Faculty Meeting Agenda  
(Revised 10/12/01)  
15 October 2001

Call to order at 4:10 pm, University Center Room 308  
Refreshments will be served at 3:30 pm in the Faculty Lounge of the University Center

1. Professor Mary Nicholas, Chair, Modern Languages and Literature, will give the memorial resolution for Dr. Arthur P. Gardner, professor emeritus of modern languages and literature

2. Corrections or approval of the 24 September 2001 faculty meeting minutes

3. Unfinished Business

4. New Business

5. Committee Reports  
   > Faculty Steering Committee – Professor Judith Lasker

6. President’s Report

7. Provost’s Report

8. Adjournment

Please note the following meeting dates for Fall 2001 and Spring 2002:

3 December 2001  
25 March 2002

4 February 2002  
6 May 2002

All meetings will begin at 4:10 p.m. in the University Center Room 308, preceded by refreshments served at 3:30 p.m. in the Faculty Lounge of the University Center.
Lehigh University

MINUTES OF THE FACULTY MEETING

15 October 2001

Presiding: Gregory Farrington (University Center Room 308)

President Farrington called the meeting to order at 4:10 PM.

1. Memorial Resolution. A tribute to Arthur P. Gardner, late Professor of German Emeritus, was read by Professor Mary Nicholas, Chair of Modern Languages and Literature, who then MOVED that her remarks be incorporated in these minutes [see Attachment 1]. The President declared the motion APPROVED by acclamation and the faculty STOOD for a moment of silence in memory of Arthur P. Gardner.

2. Minutes. The minutes of the September 24, 2001 faculty meeting were APPROVED.

3. Committee Motions. Professor Elizabeth Fifer, on behalf of the Educational Policy Committee, made three motions. First, she MOVED a departmental name change for Industrial Engineering. The motion was SECONDED [see Attachment 2]. Then, she MOVED a new degree in Industrial Engineering. The motion was SECONDED [see Attachment 3]. Finally, she MOVED approval of a new undergraduate degree in Computer Science and Business. The motion was SECONDED [see Attachment 4].

Professor Frank Gunter asked if the "Ten-Day Rule" was relevant. Registrar Bruce Correll stated that it was not.

Professor Ed Kay inquired about the Humanities and Social Sciences requirements for the Computer Science and Business degree. Professor Jim Hall noted that the degree required a total of 12 credit hours in Humanities and Social Sciences – 6 credit hours in each.

All three motions were APPROVED.

4. Unfinished Business: None.

5. New Business: None.
6. **Committee Reports.** Professor Judith LASKER, on behalf of the Faculty Steering Committee, provided an update. Professor LASKER noted that the Equal Opportunity and Harassment task force is up and running and welcomed input from the faculty. The R&P subcommittee is preparing for the next task force to be formed. A report on employment policy will be on the president’s desk tomorrow morning.

FSC is seeking input all the way through its processes and will eventually come back to the faculty with proposals. Faculty may communicate with the FSC via its website. Two more task forces will be formed—one on student conduct and one on athletics.

Professor LASKER concluded by stating that FSC is seeking ways to better recognize faculty who have had significant impacts on students’ lives.

7. **President’s Report.** President FARRINGTON began his remarks by noting that this is a period of intense activity with Founder’s Day, a meeting of the Board of Trustees, and interactions with alumni all occurring on the same weekend.

He stated that the trustees’ meeting went very well. Deans Mohamed el-Aasser and Sally White gave the trustees reports on the directions of the Rossin College of Engineering and the College of Education. For the February trustees’ meeting, three or four academic areas will be represented by the faculty.

Renovation/construction/renewal of campus buildings will be a focus of the February trustees’ meeting and beyond. The goal is to establish a priority order for brick-and-mortar investments over the next 3-5 years. The renovations of Coppee Hall and the IPD building are imminent. The Varsity House groundbreaking was Saturday. Campus Square is on schedule. It has an “overlay” zone with commercial enterprises on one side.

Numerous Federal and State government funding initiatives are underway for several colleges with all requests nicely on track. These initiatives could have extraordinary impacts.

Professor Gunter noted that the motions passed today will require 11 new faculty. He asked if these would be additions to the existing faculty or shifts of faculty resources.

The president affirmed his commitment to a faculty size that makes sense overall. Over a reasonable period of time, he said he would love to see the faculty grow. That will, however, require the equalization of teaching
loads across colleges.

As an example, the president observed that the seed money from the Lehigh 20/20 fund for I E. and Computer Science will hopefully produce the revenue to support these programs long-term. The president did state that there will inevitably be some reallocations of faculty resources

8. **Provost’s Report.** Provost Yoshida first stated that the Computer Science and Business program will have annual evaluations to determine if goals are being met. He emphasized the importance of investing in new faculty, noting that 20/20 funded two new positions in Computer Science and that there will be three new searches in Computer Science this year.

The expectation is that the number of students will increase, indirect cost recovery will increase and graduate tuition revenues will increase. If these occur a permanent funding base will exist.

The provost noted the repositioning of the Rossin College of Engineering to the area of Information Technology and made light of the College of Business investments in Business Information Systems and Accounting Information Systems. He also stated that he believed the College of Business was under funded.

A total of 34 faculty searches are underway this year – 17 in Information Technology.

The provost is meeting with Vice President Peggy Plympton regarding benchmarking departments for faculty salaries.

The provost also made note of two documents distributed to the faculty: first, a report on Lehigh 20/20 [see Attachment 5]; and, second, the strategic planning document for academic affairs [see Attachment 6].

Provost Yoshida noted that he had turned back very few recommended offers to new faculty during the past year.

President Farrington reiterated that the Lehigh 20/20 program is only a year old. It is hardly over with plenty of opportunities left. He invited all faculty with ideas to meet with the provost. He did emphasize that accountability makes a difference in all things.
The meeting stood adjourned at 4:55 PM.

Stephen F. Thode
Secretary to the Faculty
304 Rauch Business Center
(610) 758-4557
FAX: (610) 832-9415
E-mail: sft@
Memorial Resolution for
Arthur P. Gardner
Lehigh University
15 October 2001

The department of Modern Languages and Literature and the College
of Arts and Sciences note with sorrow the death of Arthur P. Gardner,
Professor Emeritus of German, on July 26, 2001, in Acton. A native of
Scranton, Pennsylvania, Arthur Gardner was born on April 18, 1922. He
graduated summa cum laude from Duke University in 1944 and received an
M.A. from Harvard University in 1945. His 1950 Ph.D., also from Harvard,
was devoted to the works of Heinrich Mann. Professor Gardner taught at
Amherst, Harvard, and the University of California at Riverside before
coming to Lehigh as an assistant professor of German in 1958. He was
promoted to associate professor in 1966 and to full professor in 1979. He
retired in 1984.

Known for his breadth of culture and his devotion to teaching,
Gardner gave long and generous service to Lehigh as adviser to the German
House and as director of a unique study abroad travel program that took
students to Hamburg and Bonn. Gardner was an accomplished singer of
German Lieder and opera himself, and he had a floor-to-ceiling collection of
recorded music that he shared generously with students and friends. He was
a popular instructor, and his skill in the classroom earned him an award for excellence in teaching from the college. A colorful character whose appearance on campus in a cape made fashion history at Lehigh, Gardner was a unique individual whose tenure at Lehigh will long be remembered. His friends on campus and abroad will miss him dearly.

Respectfully submitted,

Mary A. Nicholas, Chairperson,
Modern Languages and Literature
Maria Andrade
Marie-Sophie Armstrong
Marie Hélène Chabut
Constance Cook
Kiri Lee
Linda Lefkowitz
David Pankenier
Antonio Prieto
Vera Stegmann
Lenora Wolfgang
Memorandum

Date: August 16 2001

From: S. David Wu, Chair, IMSE Department

To: RCEAS Academic Policy Committee

Subject: Departmental Name Change

On behalf of the department of Industrial and Manufacturing Systems Engineering, I herein request to change the name of our department to "Industrial and Systems Engineering." The name change reflects a broadening scope of our departmental activities in the past decade, and our plan to further develop the following three research and educational areas:

- Manufacturing Systems and Processes,
- Operations Research and Logistics, and
- Information and Systems Engineering

With the renewed focus of the department, the name "Industrial and Manufacturing Systems Engineering" no longer reflects truthfully the composition of the departmental faculty, their research expertise, and the department's overall educational goals. More importantly, the new name reflects the strategic direction for the department for decades to come. This strategic direction has been specified in IMSE strategic plan, and the departmental Lehigh 2020 initiative proposal. The strategic direction has been strongly endorsed by the 2000 departmental visiting committee, and later by deans Chen and El-Aasser, the provost, and the president. In spring 2001 the IMSE faculty voted to adopt the new departmental name stated above.

