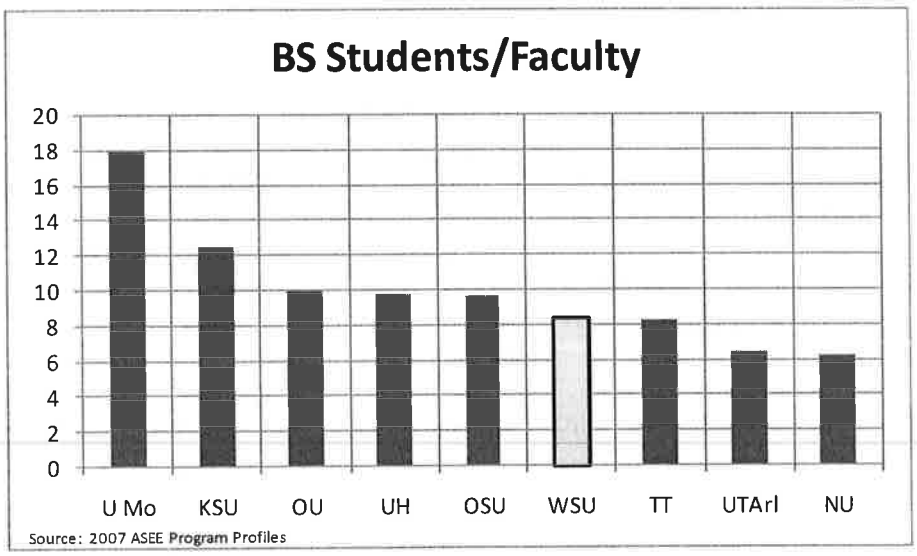

Figure 2.1 BS students per faculty member for regional comparable programs.

4. A statement that analyzes the quality of the program as assessed by the regularly offered curriculum and the effect of the curriculum on the students

4.1 Undergraduate program overview

The department offers 2 undergraduate degrees; a bachelors of science in industrial engineering and a bachelors of science in manufacturing engineering. After a decline in enrolment since 2000 (Figure 4.1), the number of student in the industrial engineering program has increased over the last two years. Recent recruiting activities have proven to be effective. The manufacturing engineering program was developed and offered at the request of industries in the region. The number of students has remained low until last year. Again the recruiting efforts and employment opportunities have generated an increase in the number of students in the manufacturing engineering program.

Both programs provide students a well rounded and integrated curricula with emphasis on hands-on experiential learning. The proximity to local industries provides a unique opportunity for students to gain firsthand knowledge of the profession that they are entering. The department actively supports four student professional organizations (IIE, ASQ, SME, and APICS) providing students an opportunity to develop leadership skills.

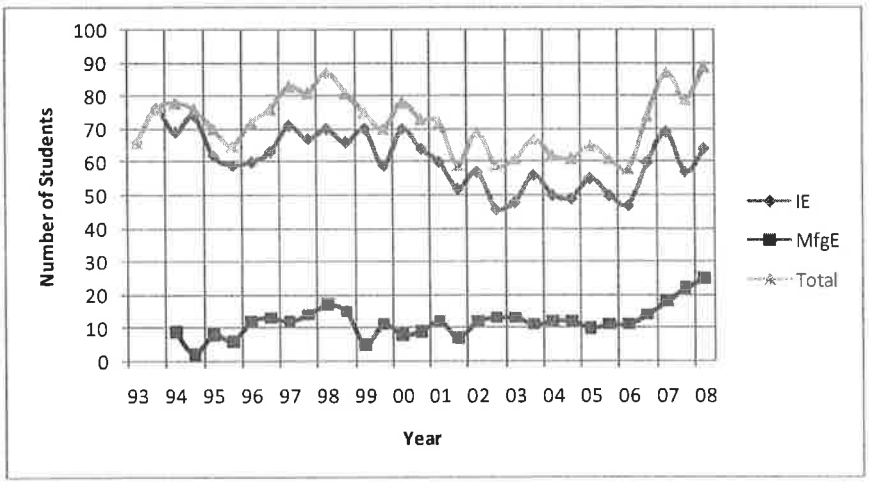

Figure 4.1 History of enrolments in BSIE and BS MfgE programs.

4.2 Timely course offerings

All of the required courses for the BSIE and the BSMfgE degrees are offered at least once a year. Elective courses are typically taught on a three semester rotating schedule. Given that approximately 60% of the programs' students are part-time, the department offers a significant number of its courses after 4:10 (Figure 4.2). The combination of evening offerings and a three semester rotation allows student to complete their programs in a timely manner.

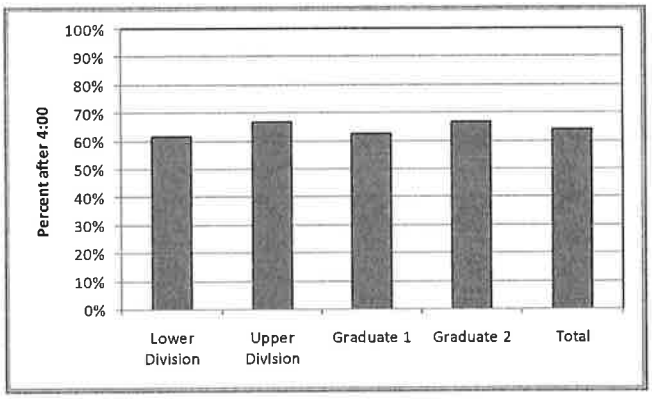

Figure 4.2 Percent of sections offered after 4:00.