Background and Rationale

Lehigh Industrial Engineering has always been recognized as a leading program in the U.S. with a strong reputation in manufacturing systems and processes, and more recently in logistics and operations research. The faculty recognizes that to remain a leading academic department we must go through continuous renewal and provide the most relevant and high quality educational training to our students. Our proposed new directions follow major trends of the industry and the evolution in the field of Industrial Engineering. Over the past thirty years, Industrial Engineering went through major evolutionally changes. The earlier development of IE focused on improving mechanical systems and processes, rooted in manufacturing and materials science. The scope of IE grew over the years as U.S. industry turned its attention to scientific approaches to
management, and later the adoption of systems methodologies such as simulation, mathematical modeling, quantitative and computational analysis for the purpose of continuous efficiency improvement. From the 1970's to the 1990's these methodologies have been successfully transformed from manufacturing processes, to plants, to enterprises, to supply chains, and to service organizations. It is now commonplace to see banks, hospitals, airlines, venture capital firms, and transportation/logistics organizations make use of the systems methodologies for planning, business analysis, and running their core business. This trend is clearly reflected in student placement records, where more than 60% of our students now start their career in the service economy. While the transition from the manufacturing to the service sector continues, the next critical phase of transition for industrial engineering is to embrace the rapid development of information science and technology. The transition will be vital for the education of our students, for the continuous growth of faculty research and scholarship, and, we believe justifies significant adjustments in our academic programs.

The name “Industrial and Systems Engineering,” reflects these new trends while preserving the identity of the discipline. The name has been used in several Industrial Engineering programs in the U.S., including top-ranked programs such as Georgia Institute of Technology, University of Florida, and Virginia Tech. The name reflects the synergy between the manufacturing/process oriented “Industrial Engineering” component, and the quantitative/methodological/information oriented “Systems Engineering” component. This properly represents our faculty composition as well as future directions as stated above.
B.S. in Information and Systems Engineering

-A New Degree Program to be Offered by Industrial and Systems Engineering

1. Summary

We propose to establish a Bachelor of Science degree program in Information and Systems Engineering (ISE) to be offered by the Department of Industrial and Systems Engineering. The goal of the program is to produce engineers who receive rigorous training in quantitative and computational analysis skills, understand the complex facets of information-centric systems, and creatively integrate information technology in industrial, service and financial organizations. To this end, the degree program constitutes a focused technical curriculum with three core areas: (1) Information Economics, (2) Quantitative Systems Analysis, and (3) Information Technology. Combining the core areas with engineering, science and business background courses, the curriculum is designed to be an ABET accredited engineering degree. Graduates of this program will be systems engineers and IT specialists sought by virtually all organizations, especially in consulting, multi-national operations, transportation logistics financial institutions, and telecommunications. The curriculum also provides a solid background for graduate studies in computational science, operations research, financial engineering, or business administration.

The new ISE program will be integrated into the Industrial Engineering undergraduate program as a distinctive new component. While the current B.S.I.E. degree program will maintain its focus on manufacturing, production and operations, we expect the two programs to cross-fertilize: the resources, industry connections, and national reputation of Industrial Engineering will help to launch the ISE program, while the ISE program will help to enhance the IIE curriculum by strengthening the computational science and information technology components.

2. Rationale

Our broader goal is to strive for a level of academic excellence in Industrial and Systems Engineering to be recognized nationally among the "top 10." The overall strategy is to leverage our traditional strength and reputation, while taking bold, innovative steps on new frontiers of the field. Over the past decade, this strategy has been successfully implemented in developing the area of manufacturing logistics and operations research, leveraging our traditional strength in manufacturing. This new area has already enjoyed significant growth and national recognition. Today, more than 80% of the research, scholarship and grant activities in the department are generated from manufacturing logistics and operations research. To continue this process of renewal and innovation, we have identified Information and Systems Engineering as the next strategic area of development. This will allow the department to provide significant support in Lehigh's strategic direction in Systems Engineering, as well as Information Science and Technology. Collaboration with The College of Business and Economics and Computer Science and Engineering is underway, and will grow significantly as the program matures.

New communications technologies, the web and recent advances in computing are profoundly changing the very nature of business and industry. The increasingly complex intertwining of organizations coupled with continued automation of business processes creates new and complex large-scale systems of enterprises, people, capital equipment and information. With these changes comes the need for engineers capable of understanding and integrating these emerging systems. The needs extend far beyond expertise in the micro level details of computer hardware and software, requiring instead systems integration, large-scale optimization and control, and knowledge of the operations of industry. These needs are consistent with the traditional skills of Industrial and Systems Engineers. The department is in an ideal position to move quickly toward establishing a national presence in this area of critical importance based on our current strengths.

We believe that establishing strong programs in Information Science and Technology will enhance the reputation of all such programs at Lehigh. While our proposed program has strong synergy with programs in Computer Science (CS) and Business Information Systems (BIS), it fits into a unique niche that is distinct from CS and BIS programs. The proposed ISE degree is designed to be an ABET accredited engineering degree. It differs from Computer Science as the curriculum focuses on the systems methodology, quantitative skills, and the engineering training required to analyze and integrate information technology into engineering systems and large-scale organizations. On the other hand, ISE differs from Business Information Systems in that it emphasizes analytical, quantitative and computing tools building on the foundations of mathematics, modeling and simulation, and systems science methodologies. It is the combination of the systems perspective, analytical focus and training in computing that sets
the ISE education apart. One may observe that there is a broad trend in the engineering community to expand in this direction. We may point to the recent establishment of the Engineering Systems Division at MIT, the new Systems Engineering Program at Cornell University, and the appointment of systems scientists (specializing in Operations Research) as engineering dean at MIT and Northwestern. The time is ripe as we will be among only a few leading institutions (including Cornell and Georgia Tech) to develop a quantitatively focused information and systems program within the college of engineering.

3. Key Innovative Components of the Program

In the following, we outline the core components of Information and Systems Engineering.

Information Economics: To study the formulation, structure, and operational dynamics of information-centric systems in the context of industrial organizations, service sector economics, and financial institutions. Topic areas range from fundamental theory and methodologies in systems science and engineering, to issues in complex supply networks, e-Business, electronic marketplaces, and financial engineering. This area of concentration is based on the solid foundations of science and economics through which we envision the long-term development of, and the profound implications of modern information systems. Education and research collaboration with the College of Business and Economics is already underway. The CBE group brings expertise in various business contexts, while the industrial engineering group provides the science-engineering perspectives with analytical and statistical tools and an intimate knowledge of large-scale industrial and service organizations.

Quantitative Systems Analysis: To study operations research and computational tools for analyzing complex systems and their information components. Topic areas include mathematical programming, optimization, decision analysis, large-scale modeling and simulation, decentralized decision processes, stochastic processes, sequencing and scheduling, parallel and distributed algorithms, and algorithm design. This area of concentration forms the methodological base for the design, integration, implementation, and management of information systems in large-scale organizations. Relying on a strong base in mathematical and computing techniques, this area has strong synergy with the department’s existing strength in logistics and operations research.

Information Technology and Applications: To study computer and communication technologies needed to design and implement information system applications. A specific focus will be the applications of information technology in manufacturing and business environments, including electronic commerce, supply chain and enterprise information systems, manufacturing information systems, and intelligent manufacturing control. This area concentrates on the technological aspects of modern information systems such as database systems, software development, and web-based systems. Curriculum and research collaboration with Computer Science and Engineering is expected.

4. Leadership

The primary leadership of our proposed academic programs will be carried out by the established departmental structure in Industrial and Systems Engineering. With close involvement of faculty committees, the department chair will assume main responsibilities for overseeing program development, faculty recruiting, performance assessment, and status monitoring. It is imperative that the new program and the faculty additions show strong synergy with existing strengths in the department and other related programs at Lehigh.