4.3 Graduation rates

Table 4.1 presents the number of degrees awarded by the department's programs. The number of graduates with a Bachelors of Science in Manufacturing Engineering is fewer than desired, but the number of majors has shown a precipitous increase (see figure 4.1). The aggressive recruiting program appears to be having an effect and the number of graduates in Manufacturing Engineering is expected to continue to increase.

Table 4.1 Undergraduate Degrees Earned.

	2002	2003	2004	2005	2006	2007	2008
BS Industrial Engineering	8	14	8	11	11	7	13
BS Manufacturing Engineering	0	1	1	2	1	2	1

4.4 Diversity of admissions

The Industrial Engineering program currently has 33.8% female students while the Manufacturing Engineering program has 25.9% female students. Minority students make up 25% of the Industrial Engineering program while minorities make up 33% of the Manufacturing Engineering students. Both programs have very diverse student bodies.

4.5 Entrance requirements

By the state of Kansas' requirement, WSU is an open-admission university. That is, any graduate of a Kansas high school is guaranteed admission to the university. Beginning with members of the Class of 2001, students entering WSU must meet the requirements in Table 4.2.

Table 4.2 WSU Admission Requirements.

To Be Admitted	Must Meet These Criteria
Kansas residents must:	1. Achieve an ACT composite score of 21 or above or a minimum combined SAT-I score of 980, **OR** 2. Rank in the top one-third of their high schools' graduating class, **OR** 3. Complete the precollege curriculum with at least a 2.0 grade point average on a 4.0 scale.
Non-residents must:	1. Achieve an ACT composite score of 21 or above or a minimum combined SAT-I score of 980, **OR** 2. Rank in the top one-third of their high schools' graduating class, **OR** 3. Complete the precollege curriculum with at least a 2.5 grade point average on a 4.0 scale.
Non-accredited high school or home-schooled students must:	1. Achieve an ACT composite score of 21 or above **OR** 2. Achieve a minimum combined SAT-I score of 980.
GED students must:	1. Have a minimum score of 510 on each subtest and an overall score of 2550, **AND** 2. Submit official ACT or SAT scores.
Transfer students with 24 or more hours must:	Have a minimum cumulative GPA of 2.0 on a 4.0 scale on all previous college work.
Transfer students with fewer than 24 hours must:	1. Have a minimum cumulative GPA of 2.0 on a 4.0 scale on all previous college work. 2. Meet one of the freshmen qualified admissions requirements.

4.6 Student recognition

The department has an emphasis on encouraging its students to participate in professional activities in a national venue and budgets to support student and student group participation. These national level competitions provide a means for the IME programs to assess the effectiveness of their curricula.

Student chapters of the Institute for Industrial Engineers (Table 4.3), APICS (Table 4.4), and the American Society for Quality (Table 4.5) are active in the department and have won numerous awards at the national and regional level. No IE program in the United States has won as many regional and national IE paper contests or certified as many students as quality professionals.

Table 4.3 Institute of Industrial Engineers International Student Paper Competition.

Name	IIE Regional Paper Place	IIE International Paper Award
Jenny Marshall	2008 (1)	2008 (3)
Daniele Davis	2008 (3)	
Michael Hurley	2007 (1)	
Mitch Rausch	2006 (1)	2006 (1)
Rebekah Drake	2006 (2)	
Janise Hamilton	2005 (1)	2005 (3)
Kelly Zens	2005 (3)	
Samantha (Vitt) Corocon	2004 (1)	2004 (1)
Marki (Farris) Huston	2004 (2)	
Virginia Youse	2003 (1)	
Jennifer Sutherland	2001 (1)	2001 (1)
Charity Kennedy	2001 (2)	
Vigneshara Sambasivan,	2000 (3)	

Table 4.4 APICS Undergraduate Paper Competition.

Year	Placement
2008	Regional – First & Second
2007	International – Second Regional – First, Second, & Third
2006	Regional – First, Second, & Third
2005	Regional – First
2004	Regional – First
2003	Regional – First, & Second
2001	Regional - Third

Table 4.5 American Society for Quality Student Certifications.

Year	CQIA	CQE	CSSGB	CSSBB
2008	2	1	17	2
2007	10	1	12	1
2006	3			1
2005	6	3		
2004	8	5		1
2003	9	4		
2002	26	1		

CQIA= Certified Quality Improvement Associate
CQE= Certified Quality Engineer
CSSGB= Certified Six Sigma Green Belt
CSSBB= Certified Six Sigma Black Belt

4.7 Program goals and Objectives

The objectives of the Industrial Engineering Program are to prepare its graduates to do the following:

- Be employed in jobs related to design, implementation, and improvement of systems in manufacturing and service sectors.
- Pursue graduate studies.
- Enjoy professional success because of the program's emphasis on solving real-world problems in industries and organizations in the Wichita metropolitan area.

The objectives of the Manufacturing Engineering program are to prepare its graduates to:

- Be employed in jobs related to design, planning and control, implementation, and improvement of manufacturing processes and systems.
- Pursue graduate studies.
- Enjoy professional success because of the program's emphasis on solving real-world problems in industries and organizations in the Wichita metropolitan area.

Following is the list of the current program outcomes selected as attributes that its graduates of both the Industrial Engineering and the Manufacturing Engineering programs will attain at the time of graduation:

1. Ability to apply knowledge of mathematics, science, and engineering.
2. Ability to design and conduct experiments, as well as to analyze and interpret data.
3. Ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
4. Ability to function on multidisciplinary teams.
5. Ability to identify, formulate, and solve engineering problems.
6. Understanding of professional and ethical responsibility.
7. Ability to communicate effectively.
8. Broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
9. Recognition of the need for, and an ability to engage in, life-long learning.
10. Knowledge of contemporary issues.
11. Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

4.8 Assessment, improvement and compliance

The four identified program constituents (Students, Alumni, Employers, and Faculty) have been, are, and will remain, involved in the process of program objectives development, evaluation, assessment, and revision. A set of assessment tools have been developed and are revised periodically as the program curricula are improved.

Table 14.6 Quantitative Assessment Tools Used.

Instrument	Purpose	Frequency
Prerequisite Assessment	Assess curriculum integration	Each course every semester
Core Competency Exam	Assess retention of material	At graduation
Senior Exit Survey	Assess student perception	At graduation
Alumni Survey	Assess effectiveness of curriculum	Every other year
Employer Survey	Assess effectiveness of curriculum	Every other year

The process for obtaining inputs from the four constituencies for formulation and revision of the Program Educational Objectives consisted of the following: faculty meetings, Industry Advisory Council meetings, IME Student Council meetings, Senior Exit Surveys, Alumni Surveys, and Employer Surveys. The steps in the process are listed in the following text box.

5.1 Information on student/employer needs

Students and employers form two of the three constituencies of the Industrial and Manufacturing Engineering (IME) department. The third constituent is the faculty. These constituencies were identified in the self assessment process developed as part of the accreditation review of the undergraduate programs. Student needs are formally assessed through Prerequisite Assessments, Core Competency Exams, Senior Exit Surveys, and Alumni Surveys. Other informal means are used to provide student input. The Student Advisory Board is made up of the current presidents of the student chapters of IIE, ASQ, SME, APICs, and Alpha Pi Mu. They sit on the Budget and Strategic Planning committee when decisions are made regarding the expenditure of student fees. Employer needs are formally assessed through both the Alumni Survey and the Employer Survey. Informally, the Industrial Advisory Committee provides direction to curricular issues at its semi-annual meetings. They along with project sponsors assess the project presentations of the Senior Design presentations. We use a formal rubric to guide their assessments and provide our programs with data for evaluation.

- Each Fall,
  - October
    - **Department chair** prepares a report summarizing Alumni Survey (of previous fall/spring), the Senior Exit Survey (of previous fall/spring), and the Industrial Advisory Board (IAB) Meeting actions (of previous spring).
    - A copy of the report is sent to the IAb for its review and input.
  - November
    - **Curriculum and Assessment Committee (CAC)**
      - ◊ Reviews chair's report.
      - ◊ Reviews Core Knowledge Exam results (of previous Spring).
      - ◊ Reviews prerequisite exam reports from instructors of current semester.
      - ◊ Prepares recommendations for revision, feedback to course coordinators, and update of curricular material.
  - December
    - **Department Faculty**
      - ◊ Reviews CAC's recommendations.
      - ◊ Discusses and approves curricular changes based on the recommendations of CAC
      - ◊ Implements changes adopted..
- Each Spring,
  - March
    - **Curriculum and Assessment Committee**
      - ◊ Reviews Core Knowledge Exam results (of previous fall).
      - ◊ Reviews pre-requisite exam reports from instructors (of previous fall).
      - ◊ Prepares recommendations for revision, feedback to course coordinators, and update of curricular material.
  - April
    - **Department Faculty**
      - ◊ Reviews CAC recommendations.
      - ◊ Approves revision/update of program objectives and objective target levels.
      - ◊ Implements changes adopted.
    - **Department faculty** discusses and approves curricular changes based on the recommendations of CAC.
    - **IAC** meets to discuss, among other issues, program objectives (evaluation/ review), curriculum/laboratory update, and any program-related issue that may arise.
- Odd Years, IME Department administers an Alumni Survey and Employer Survey, the results reviewed by the Curriculum Committee. College of Engineering administers the Alumni Survey, the results of which are

5. A statement that addresses student needs, employer demands, and how well the program prepares the students for their goals.