5. Collaborative Support and Interaction with Business and Computer Science

Collaboration with the College of Business and Economics has been initiated at the research as well as curriculum levels. The CBE collaboration provides essential business context for research and education in information and systems engineering. While the topic area addressed by the ISE program tends to have a stronger methodological, modeling and systems emphasis, the CBE element works to broaden these perspectives and demonstrate their relevance in the business context. The Computer Science element provides a strong technological base for information and systems engineering. Since the computer science and engineering department will be expanding in the next several years, the nature and formats of our collaboration is not as well defined. Through initial interactions with the current CS faculty, it is clear that curriculum level collaboration in the area of computer programming and software will be essential.
6. External Reviews

An earlier version of the ISE program design was included in a departmental Lehigh 2020 proposal reviewed by a distinguished panel of external reviewers as follows:

Dr. Jane C. Ammons, Professor, ISyE Department, Georgia Institute of Technology
Dr. John R. Birge, Dean, McCormick School of Engineering and Applied Science, Northwestern University
Dr. Thor J. Hodgson, J. Ryan Professor of IE, North Carolina State University, National Academy of Engineering
Mr. Richard S. Wasch, '71, Partner, Accenture (formerly Anderson Consulting)

The reviewers provided significant and valuable input, which helps the proposal take its current shape. They strongly endorsed the concepts and the market needs of such programs, and recommended the design of the program toward ABET accreditation. For example, Dean Birge (Northwestern) commented: "This proposal addresses an important area where many industrial engineering graduates now find employment. The growth of this economic sector is certainly clear; academic programs should prepare students to meet it. The proposal addresses the issues about differentiation from CS and management schools by explaining the emphasis on a systems approach and use of more sophisticated tools ... The department must face the question of whether to have a non-ABET accredited degree .... Without accreditation, students may face some problems in placement and would particularly have problems in achieving professional registration if they do not have an ABET accredited degree."

Professor Ammons (Georgia Tech) stated in her report: "Establishing a relevant program in information engineering is an 'opportunistic' development for Industrial & Manufacturing Engineering at Lehigh University, demonstrating innovative leadership of changes that are currently evolving in top-tier academic programs, while providing highly qualified graduates to meet the business needs of today and tomorrow. Overall, I find the proposed program to be well-thought-out and complementary to Lehigh's existing programs for Industrial and Manufacturing Systems Engineering, computer science and business. There is high potential for success of the proposed programs, a terrific and timely opportunity for Lehigh University." She also caution "the devil is in the details," and suggested various programmatic changes.

Professor Hodgson (NC State, NAE) stated: "I've read the report and can only praise it. It is right on the money with respect to the recommendations of the visiting committee. It is simply a reflection of the direction the faculty of the department have taken over the last 10 years. It is exactly what the market is looking for. Properly marketed, it will attract many new students. You have gone from strength (manufacturing) to strength (systems) ..." He cautioned: "I still worry about the loads placed on the faculty. It is clear from the data and personal observation that they are stretched very thin. Unless the university fully buys into this at the highest levels and commits to the necessary faculty, I believe that to do this is a mistake."

Mr. Wasch (Accenture): "I believe the proposed degree programs in Information and Systems Engineering are both timely and extremely important. As a matter of fact, I think a degree program like this is long overdue at Lehigh. My son is currently in the process of making college selections and we have seen Information Systems type of programs. IE is the only discipline that integrates engineering, business, quantitative analysis and information systems in the same curriculum. The systems engineering aspects are unique and will complement well with the real needs in the industry. From a recruiter's point of view, establishing a program such as you have proposed will give Lehigh a significant edge, as there are very few programs like this around the country. It provides a well-rounded technical education, it provides the necessary modeling and mathematical skills, and it provides in-depth knowledge in information technology."

7. Competitive Analysis

Competing programs to the proposed ISE degree are top-ranked Industrial Engineering or Systems Engineering Programs that have an Information Systems component. We found that the proposed ISE degree is a distinctive curriculum compared to other such programs. We found few programs that offer a similar course of study, even though the names of the programs may be similar. The degree requirements for the most similar curriculum are found in Case Western Reserve University, the US Naval Academy, and the programs are in the planning stage at Cornell University, Georgia Tech, and USC.
School
(Similar Curriculum in place or in planning):
Cornell University
Georgia Institute of Technology
University of Southern California
Case Western Reserve
US Naval Academy

Competitive programs with Information Systems or Systems Engineering Components:
Stanford University
Harvard University
Northwestern University
University of Pennsylvania
Columbia University
University of California Berkeley
University of Arizona
University of Florida
Rensselaer Polytechnic Institute
US Military Academy
University of Virginia
Washington University-St Louis - System Science Engineering

8. Employment Opportunities and Market Analysis

It has been shown over and again that the enrollment in engineering programs has strong ties with reputation, the accreditation status, and the employment market. We believe that complimentary new programs in Information Science and Technology will enhance the reputation of all such programs at Lehigh. We have addressed the accreditation issue previously, in the following, we use the employment information provided by Lehigh’s Career Services to assess the potential job market for ISE majors. Our interactions with Career Services lead us to believe that the ISE degree majors will attract employers who traditionally recruit Industrial Engineers, Computer Engineers, Computer Science, and Business Information Systems majors.

The industrial engineering class of 2000 accepted jobs in the industry sectors listed in the following tables. This shows a strong affinity to the consulting firms, while the average salary level indicates that there is a significant interest and promising career outlook in communication services, banking, computers, and business equipment. We expect a much higher percentage of ISE students to be employed by these industries. As the economy continues to shift toward service sector opportunities, the needs for systems professionals will be further amplified.

INDUSTRIAL ENGINEERING CLASS OF 2000
JOBS ACCEPTED BY INDUSTRY TYPE (RANKED BY AVG SALARY)

<table>
<thead>
<tr>
<th>Industry Type</th>
<th>Percentage</th>
<th>Avg Salary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication Services</td>
<td>5%</td>
<td>$60,000</td>
</tr>
<tr>
<td>Banking (Commercial)</td>
<td>5%</td>
<td>$52,500</td>
</tr>
<tr>
<td>Consulting Services</td>
<td>27%</td>
<td>$50,500</td>
</tr>
<tr>
<td>Chemical, Drug &amp; Allied Products</td>
<td>2%</td>
<td>$50,000</td>
</tr>
<tr>
<td>Computers &amp; Business Equipment</td>
<td>2%</td>
<td>$50,000</td>
</tr>
<tr>
<td>Automotive &amp; Mechanical Equipment</td>
<td>8%</td>
<td>$45,200</td>
</tr>
<tr>
<td>Financial Services</td>
<td>5%</td>
<td>$43,000</td>
</tr>
<tr>
<td>Building Materials &amp; Construction</td>
<td>5%</td>
<td>$43,000</td>
</tr>
<tr>
<td>Amusements/Recreation/Fast Food</td>
<td>5%</td>
<td>$42,500</td>
</tr>
<tr>
<td>Other Service Employers</td>
<td>5%</td>
<td>$41,263</td>
</tr>
<tr>
<td>Electrical/Electronic Equipment</td>
<td>8%</td>
<td>$41,167</td>
</tr>
<tr>
<td>Others (e.g., transportation, advertising, education)</td>
<td>18%</td>
<td></td>
</tr>
</tbody>
</table>

Industrial Engineers, Computer Engineers and Computer Science majors typically attract employers from a broader range of industries than other engineering majors. However, during the abrupt economic downturn of January to
June 2001, we saw a sharp downturn in recruiting activity for these majors. Furthermore, at least ten corporations actually reneged on offers and many other firms cut starting salaries and/or pushed back start dates. In 2000-2001's, only 300 companies recruited IE's, CompE's and Comp Sci's compared to 410 in 1999-2000. The next table (statistics collected by Career Services) displays the number of companies sending recruiters to Lehigh specifically for industrial engineers vs. those recruiting for other disciplines. This data indicates a high demand for the skills developed in the industrial engineering curriculum; it also shows the greatest resiliency in an economic downturn.

<table>
<thead>
<tr>
<th>Recruiting Year</th>
<th>Industrial Engineers</th>
<th>All Engineers</th>
<th>All Majors</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000-2001</td>
<td>1.7</td>
<td>0.9</td>
<td>1.4</td>
</tr>
<tr>
<td>1999-2000</td>
<td>2.5</td>
<td>1.4</td>
<td>1.7</td>
</tr>
</tbody>
</table>

Our interactions with Lehigh's admission officers also indicates that the general demand for an "information system," and "systems engineering" degree is increasingly high and they expect that the proposed ISE degree program will be "very easy to sell."