5.1.1 Alumni Survey

The Alumni Survey instrument was revised in spring 2001 and sent to all engineering graduates. In spring 2003 and 2005, the same survey was mailed to all graduates of the most recent two years. Only a few IME responses were received, and some were only partially completed. Therefore, it was decided to use an online survey service since 2005. The data indicates that all objectives are being achieved at a relatively high level: 92 percent of program graduates are employed in IE/MfgE-related jobs, 62 percent of graduates have completed or are currently enrolled in a graduate program, and all graduates appear to be successful (100 percent of them are employed). Tables 5.1 and 5.2 indicate that alumna of our programs perceive that their experience prepared them well to accomplish tasks they encounter in their careers.

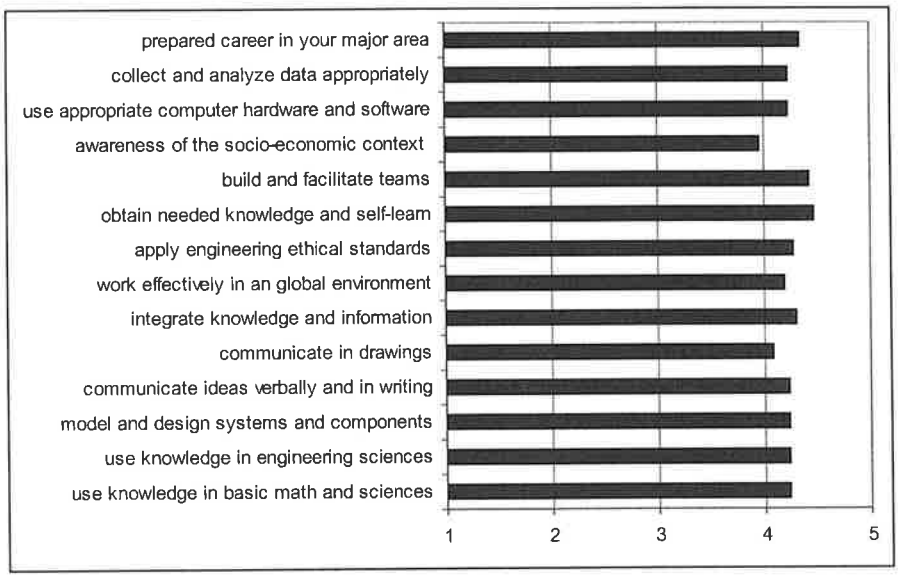

Figure 5.1 Average Rating of How UG Engineering Education Has Prepared Respondents to Perform Specific Tasks (1=extremely poorly, 5 extremely well). Spring 2007 Alumni Response

5.1.2 Employer Survey

The Employer Survey instrument was sent to companies who have hired WSU students. The survey consists of three sections. The first gathers general information on students. In the second section, questions are asked to evaluate program outcomes (Section 4.7). In the third section, questions are asked to assess the achievement of program objectives. The results of section three are shown in Table 5.2. A total of 14 responses evaluating 33 graduates of IE and MfgE programs were received. The results, as related to Program Educational Objectives, are summarized in Table 5.2. The results indicate that employers are generally satisfied with the performance of WSU graduates.

Table 5.1 Spring 2007 Alumni Response to Program Preparation.

(1= Extremely Well, 5 = Extremely Poorly)

	Evaluation Statements	Assessment
The degree to which the program has prepared me for these jobs (answer as many as relevant to you):		
	Design of systems	2.1
	Implementation of systems	1.9
	Improvement of systems	1.7
	Quality engineering	1.6
	Facilities management	2.1
	Man-machine systems	2.3
	Simulation	2.2
	Project planning	2.0
	Inventory management	2.2
	Ergonomics	1.9
	Optimization	1.9
	Other (specify)	
The degree to which the program has prepared me for graduate studies (degree or non-degree).		1.9
The degree to which emphasis in solving real-life problems in my degree program has helped me to succeed in professional life.		1.6

Table 5.2 Employer Survey Responses (2007).

Program Educational Objective	Response
How many WSU BSIE/BSMfgE graduates that you directly supervise are predominantly employed in jobs related to their preparation?	64%
How many WSU BSIE/BSMfgE graduates you directly supervise have pursued or are currently pursuing graduate studies (degree bound or just taking courses)?	30%
How many WSU BSIE/BSMfgE graduates that you directly supervise have participated in professional development activities (such as, attending workshops, seminars, short courses, conferences, etc.) during the past three calendar years?	61%
To what degree is the professional success of WSU BSIE/BSMfgE graduates you directly supervise due to their exposure in the curriculum to solving real-world problems?**(on a scale of 0 to 100)**	83
How many WSU BSIE/BSMfgE graduates that you directly supervise would you assess to be above average compared to all engineering graduates you directly supervise?	55%

5.2 Student Satisfaction

Various outcomes of the educational process required for achieving the program objectives have been identified and the IME department actively brings to bear all its resources on a plan (educational process) aimed at achieving the outcomes, assessing the success annually and modifying the plan using the feedback received to ensure achievement of the desired outcomes.

One measure of student satisfaction is students' perceptions of the advising process. In IME each student is assigned a faculty advisor. The results a survey taken by every IME student each time that they are advised is summarized in Table 5.3. The results indicate that the students are consistently advised in an effective manner.

Table 5.3 Student Advising Survey.

Question Number	Question	Spring 07 (31) (percent)	Fall 06 (19) (percent)	Spring 06 (7) (percent)
1	My overall advising experience was good.	94	100	97
2	It was easy to schedule an appointment with my advisor.	93	99	100
3	My advisor gave me good information on what courses to take.	96	99	100
4	My advisor took interest in my academic progress.	94	98	100
5	My advisor took interest in my professional career.	92	97	97
	Average Percent of All Questions	**94**	**99**	**99**

As part of the Senior Exit Survey each graduating senior rates their confidence in applying their knowledge to different domains. Figure 5.2 shows the level of confidence expressed by students in their knowledge in eight areas. Our objective is to maintain the level of confidence above 70% and we track this on an annual basis. This measure has stayed fairly constant over time.

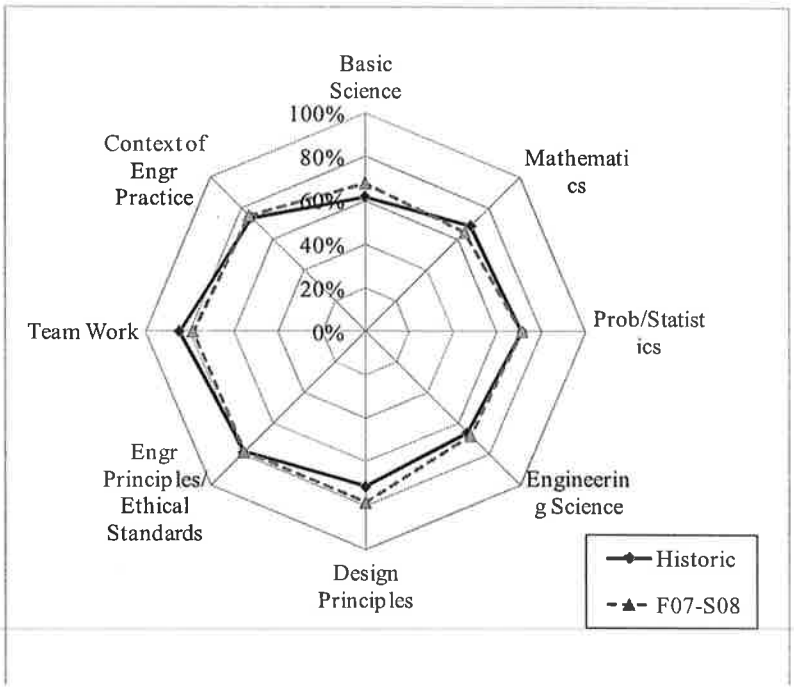

Figure 5.2 Student confidence in knowledge. Assessed for graduating seniors.

Figure 5.3 shows student confidence in their ability to perform seven general tasks that they may encounter on the job. Again program targets are to keep these at or above the 70% level. We have observed that these measures tend to vary to a greater degree than student confidence in knowledge (Figure 5.2).

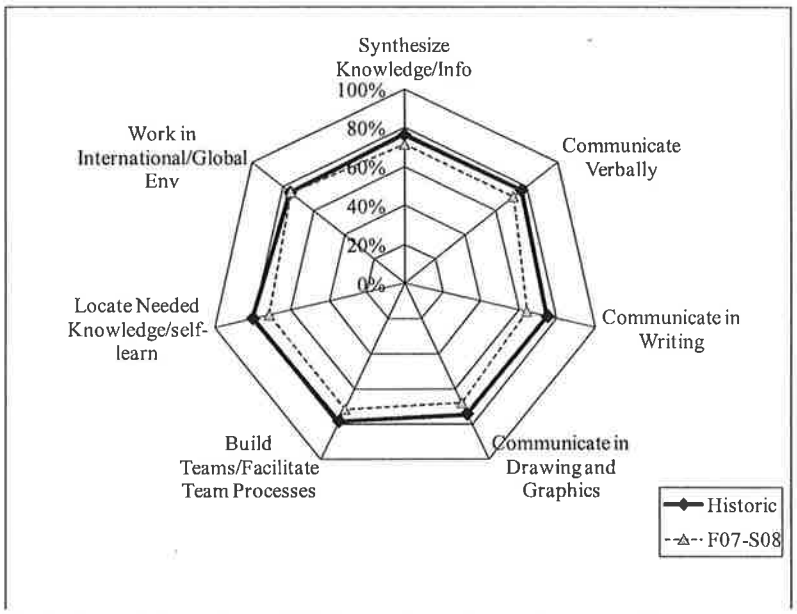

Figure 5.3 Student confidence in ability to perform task. Assessed from graduating seniors.

5.3 Changes in Programs tin response to Constituent Feedback

Each of the changes listed below was developed in response to a perceived need of *at least two* of our primary constituencies; industry, students, or faculty.