8. Resource Implications

We expect the new ISE degree program to attract 10-15 new students per year (or 40 total) to Lehigh after reaching steady state. In addition, we approximate approximately 25-30% of future industrial engineering majors to select the ISE major instead. This means the proposed ISE program will have approximately 80 majors, or up to 27 majors per class. As part of the Lehigh 2020 proposal, we have completed detailed financial and faculty load analyses. We have requested an increase of six faculty members and a technical staff to cover the additional load. The Lehigh 2020 plan has received initial approval by the administration. In AY2000-2001, one new faculty member has been hired under the 2020 plan.
Appendix. Proposed Curriculum for B.S. in Information and Systems Engineering

Objective: To create a bachelor of science degree program that produces graduates who understand the complex facets of modern information systems, and the integration of these systems in industrial, service and financial organization. The degree program constitutes a broad based curriculum focusing on three core areas: (1) Information Economics, (2) Quantitative Systems Analysis, and (3) Information Technology. The core areas will be coupled with general engineering and business background courses.

The program will follow the general requirements of all engineering degree programs in the College of Engineering and Applied Science:

- Common freshman year
- HSS program (23 credits) including 10 credits of required courses (Engl 1, Engl 2, and Eco 1) and 13 credits of electives that provide for breadth and depth
- Math 205 Linear Methods (3) is required
- Engr 1 Engineering Computations (3) is required
- Engr 2 Introduction to Engineering (3) is required
- Free Electives (6 credits)

Main requirements of the B.S. degree program are outlined in the following pages. The four-year layout of the degree program is summarized in Table 1. The inclusion of computer science (CS) and business information systems (BIS) courses has been communicated to, and will be coordinated with the CS and BIS faculty. Table 2 provides the ABET course classifications and totals.
# Proposed B.S. in Information and Systems Engineering

## Degree Requirements

<table>
<thead>
<tr>
<th>Area</th>
<th>Credits</th>
<th>Courses/Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>English Composition</td>
<td>6</td>
<td>Engl 1 and 2 or equivalent</td>
</tr>
<tr>
<td>Humanities/Social Sc.</td>
<td>17</td>
<td>HSS program described by the College of Engineering and Applied Science including:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eco 1 Principles of Economics (4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HSS electives (13 credits)</td>
</tr>
<tr>
<td>General Computing</td>
<td>11</td>
<td>Engr 1 Engineering Computations (3)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Csc 17 Structured Programming and Data Structures (4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IE 1yy Algorithms in Systems Engineering (3)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IE 1xx Algorithms in Systems Engineering Laboratory (1)</td>
</tr>
<tr>
<td>Mathematics</td>
<td>21</td>
<td>Math 21, 22, 23 (Calc I, II, and III) (4 each)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Math 205 Linear Methods (3)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IE 111 (Probability and Statistics) (3)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IE 121 (Applied Engineering Statistics) (3)</td>
</tr>
<tr>
<td>Science Core</td>
<td>15</td>
<td>Chem 21 22 Chemistry I and Laboratory (5)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Phy 11, 12 Physics I and Laboratory (5)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Phy 21, 22 Physics II and Laboratory (5)</td>
</tr>
<tr>
<td>Engineering Core</td>
<td>8</td>
<td>Engr 2 Introduction to Engineering (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ECE 81 Principles of Electrical Engineering (4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mech 2 Elementary Engineering Mechanics (3)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mat 33 Engineering Materials and Processes (3) or</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MSE 104 Thermodynamics I (3)</td>
</tr>
<tr>
<td>Info Economics</td>
<td>9</td>
<td>Acct 108 Fundamentals of Accounting (3)</td>
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<tr>
<td></td>
<td></td>
<td>BIS 211 Management Information Systems (3)</td>
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<td>IE 226 Engineering Economics and Decision Analysis (3)</td>
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<td>Additional courses through technical and free electives (e.g. BIS 331)</td>
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<td>Quantitative Sys. Anal.</td>
<td>13</td>
<td>IE 220 Introduction to Operations Research (3)</td>
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<td>IE 22a Introduction to Operations Research Laboratory (1)</td>
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<td>IE 305 Simulation (3)</td>
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<td>IE 316 Advanced Operations Research Techniques (3)</td>
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<td>12</td>
<td>IE 224 Information Systems Analysis and Design (3)</td>
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<td></td>
<td></td>
<td>IE 2xx (Introduction to Web Technologies) (3)</td>
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<td>IE 345 Manufacturing Information Technology (3)</td>
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<td></td>
<td></td>
<td>IE 341 Data Communication Systems Analysis and Design (3)</td>
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<td>Technical Electives</td>
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<td>Any mixture of courses from the list of approved technical electives.</td>
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<tr>
<td></td>
<td></td>
<td>Examples Advanced BIS courses such as BIS 331 Electronic Commerce and Security;</td>
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<tr>
<td></td>
<td></td>
<td>IE 251 Production and Inventory Control; any</td>
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<tr>
<td></td>
<td></td>
<td>IE 300 level course except IE 328; any advanced CSC except CSC</td>
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241 or CSC 252; Advanced Math courses such as Math 230 or Math 251.

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<th>Course Type</th>
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<td>IE 154 Senior Project (3)</td>
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<td>IE 3XX Systems Engineering Design (3)</td>
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* 200 level or above
Table 1. Four-Year Outline of the B.S. Degree in Information and Systems Engineering

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<th>Information and Systems Engineering Degree</th>
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<td>Engl 1</td>
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<tr>
<td>Chem 21/22</td>
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<td>Engr 1</td>
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<tr>
<td>IE 111</td>
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<tr>
<td>Math 23</td>
<td>IE 1YY</td>
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<tr>
<td>Phy 21/22</td>
<td>IE 1ZZ</td>
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<tr>
<td>CSC 17</td>
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<td></td>
<td>Math 205</td>
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<td></td>
<td>ECE 81</td>
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<th>Junior Fall</th>
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<td>Mech 2, Mat 33 or ME104</td>
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<tr>
<td>BIS 211</td>
<td>IE 226</td>
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<tr>
<td>Eco 1</td>
<td>IE 305</td>
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<tr>
<td>IE 224</td>
<td>HSS</td>
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<tr>
<td>IE 220</td>
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<tr>
<td>IE 122 (Revised)</td>
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**Summer before Senior Year**

IE 100 0

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<td>IE 316</td>
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<td>IE 339</td>
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<tr>
<td>IE 3XX</td>
<td>IE 341</td>
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<td>Technical Elec</td>
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<tr>
<td>HSS</td>
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<td>Free Elective</td>
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<td><strong>Total</strong></td>
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Advanced* Math courses: Math 230, Math 251
Any Advanced* CSC course except 241 or 252

Total Degree=117+13(HSS Elective)=130 credits

* 200-level cr above
Table 2. ABET course classifications

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<th>Abet Classifications</th>
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<td>Phy 11/12</td>
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<tr>
<td>Acct 108</td>
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<td>ECE 81</td>
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<tr>
<td>Technical Elective</td>
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<td>HSS electives</td>
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Total 130 35 52 31 12

ABET Req by hrs 32 48

Meet lower by % 32.5 48.75
Proposed New and Revised Courses for I&SE Degree

**New Courses**

**IE 1YY Algorithms in Systems Engineering (3)**
This course will be an introduction to the use of computers to solve problems arising in systems engineering. The course will focus on the design and implementation of algorithms for systems modeling, systems design, systems analysis, and systems optimization. Topics covered will include fundamentals of computer systems, basic data structures, the design and implementation of efficient algorithms, and application of algorithms to the design and optimization of complex systems such as those arising in transportation, telecommunications, and manufacturing. Prerequisites: ENGR 1, CSC 17

**IE 1Z2 Algorithms in Systems Engineering Laboratory (1)**
Laboratory exercises and projects in the design and implementation of algorithms for systems modeling, systems design, systems analysis, and systems optimization. Co-requisite: IE 1YY

**IE 2XX Fundamentals of Web Applications (3)**
Introduction to web technologies required to support the development of client side and server side components of Internet-based applications. Students will be exposed to the problems of design implementation, and management by way of assigned readings, class discussion, and project implementation. Term project. Prerequisites: IE111, IE121, IE224

**IE 3XX Systems Engineering Design (3)**
Analysis, design, and implementation of solutions to problems in manufacturing and service sectors using information technology. Emphasis on problem identification and the evaluation of proposed solutions and implementations. Term Project. Prerequisites: IE 220, 2XX

**Revised Courses**

Original **IE 122 Software Tools (1)** Introduction to application software tools, including word processing, spreadsheets and statistical packages. Problem solution will be drawn from other courses in the sophomore program. Prerequisites: ENGR 1; IE 121 either previously or concurrently.

Revised **IE 122 Software Tools (1)** Introduction to application software tools used to solve stochastic and deterministic problems. Problem design and solution will be drawn from IE 220. Co-requisite: IE 220.

Original **IE 345 Manufacturing Information Systems (3)** This course examines the foundations for information systems required to support the manufacturing function throughout the product life cycle. Students will be exposed to the problems of design, implementation, and management by way of assigned readings, class discussion of cases, and a research project.

Revised **IE 345 Manufacturing Information Technology (3)** A study of contemporary Information Technology solutions used to support the manufacturing function from product concept and design through production planning, manufacture, and delivery. Emphasis will be placed on information exchange protocol standards used to improve the overall integration of manufacturing systems. Prerequisites: IE2XX
The Computer Science and Business Program

A Joint Initiative Between the CS&E Department and the College of Business and Economics.

Introduction
This proposal describes a new and unique major in computer science and business (CSB) to be jointly offered by the College of Business and Economics (CBE) and the department of Computer Science and Engineering (CS&E). The CSB program will integrate computing technologies and business topics at an unprecedented level. CSB majors will obtain the skills and training needed to understand business functions and business related problems, to analyze business-user information needs, to design computer based information systems, and to implement systems solutions within business organizations. Graduates of the program will be ideal candidates for placement within large consulting firms, small consulting teams, and startup companies. This program will also prepare students to become the CIO's, decision makers, and general managers of information age corporations.

Rationale
We believe that the CSB major will help to differentiate Lehigh from the competition by providing a benchmark niche program that other schools will attempt to emulate. Investing in the resources needed to implement the CSB major will also strengthen existing programs. New faculty hired into this program will likely add new electives at the boundary between computing and business that will appeal to other students in business, in computer science and engineering, and in industrial engineering. Furthermore, we expect the CSB program to form a natural bridge between the CS&E department and the CBE creating a partnership that will extend into joint research initiatives such as data warehousing, computer security and assurance, intelligent agents and continuous auditing, and software risk analysis.

Key Features of the CSB Program

A Balanced Program
Programs at other universities combine computer science with a smattering of business or offer business degrees with minimal exposure to computing. The CSB program will integrate technology skills in software development with a solid background in business and economics. The CSB student’s deep immersion in both of these disciplines distinguishes this program from programs offered by other universities. At the same time it will be a well balanced, four year, highly selective program totaling 135 credit hours. The pie chart below shows the relatively equal percentages of credits drawn from computer science, business and economics, distribution and electives courses. These percentages will vary among students depending upon how individuals choose to use their CSB elective courses. Appendix A contains the proposed curriculum for the program.

Accredited in Business and Computer Science
An important aspect of this program is that it will be the first of its kind to be accredited in both Computer Science (by CSAB) and in Business (by AACSB). This novel feature is facilitated, in part, by recent changes in accreditation standards.

New Students to Lehigh
This program has the potential to generate new student applications. We expect to bring 30 to 35 new students per year into the CSB program with approximately 120 students at steady state.
will target highly ranked students who would not have otherwise chosen Lehigh. Recruiting efforts will focus on the top 10 percent of the freshman applicant pool. Since demand for this program is expected to be high, we feel that the best students can be attracted with financial aid packages that are consistent with those offered to other students of similar caliber. This will be a competitive and demanding program by virtue of its level of difficulty. The program will, however, be open to other Lehigh students transferring into it after the freshman year.

A Differentiated Program
Three major distinguishing characteristics differentiate the CSB program from its nearest Lehigh companion program, Integrated Business and Engineering (IBE).

1. In-depth Focus Within the CSB Curriculum
The fundamental and most important difference between the proposed CSB program and the current IBE program is the degree of focus in their respective curricula. The IBE program follows a generalist or breadth-based approach in its coverage of engineering topics with a major program determined officially by the end of the sophomore year. The CSB student should know from the outset of entry into the program that this curriculum is more deeply focused. For example, the much larger computer science component within CSB is accomplished by eliminating many generic engineering requirements.

2. Student Affiliation in Both Colleges
Another important difference between CSB and IBE is the students’ college affiliation. An IBE student enters either the CBE or the CEE with the IBE student’s affiliation determined by his or her intended curriculum. For example, if a student plans to major in Finance, the official listing is as a CBE student. In contrast, and in keeping with the key feature of dual accreditation for CSB in business and computer science, CSB students will be affiliated with both colleges and will follow a common curriculum. Initially, this can be implemented in the university computer system with a fifth college category indicating that CSB is a joint, inter-college program. Ultimately, the student will receive a joint degree for the CSB major from both colleges.

3. Availability to All Lehigh Students
The quality and rigor of the CSB’s academic content will be equal to Lehigh honors-type programs. The level of demanding material and high expectations for student performance will be the norm. The program will, however, be open to any student wishing to accept the challenges we offer, whether the student matriculates at Lehigh specifically for CSB or enters the program at a later point.

These three differences, especially the depth vs. breadth, promote a complementary rather than competitive relationship between the CSB and IBE programs. Students interested in IBE are not likely to be attracted to CSB because they constitute different student pools with little, if any, overlap. Further, these differences should be clearly articulated in a positive manner to inform students as they decide which programs best suit their interests and abilities.

Program Administration
Two faculty members will serve as co-directors of the CSB program. One will be appointed from the CBE and the other from the CS&E department. Their tasks will include promotion of the CSB program, recruiting and advising prospective students, overseeing new integrated course development, mentoring students engaged in summer internship programs, grant proposal writing, and administration of the program budget.
Market Analysis

Programs at Other Institutions
An analysis of both the computer science and business programs of the top 25 universities revealed that the proposed CSB program is truly unique. Four programs that roughly compare are summarized below:

- University of Pennsylvania has a joint degree program in Management and Technology that is similar to Lehigh's IBE program. This program is more generalized than the CSB and is not accredited in Computer Science.
- Dartmouth has a modified Major in Computer Science and Economics. Since Dartmouth has no undergraduate business program, students are limited to studying only economics. This program is not accredited in Computer Science.
- Washington University of St. Louis provides a second-degree option in Computer Science and Business. The program takes 150 hours and 10 semesters to complete. It is not a four-year joint program as proposed here.
- Carnegie Mellon permits an undergraduate business degree with a Computing and Information Technology track. The track is limited to six computer science courses. The proposed CSB program provides for considerably more coverage of computer science.

Market Survey
We constructed a web-based survey instrument that was administered to all computer science students, business students (all majors), and employers who recruit these students at Lehigh. The purpose of the survey was to:

1) Obtain feedback about program content.
2) Assess demand for CSB graduates.
3) Gauge student interest in the program.

In addition to capturing demographic information about respondents, the survey posed a number of global questions relating to the importance of accreditation and the need for undergraduates with depth in both business and computer science. Student respondents were asked if they preferred the proposed CSB program to their existing degree program. Employers were asked to state how many CSB graduates their organizations would hire each year. All respondents were asked program-content questions whereby they rated the importance of specific courses. Finally, the respondents were asked to add or delete courses from the proposed program and to make comments or recommendations. The general findings are summarized below.

- Approximately 10 percent of the Lehigh students surveyed indicated that they would have chosen CSB over their current programs had it existed when they selected Lehigh. Based on this response, we anticipate that the program will draw only a few students from the existing CS&E and BIS degrees. We do not expect widespread cannibalization of these programs.

- Employers responded overwhelmingly that accreditation in both computer science and business was important, and similarly agreed that depth in both business and computer science education was desirable. The respondents estimated that their firms would hire 25 CSB students on average.

The survey suggests that CSB graduates will be heavily recruited. The strong demand by employers, which is not currently being satisfied by competing institutions, further supports the
proposition that this program will attract new students to Lehigh who may have otherwise gone to competing schools.

Resource Implications

New Faculty Positions
Accommodating 120 new students over four years carries significant resource implications for all three colleges offering undergraduate programs. Based on current class sizes and teaching loads, we estimate that the CBE will require an additional five faculty and three TA positions to successfully implement this major. The RCEAS will need to be increased by an additional seven faculty and four TA positions. Faculty hired in either college who will teach in this program will teach also in other programs and courses.

The growth in CBE faculty represents net new positions. Net new faculty are critical for the CBE because of enrollment demands that exceed its ability to currently handle existing programs.

It is anticipated that CSE positions will represent both net new slots funded by the growth of the undergraduate population as well as the reallocation of positions from other programs within RCEAS. Over the next few years an anticipated 19 faculty will be retiring thereby enabling a reallocation of teaching positions among departments within the college.