- IME 222 Engineering Graphics, changed computer graphics to CATIA, the local industry standard

- IME 258 Manufacturing Processes I, significantly revised content and laboratory experience in order to serve as an exciting introduction to Manufacturing Engineering.
- Cessna Manufacturing Laboratory. Significant equipment acquisition has improved the quality of student experience in several course laboratories.
- IME 556 Information Systems, course content and laboratory experience significantly revised in order to incorporate the new role of Industrial Engineers as managers of operational and strategic information.
- ME 576 Composites Manufacturing, a new course was developed with an extensive laboratory facility. It has been regularly offered as a require course in the MfgE curriculum and a popular elective in the IE curriculum.
- IME 676 Aircraft Manufacturing and Assembly, a new course was developed with an extensive laboratory facility. It has been regularly offered as a require course in the MfgE curriculum and a popular elective in the IE curriculum.
- IME 767 Lean Manufacturing, a new course graduate/undergraduate was developed and has been taught annually with team projects in local industry. It is a popular technical elective for both IE and MfgE student.
- IME 778 Machining of Composites. A new graduate/undergraduate course that is an elective for both IE and MfgE students.
- Accelerated BS-MSIE program.. a thesis only MSIE program has been developed for exceptionally qualified and motivated undergraduate students in IE.
- Minor in Manufacturing Engineering, has been developed primarily targeted at AE and ME students wishing to broaden their educational experience.
- Include approved Cooperative Education experience for up to 3 credits of technical elective.
- Add MIS 310 (VB.NET) as fulfilling computer programming competency.
- Numerous other changes such as adjustments to prerequisite and the published long range schedule of course offerings were made.
- In order to address the needs of students transferring into the Industrial Engineering and Manufacturing Engineering programs formal 2+2 programs have been developed and approved for:
    - Butler Community College
    - Cowley College
    - Universidad de Lima
    - Other regional colleges are in process including WATC

6. A statement that describes the service the program provides to the discipline, other programs at the university, the metropolitan area or Kansas, or other matters as appropriate.

All faculty members in the IME department are actively involved in research, as outlined in the earlier section on faculty productivity. This translates into service to the discipline in the form of editorships, organizing conference symposia, refereeing journal and conference publications and proposals, serving on proposal review committees, etc. Table 6.1 summarizes the contribution of the IME faculty in these aspects.

Table 6.1. IME Faculty Professional Service Record.

Category	2005	2006	2007
Seminars/Short Courses/workshop	36	21	20
Consultancies*	2	0	5
Other Speaking Engagements+	24	11	3
Board/Committee Service**	1	1	3
Attendance at conferences	#	#	9

* does not include reviewing of conference/journal papers or professional certification
\+ does not include conference presentations
** does not include WSU service

missing data

Dr. Abu Masud serves as an evaluator for two accrediting agencies (ABET and NCA). Dr. Krishnan serves as an evaluator for ABET. Dr. Gamal Weheba and Dr. Larry Whitman are Examiners for The Kansas Award for Excellence.

The aviation industry dominates the economy of Kansas, particularly that of Wichita. Not surprisingly, a good fraction of the research being carried out in the IME department is funded by the local aviation industries. Many of the projects are in manufacturing.

*7. **An assessment of the program's cost effectiveness as measured by such matters as cost per credit hour, peer comparisons, and other indicators.***

Table 7.1 Cost per credit hour for IME.

	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	5 Year Weighted Average
Cost/SCH	$271.70	$255.64	$274.18	$302.18	$320.21	$284.03

The cost per credit hour is presented in Table 7.1. The cost includes salaries and operating expenses.

Recently, a benchmarking assessment was performed by our department with the industrial (and manufacturing) engineering departments of the following universities in the mid-west region: University of Nebraska at Lincoln (NU), Kansas State University (KSU), University of Missouri at Columbia (UM), University of Oklahoma (OU), Oklahoma State University (OSU), University of Texas at Arlington (UTArl), University of Houston (UH) and Texas Tech University (TTU). Note that, except for UT at Arlington and University of Houston, none of the programs could be considered urban serving research universities like Wichita State.

The size of the program offered by the IME department is also a measure of its productivity. Using data from the ASEE data on college profiles, the size of Industrial and Manufacturing Engineering programs were compared for state schools in the central United States. Figure 7.1 indicates that the IME department is considerably above average in the total number of students. Data from the same source indicates that the number of faculty is equal to the mean of the region. This study was done for academic year 2006-2007.