The above resource requirements do not reflect the potential impact on the CAS. For example, additional sections of math, English and humanities may need to be offered to service students enrolled in the CSB program. The extent of this additional burden will depend on the actual increase in the university's target class size as a result of the CSB program. It is expected the administration will provide the necessary support for those increases.

Computing and Library Resources
CSB program requirements are based largely on existing courses. To the extent that these courses employ computing and library resources, an additional 35 students per year will increase the demand for such resources marginally.
Appendix A
Proposed Curriculum

BS in Computer Science and Business (CSB)

The proposed CSB major will consist of 135 credit hours that are fairly evenly distributed among business, computer science, and other distribution and elective courses. This unique configuration allows the CSB major to be accredited in both computer science (by CSAB) and in business (by AACSB) simultaneously. The specific courses taken by CSB students will change somewhat from the sample curriculum presented below because of ongoing revision to the CBE undergraduate core, continuing feedback from our corporate partners, and faculty input. Also, as we attract additional faculty, we plan to add new courses to Lehigh's curriculum that will be incorporated into the CSB major.

The required courses for the CSB degree constitute the fundamentals of structured programming, discrete mathematics, algorithms, computer architectures, programming languages, software engineering, accounting, finance, marketing, management and economics. None of the program requirements for the CSB major may be taken pass/fail. Based on the current curriculum, the recommended sequence of courses is presented below.

**Freshman year, first semester (18 credit hours)**

Engl 1 Composition and Literature (3)
Eco 1 (4)
Math 21 Calculus I (4)
Bus 1 Intro to Business I (3)
CSC 10 & CSC 14 (8)

**Freshman year, second semester (16 credit hours)**

Engl 2 Composition and Literature (3)
Math 52 Survey of Calculus II (3)
Engr 2 Intro To Engineering (1)
Phy 11, 12 Intro. Physics I and Lab (5)
CSC 17 Structured Programming and Data Structures (4)

**Sophomore year, first semester (17 credit hours)**

Phy 21 Intro To Physics II (4)
ECE 33 Intro. to Computer Engineering (4)
Math 205 Linear Methods (3)
Acc 151 Intro. to Financial Accounting (3)
CSC 261 Discrete Structures (3)

**Sophomore year, second semester (16 credit hours)**

CSC 109 Systems Programming (3)
CSC 241 Data Base Systems (3)
Acc 152 Intro. to Managerial Accounting (3)
Math 231 Statistics (3)
Eco 129 Money and Banking (4)

**Junior year, first semester (18 credit hours)**

CSC 262 Programming Languages (3)
CSC 3XX Computer Networks (3) *(new course)*
Fin 125 Introduction to Finance (3)
Mkt 111 Contemporary Marketing (3)
Eco 115 Applied Microeconomics (3) (HSS - CSAB)
CSB Professional Elective (3) **

**Junior year, second semester (15 credit hours)**
CSC 340 Design and Analysis of Algorithms (3)
CSC 216 Software Engineering (3)
ECE 201 Computer Architecture (3)
CSB 3XX Computer Based Business Solutions (3) (new course)
HSS Elective (3) (CSAB/AACSB)

**Senior year, first semester (18 credit hours)**
CSC 303 Operating System Design (3)
CSB 3XX New Integrated Senior Project Class (2) (new course)
Mgt 280 Management of People and Operations (4)
Law 201 Legal Environment for Business (3) (HSS - CSAB)
CSB Professional Elective (3) **
HSS Elective (3) (CSAB/AACSB)

**Senior year, second semester (17 credit hours)**
Mgt 301 Business Management Policies (3) (special section) *
CSB 3XX New Integrated Senior Project Class (2) (new course)
CSB Professional Elective (3) **
CSB Professional Elective (3) **
HSS Elective (3) (CSAB/AACSB)
HSS Elective (3) (CSAB/AACSB)

*We anticipate that this will be a special section of Mgt 301 that focuses on the role of information technology in the formulation of business policies, strategies and tactics. This section will be required of CSB majors but will be open to other CBE students.

**One CSB Professional Elective must be a course in the sciences.

**Note:** The above program meets the Humanities and Social Science (HSS) requirements of both the Engineering and Business colleges, although each college computes the requirement differently. The Business college requires 12 HSS credits, not including 6 credits of English and not including courses in the Business college, such as Economics courses. So does the above program. In the Engineering college all programs, except Computing Science, require 25 HSS credits (including designated Business college courses). Computing Science requires 30 HSS credits. The above program requires 32 HSS credits.

**CSB Tracks**
Students will use their CSB professional electives to develop areas of concentrations or tracks from courses offered within the CS&E department or CBE. In certain cases, the student's advisor may also approve technical courses from other departments. Some possible examples of CSB tracks are presented below:

**Accounting Track**
Acct 315 Financial Accounting I
Acct 324 Cost Accounting
Acct 320 Auditing
Business Economics Consulting
   Eco 322 Competitor and Market Analysis
   Eco 333 Economics of Business Decisions
   Eco 357 Econometrics

Finance
   Fin 323 Investments
   Fin 328 Corporate Finance
   Fin 334 Derivatives
Lehigh University – Provost Office

DATE: 12 October 2001

TO: Faculty Colleagues

FROM: Ron Yoshida

SUBJECT: Lehigh 20/20 – One year later

Background

On 5 October 2000, President Farrington announced a seven-year $75 million investment in Lehigh’s future. Several initiatives were specified in his address: biosciences/biotechnology, optoelectronics, computer and information science, humanities, and choral arts. Initiatives approved for funding as part of the earlier Academic Initiatives Fund were carried forward into this program. Faculty colleagues have been and continue to be, invited to submit proposals for additional initiatives.

Current Status

By 17 November 2000, we published guidelines for requesting funds for programs, including those earmarked in President Farrington’s speech. These guidelines are available at www.lehigh.edu/~inprv/lehigh_2020.htm. We also enlisted the finance and administration areas to help us assess proposals.

Attached is a spreadsheet outlining initiatives that have been approved in concept, those under review, and proposals being developed but yet to be received. The spreadsheet presents the funds requested, NOT the funds that have been approved or committed to each project.

Proposals approved in concept are those whose visions and plans – both academic and financial – were recommended by the deans and reviewed favorably. We have committed substantial dollars from the Lehigh 20/20 fund during 2000-01 and 2001-2002 totaling $3.7 million primarily in support of hiring additional faculty for the major academic initiatives. We have encumbered another $4.5 million in 2002-2003.

Future Directions

We have learned much from engaging in this process and have refined the way in which we evaluate each proposal – from its vision to its implications for the university as a whole.

First, we are clearer that some proposals more than others, have the potential to increase the number of students either at the undergraduate or graduate levels. Almost
all of the original proposals promised huge increases in the number of undergraduates. Adding up all of these promised new students would have quickly made Lehigh a campus serving 7,000 undergraduates. This growth is neither realistic nor part of our vision for Lehigh.

Thus, we are clear that, while there are proposals that can indeed increase the number of undergraduates there are others that, without such growth, can still lead to qualitative and significant improvement in programs that we offer students. Programs in the former category may grow their student numbers but not necessarily grow the university-wide or college-wide student body. For example, the Computer Science and Engineering program in partnership with Business projects student growth. It remains to be seen whether the growth will occur, and whether it will result in an overall gain for the university. It is possible that growth may occur in that program while total undergraduate enrollments in Engineering decline.

As we monitor these programs, it will become clearer whether there is overall growth from these programs to the University. If such growth occurs, we know that departments that support the first and second year academic experiences of these students, as well as areas such as student life, housing and dining, must be funded as well.

In the latter category, those initiatives that enhance the quality of existing programs can make Lehigh more competitive in attracting the best students and faculty. These programs, however, require more immediate internal reallocation within and among colleges rather than heavy reliance on Lehigh 20/20 funds. Programs in this category are the Humanities Center, Choral Arts, and Chemical Engineering renewal.

However, all of the proposals approved in concept and any proposals yet to be approved will be reviewed within a budget model that has recently been developed. It came to our attention that colleagues were using different amounts of dollars to project potential revenue from sources such as undergraduate tuition and indirect cost recovery. Undergraduate or graduate tuition dollars were attributed to the program itself and did not account for the funding needs of other departments including Student Affairs, Information Resources, Residential Services and Facilities who will support the program. As we gained experience in budget projections, we settled upon a template for assessing the budgetary impact of each proposal. We will be conducting analyses of the proposals approved in concept and future proposals using this template. We will soon publish this template on the Provost web site.

Second, regardless of the size of the proposal, we have been very careful in insuring that the various units, primarily the Colleges, make commitments to fund the programs and faculty once Lehigh 20/20 funds are expended. Colleagues must appreciate that Lehigh 20/20 funds are one-time only. We are committing to reallocations that will provide the dollars to permanently fund these programs, especially faculty members. In case we do not experience a net gain in the total university student body—undergraduate and graduate.

Finally, accountability is essential. We have developed a monitoring system so that we can determine on a regular basis whether each program is meeting its intended goals and what actions may need to be taken in adjusting expectations or funding.
Conclusions

As noted in the Academic Affairs Strategic Plan, we will begin studying the potential impact of a 10% increase in undergraduate student enrollment at Lehigh. The funded Lehigh 20/20 programs are important contributors to enhancing the quality of our program offerings as well as the possible enlargement of the student body. As such, we will continue our careful review and funding of current projects as well as future ones.
<table>
<thead>
<tr>
<th>Proposal Name</th>
<th>Goal to be Achieved</th>
<th>FY01 $ Committed or Requested</th>
<th>FY02 $ Requested</th>
<th>FY03 $ Requested</th>
<th>Total Future $ Requests</th>
<th>Cumulative Total $ Requested</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approved in concept</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer Science &amp; Engr.</td>
<td>I</td>
<td>$7,620</td>
<td>$2,114,000</td>
<td>$1,710,000</td>
<td>$2,493,311</td>
<td>$6,324,931</td>
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<tr>
<td>Industrial &amp; Systems Engr.</td>
<td>I</td>
<td>$3,195</td>
<td>$725,350</td>
<td>$795,600</td>
<td>$2,641,040</td>
<td>$4,165,185</td>
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<tr>
<td>IR-Technology Classroom</td>
<td>B</td>
<td>$0</td>
<td>$365,000</td>
<td>$365,000</td>
<td>$1,095,000</td>
<td>$1,825,000</td>
</tr>
<tr>
<td>IR-Network Infrastructure</td>
<td>B</td>
<td>$140,000</td>
<td>$380,000</td>
<td>$390,000</td>
<td>$810,000</td>
<td>$1,720,000</td>
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<tr>
<td>Vice Provost for Research</td>
<td>E</td>
<td>$209,000</td>
<td>$372,700</td>
<td>$372,700</td>
<td>$0</td>
<td>$954,460</td>
</tr>
<tr>
<td>Chemical Engineering</td>
<td>E</td>
<td>$127,091</td>
<td>$184,840</td>
<td>$85,000</td>
<td>$70,000</td>
<td>$466,931</td>
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<tr>
<td>Masters in Accounting</td>
<td>I</td>
<td>$150,000</td>
<td>$200,000</td>
<td>$0</td>
<td>$0</td>
<td>$350,000</td>
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<tr>
<td>Humanities Center</td>
<td>E</td>
<td>$101,700</td>
<td>$54,220</td>
<td>$0</td>
<td>$0</td>
<td>$155,920</td>
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<tr>
<td>Choral Arts Program</td>
<td>E</td>
<td>$25,000</td>
<td>$25,000</td>
<td>$25,000</td>
<td>$0</td>
<td>$75,000</td>
</tr>
<tr>
<td>Linderman Feasibility Study</td>
<td>B</td>
<td>$50,000</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$50,000</td>
</tr>
<tr>
<td>Under review</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical &amp; Computer Engr.</td>
<td>I</td>
<td>$790,197</td>
<td>$2,046,705</td>
<td>$3,096,526</td>
<td>$10,859,139</td>
<td>$16,784,567</td>
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<tr>
<td>Student Affairs – Disabilities</td>
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<td>$0</td>
<td>$102,915</td>
<td>$102,915</td>
<td>$0</td>
<td>$205,830</td>
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<tr>
<td>Owning the Valley</td>
<td>I</td>
<td>$0</td>
<td>$115,000</td>
<td>$115,000</td>
<td>$115,000</td>
<td>$345,000</td>
</tr>
<tr>
<td>Proposal not received</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bioscience/Biotechnology</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optoelectronics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Goal to be achieved legend:  I = increase revenue – new programs  E = Enhance existing programs  B = Basic infrastructure
Strategic Planning Document
Academic Affairs – 2001/02
12 October 2001

This plan presents Academic Affairs' commitment for meeting the Seven Goals of Lehigh for the 2001-2002 academic year. The specifics outlined in this document are not inclusive of all actions being undertaken by each college and unit but represent those that the Academic Affairs stem has judged will greatly move it toward the goals set.

The initials after each action step identify the person responsible for completing the task. A legend is provided at the end of this document noting the initials and full name equivalents.

During the year, Academic Affairs will be developing a longer range five-year plan.

Goal #1: Lehigh Culture and Style – Lehigh must strive to be a true university combining teaching, research and service. . . . The people of Lehigh should work together to achieve a strong sense of community.

1a. Develop interdisciplinary programs through the Lehigh 2020 program as well as reallocation of resources within and between colleges
   ➢ See new program development under Goal #3a
   ➢ Approve new policies and procedures for joint appointments (RKY)

1b. Improve student life for graduate students
   ➢ By October 1, hire a graduate student life director to address graduate student life issues (JWS)
   ➢ During Fall 2001 semester, Institutional Research will conduct graduate student survey (NGM)
   ➢ Develop strategic action plan to enhance graduate student life (by May 2002) (KHH)

1c. Implement "A Matter of Degree" program
   ➢ Continue the work started with Project Impact with the implementation of "A Matter of Degree" funded by Robert Wood Johnson (JWS)
   ➢ Identify, support and promote positive elements of campus social climate (JWS)
   ➢ Conduct community assessment to identify new opportunities for collaboration with Bethlehem residents and city officials (JWS)
   ➢ Apply environmental model, developed during Project IMPACT, to racial and gender diversity issues (JWS)
   ➢ Develop and implement interventions to reduce alcohol-related problems among key student groups with special emphasis on freshmen (JWS)
1d. Review and reposition international strategy

➤ Create international Policy Group to recommend university wide priorities for recruiting international students, establishing international partnerships and for developing study abroad experiences (SKS)
➤ Coordinate activities of all offices across the university that work with international students under the provost office (SKS)
➤ Conduct study abroad review once a director is selected (SKS)

1e. Begin a five-year program to create the library and information technology infrastructure to support a comprehensive university with a commitment to undergraduate teaching

➤ Complete feasibility study for a renovated and revitalized Linderman Library (BMT)
➤ Upgrade the visible high technology presence in key areas of the campus with the installation of 210 new PCs and wireless lap-tops in student labs and university libraries (BMT)
➤ Expand wireless network coverage to include UC Grace Lounge, the Ulrich Center, Iacocca Building Teaching Lab, Rauch Business Center, Fairchild Martinvale Library, and UC Lawn (BMT)
➤ Increase bandwidth capacity on campus research and teaching network (BMT)
➤ Renovate classroom space including a potential classroom site in the Riverport site (BMT)

1f. Revise and broaden Lehigh’s Rules and Procedures on harassment to foster inclusive and civil behavior among students, faculty and staff

➤ Design and pilot a cross cultural model of leadership development (JWS)
➤ Conduct year-long series of events celebrating 30th anniversary of undergraduate women at Lehigh (KRH)

Goal #2: Academic Quality – The quality and productivity of Lehigh’s faculty, staff, students, departments and programs should compare favorably with those of top-25 research universities in the United States.