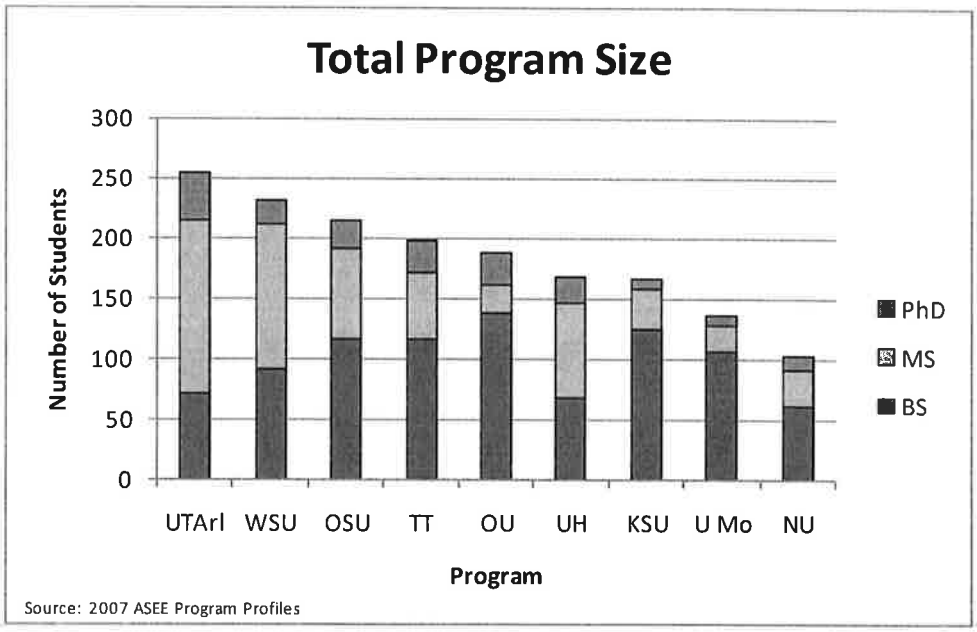

Figure 7.1 Total program size compared with regional Industrial Engineering programs.

Table 7.2 presents a comparison of the productivity of the same programs. Note that the Department of Industrial and Manufacturing Engineering compares very favorably with these programs with higher than average MS degrees per faculty and higher externally funded research per faculty. The MS degree per faculty is exceeded only by the University of Texas at Arlington and the research dollars per faculty is exceeded only by the University of Oklahoma.

Table 7.2. Summary of Productivity for Comparable Programs in Midwest.

University	Students/Fac			Degrees/Fac			External Funding
	BS	MS	PhD	BS	MS	PhD	
NU	6.2	3.0	1.1	1.6	1.1	0.0	$49,400
KSU	12.5	3.3	0.8	2.6	1.4	0.1	$54,900
U Mo	17.8	3.5	1.3	3.2	1.2	0.2	$30,333
OU	9.9	1.6	1.9	1.5	1.1	0.4	$137,714
UTArl	6.5	13.1	3.6	1.1	6.7	0.5	$17,636
TTU	8.3	3.9	2.0	1.8	1.9	0.4	$35,000
OSU	9.7	6.3	2.0	2.1	4.8	0.3	$45,250
Average	**10.1**	**6.7**	**1.8**	**2.0**	**1.3**	**0.5**	**$52,891**
WSU	**8.4**	**10.9**	**1.7**	**1.3**	**3.2**	**0.5**	**$99,220**

Source: ASEE Online Profiles

In summary, the programs offered by the Industrial and Manufacturing Engineering Department at Wichita State University have demonstrated effectiveness in responding to the needs of its constituencies by providing high quality programs, offered at convenient times, to a large number of students, by a high quality faculty. The cost data indicates that all of the programs are also very cost effective.

APPENDIX A: Statistical Data

Section I: Part A: Academic Instruction Expenditures

DESCRIPTION	2002	2003	2004	2005	2006	2007	2008
1. Salaries/Benefits	$1,102,492	$1,048,522	$1,033,851	$1,031,390	$1,115,847	$1,180,679	$1,174,019
2. Other Operating Exp.	$114,173	$71,682	$79,587	$121,111	$107,692	$84,990	$109,003
3. Total	$1,216,665	$1,120,204	$1,113,438	$1,152,501	$1,223,539	$1,265,669	$1,283,022

Section I: Part B: Student Credit Hour Production

DESCRIPTION	2002	2003	2004	2005	2006	2007	2008
1. Lower Division	1,924	1,901	1,772	1,708	1,710	2,065	1,913
2. Upper Division	1,422	1,056	853	806	827	810	1,202
3. Masters	1,016	1,257	1,324	1,164	1,166	1,343	1,280
4. Doctoral	116	168	112	136	118	124	193
5.Total	4,478	4,382	4,061	3,814	3,821	4,342	4,588

Section I: Part D: Percentage of Departmental SCH taken by:

DESCRIPTION	2002	2003	2004	2005	2006	2007	2008
1. Their Undergraduate Majors	16.2	17.2	15.6	19.8	15	1	1.9
2. Their Graduate Majors	45.5	43.8	39.8	35.2	43.1	0	0
3. Non-Majors	38.3	39	44.6	45	41.9	99	98.1

Section I: Part E: Departmental Faculty

DESCRIPTION	2002	2003	2004	2005	2006	2007	2008
1. Tenured/Tenure Track Faculty Head Count	10	11	11	10	10	9	9
2. Tenured/Tenure Track Faculty with Terminal Degrees	10	11	11	10	10	8	8
3. Total Tenured Faculty	3	6	6	7	7	6	7
Total Instructional Faculty FTE in Department	10	11	11	10	10	9	9

Section I: Part F: Actual Instructional FTE

DESCRIPTION	2002	2003	2004	2005	2006	2007	2008
1. Tenured/Tenure Track Faculty	9.87	10.08	11	8.75	9.96	10.68	10.8
2a. Instructor of Record (IOR)	0.75	1	0.92	0.68	0.92	0.44	1
2b. Not Instructor of Record	3.65	3.75	0.88	1.35	1.53	0.2	0.6
3. Other Instructional FTE	0.4	2.5	1.5	2	1.75	1.5	1.1
4.Total FTE	14.67	17.33	14.3	12.78	14.16	12.82	13.5
5. SCH generated by Tenured/Tenure Track Faculty	1,715	1,623	1,495	1,262	969	1,403	1,581
6. SCH generated by GTA's (IOR)	111	177	273	117	207	210	372
7. SCH generated by Other Instructional Faculty	56	177	177	285	383	363	195
8. Total SCH	1,882	1,977	1,945	1,664	1,559	1,976	2,148
9. Average SCH per Tenured/Tenure Track Faculty	173.76	161.01	135.91	144.23	97.29	131.37	146.39
10. Average SCH per GTA (IOR only)	148.00	177.00	296.74	172.06	225.00	477.27	372.00
11. Average SCH per Other Instructional Faculty	140.00	70.80	118.00	142.50	218.86	242.00	177.27
12. Average Overall SCH per FTE	128.29	114.08	136.01	130.20	110.10	154.13	159.11

Section II: Part A: Majors in the Discipline Engineering Management

DESCRIPTION	2002	2003	2004	2005	2006	2007	2008
1. Freshmen/Sophomores (optional)	0	0	0	0	0	0	0

2. Jrs., Srs., 5th Year Majors	0	0	0	0	0	0	0
3. Masters	11	9	10	10	16	18	17
4. 1st Prof / Specialist / Certif.	0	0	0	0	0	0	0
5. Doctoral	0	0	0	0	0	0	0

Section II: Part A: Majors in the Discipline, Industrial Engineering

DESCRIPTION	2002	2003	2004	2005	2006	2007	2008
1. Freshmen/Sophomores (optional)	18	15	12	6	12	14	26
2. Jrs., Srs., 5th Year Majors	44	43	36	42	38	37	49
3. Masters	131	137	121	106	87	81	103
4. 1st Prof / Specialist / Certif.	0	0	0	0	0	0	0
5. Doctoral	13	12	14	14	19	19	21

Section II: Part A: Majors in the Discipline Manufacturing Engineering

DESCRIPTION	2002	2003	2004	2005	2006	2007	2008
1. Freshmen/Sophomores (optional)	4	5	5	2	2	6	4
2. Jrs., Srs., 5th Year Majors	8	7	9	7	6	7	13
3. Masters	0	0	0	0	0	0	0
4. 1st Prof / Specialist / Certif.	0	0	0	0	0	0	0
5. Doctoral	0	0	0	0	0	0	0

Section II: Part B: ACT Scores of Undergraduate Jrs.,Srs Industrial Engineering

DESCRIPTION	2002	2003	2004	2005	2006	2007	2008
1. Average ACT Composite	22.1	22.1	22.8	23.3	23.8	23.8	23.8
2. Low ACT	9	9	12	15	15	13	15
3. High ACT	30	30	32	31	31	27	29
4. Number Reporting an ACT Score	19	20	16	16	16	12	19
5. Percent Reporting ACT Score	43.18%	46.51%	44.44%	38.10%	42.11%	32.43%	38.78%

Section II: Part B: ACT Scores of Undergraduate Jrs.,Srs Manufacturing Engineering

DESCRIPTION	2002	2003	2004	2005	2006	2007	2008
1. Average ACT Composite	18.6	17.3	20	23	19.5	25	22.5
2. Low ACT	12	12	12	17	14	22	22
3. High ACT	25	26	26	26	25	28	23
4. Number Reporting an ACT Score	5	4	5	4	2	3	2
5. Percent Reporting ACT Score	62.50%	57.14%	55.56%	57.14%	33.33%	42.86%	15.38%

Section II: Part C: Degrees Conferred Engineering Management

DESCRIPTION	2002	2003	2004	2005	2006	2007	2008
1. Associate	0	0	0	0	0	0	0
2. Baccalaureate	0	0	0	0	0	0	0
3. Masters	3	3	0	2	4	6	2
4. First Prof / Specialist / Certificate	0	0	0	0	0	0	0
5. Doctorate	0	0	0	0	0	0	0

Section II: Part C: Degrees Conferred Industrial Engineering

DESCRIPTION	2002	2003	2004	2005	2006	2007	2008
1. Associate	0	0	0	0	0	0	0
2. Baccalaureate	8	14	8	11	11	7	13
3. Masters	28	19	35	57	25	34	30
4. First Prof / Specialist / Certificate	0	0	0	0	0	11	8
5. Doctorate	2	1	2	3	0	4	6

Section II: Part C: Degrees Conferred Manufacturing Engineering

DESCRIPTION	2002	2003	2004	2005	2006	2007	2008
1. Associate	0	0	0	0	0	0	0
2. Baccalaureate	0	1	1	2	1	2	1
3. Masters	0	0	0	0	0	0	0
4. First Prof / Specialist / Certificate	0	0	0	0	0	0	0
5. Doctorate	0	0	0	0	0	0	0