2a. Conduct 34 searches in the right areas for new faculty members – 17 in the area of information technology (Deans). We will continue to recruit the highest level faculty members requiring:

➤ each search committee to be composed of faculty members from different departments,
➤ each candidate to show high promise in scholarship and in undergraduate and graduate teaching,
➤ each search to proactively seek diversity candidates to include in the pool,
➤ closing searches if the best candidate is unable to be secured.
2b. Continue to recruit higher quality undergraduates

<table>
<thead>
<tr>
<th></th>
<th>Fall 2001</th>
<th>Fall 2002</th>
<th>%Δ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applications</td>
<td>8042</td>
<td>8800</td>
<td>7</td>
</tr>
<tr>
<td>Acceptance Rate</td>
<td>48%</td>
<td>44%</td>
<td>(8)</td>
</tr>
<tr>
<td>Yield</td>
<td>29%</td>
<td>30%</td>
<td>2</td>
</tr>
<tr>
<td>Class Size</td>
<td>1114</td>
<td>1120</td>
<td>1</td>
</tr>
<tr>
<td>Engineering Al</td>
<td>199</td>
<td>201</td>
<td>1</td>
</tr>
<tr>
<td>Arts and Sciences Al</td>
<td>195</td>
<td>197</td>
<td>1</td>
</tr>
<tr>
<td>Business and Economics Al</td>
<td>192</td>
<td>194</td>
<td>1</td>
</tr>
<tr>
<td>Average SAT</td>
<td>1284</td>
<td>1300</td>
<td>1</td>
</tr>
<tr>
<td>% Minority</td>
<td>14%</td>
<td>15%</td>
<td>7</td>
</tr>
<tr>
<td>International Freshmen</td>
<td>36</td>
<td>36</td>
<td>0</td>
</tr>
</tbody>
</table>

- By the end of the fall semester, the Interim Dean of Admissions will develop a strategy with each college to develop specific programming designed to increase the yield (JBG)
- Interim Dean of Admissions will review programs already in place and implement changes designed to help the programs increase yield (JBG)
- By 15 December, the Director of Alumni Affairs will have a draft of an Alumni Relations/Recruiting Plan that will outline how alumni can be used in the recruitment process – Admissions and Alumni will work together to identify select alumni in targeted areas of the country to aid in the recruitment of the best students to Lehigh. (CVM)

2c. Raise retention rates for every year

<table>
<thead>
<tr>
<th></th>
<th>00-01</th>
<th>01-02</th>
<th>%Δ</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st year retention</td>
<td>94%</td>
<td>95%</td>
<td>1</td>
</tr>
<tr>
<td>2nd year retention</td>
<td>93%</td>
<td>95%</td>
<td>2</td>
</tr>
<tr>
<td>3rd year retention</td>
<td>96%</td>
<td>97%</td>
<td>1</td>
</tr>
</tbody>
</table>

- Analyze the retention data by year, as well as by college to discern where to target retention efforts (complete by 15 December) – NGM
- Colleges will conduct training of non-major advisors and will commit to making advising a significant activity to be evaluated for merit (BSC)
- With colleges and relevant administrative department, contact all early withdrawal/non-returning students during fall semester. By 1 March, develop action plan to reduce rate of early withdrawal/non-returning students. (JWS, Deans)
- By 1 March, create a common freshman/non-major advisor manual and resource guide as well as a document listing minors to aid in the advising process (BSC)
- RCEAS will develop guide of minors and their respective program of studies for undergraduate students (RNW)
- Registrar will work with the deans to address the enrollment management bottleneck problems (wait lists, closed courses). (BSC)
- By 1 December, revise methodology and develop implementation timeline to measure student satisfaction. With data, take appropriate steps to address key issues found in study. (JWS)
2d. Programs will have comparable PhD students/faculty member ratios and quality of students as comparable Research universities.

- Benchmark Lehigh programs offering doctorates to comparable institutions (DBW)
- Set goals for doctoral student/faculty ratio for each program (Deans)
- Develop indicators of student quality such as student publications, awards and grants received (Deans)

Goal #3: Undergraduate Education – Each of Lehigh’s undergraduate programs should strive to be one of the finest and most distinctive of its type. In addition, Lehigh should lead in creating innovative undergraduate programs that are particularly attractive to the finest students.

3a. Academic Affairs will continue to work on developing and marketing the following for Fall 2002:

- Bioengineering, BS/Minor (MEA)
- Environmental Engineering, BS (MEA)
- Design Arts, BA major and minor (BC)
- Photonics, MS (BC, MEA)
- Information & Systems Engineering, BS, MS (MEA)
- Wireless and Networking, BS(MEA)
- Supply Chain Management, BS (RMD)
- Computer Science and Business, BS (MEA, RMD)
- Upgrade Engineering CoOp program (MEA)

3b. The undergraduate colleges will develop distinctive freshman year experiences for Fall 2002 implementation.

- The CBE is developing a revised undergraduate business core that will a) reduce the required business core by as much as 20%, b) integrate material across core courses, and c) develop bread in areas to complement majors (RMD)
- RCEAS will create a task force to restructure Engineering 2 and 3 and create a one credit course (Introduction to Engineering) (MEA)
- CAS will evaluate the objectives and implementation of the College Seminar program to ensure it provides a distinctive experience while meeting specific educational objectives (BC)

3c. Create effective classroom and library facilities to meet demands of new programs and methods of learning

- Review, assess, and adapt existing classroom and library facilities to support student collaborative learning and faculty teaching methods – eLearning suites, group study space, comfortable learning spaces (BMT)
- Implement real-time on-line library reference services for undergraduates (virtual reference desk) (BMT)

3d. Review teaching evaluation procedures in all colleges and establish university-wide and college standards and methods by May 2002 (FKY and Deans)
Goal #4: Research, Graduate Education and Life-Long Learning – Lehigh should be known for excellence in research and scholarship, which in turn supports its programs of graduate and undergraduate education.

4a. Create the technical, computational and instrumentation infrastructure and evaluate the space needs required to permit research and scholarship at levels comparable with the top 25 universities

- Propose campus network plan connecting Packer campus, E-mountain, and River Port research park with high-speed fiber-optic and wireless connectivity (BMT)
- Implement high bandwidth network connections for new research initiatives in bioengineering, optoelectronics, computer sciences, and other academic areas (BMT)
- Develop plan to create high-end research computation capability (e.g. Beowulf cluster) (BMT)
- Assess current use of all research space on campus (DBW)
- Develop plan to coordinate research instrumentation needs across campus and set priorities (DBW)

4b. Create a new Center for Optical Technologies (DBW)

4c. Evaluate all Centers and Institutes in the University and determine viability and future direction by 30 April 2002 (DBW and Deans)

4d. Raise the Indirect Cost Recovery Total from $5.1 million to $6.2 million.

- Develop a mentoring system within the colleges to aid new professors in the submission of proposals to federal agencies and corporations. (DBW)
- By October 2001, submit proposal for the Biogreenhouse project in partnership with the Hershey Medical Center and Penn State. (DBW)
- Submit NSF (or equivalent) Career Award proposal by each new professor in Engineering and the Sciences within the first year of their arriving on campus (DBW)
- COE will submit a proposal to: the National Science Foundation, the Office of Special Education Research Services, and the Office of Overseas Schools (SAW)

4e. Other metrics for quality of research will be developed in all areas (DBW and Deans)

4f. Raise the Graduate Tuition Total Net Cash from $4.6 million to $5.1 million

- Develop and market new program offerings as they become available to generate new students (Deans)
- RCEAS will complete a new publication by 11 October that will be used as a marketing tool to attract graduate students to the college (MEA)
- COE will expand the international offerings currently available in Lugano, Switzerland to attract additional students (SAW)
- COE will create a partnership with the Principals Training Center and the Educational Leadership program to enhance the number of certificate and Master's students (SAW)
- CBE will complete the introduction of the New Ventures Forum which is a 12 hour graduate certificate program on new venture creation for both startup and established companies (RMD)
Goal #5: Visibility — In order to attract the finest faculty and students and enhance its institutional reputation, Lehigh must implement a coordinated and aggressive program to achieve greater visibility and recognition — regionally, nationally, and internationally.

5a. Review the departmental and college-wide tenure and promotion criteria and make changes as necessary by June 2002 (Provost and Deans)

5b. Increase the number of faculty members who receive national level recognition: such as the National Academy of Engineering, Fellows of the American Psychological Association, Guggenheim, Sloan, Mellon, Spencer Fellows (RKY, Deans, DBW)

➢ Work in partnership with the VP for Research, Deans, Chairs and the Foundation office to mentor faculty in preparing and applying for these awards (DBW)

5c. Increase the number of undergraduate and graduate students who compete for prestigious fellowships and awards such as Rhodes, Marshall, Fulbright, National Science Foundation

➢ Fund appropriately the effort to more systematically identify and mentor students from the freshman year to compete for these fellowships (RKY)

5d. Promote Lehigh's Research Centers and Institutes by working with University Communications and the Alumni Association (DBW)

Goal #6: Alumni Relations and Development — Lehigh must develop a professional and effective advancement program, which embraces both alumni relations and development.

6a. Raise the Foundation Grants Total from $3.5 million to $4.0 million (note that beginning in FY02, family foundation grants will not be counted in these totals, only independent foundations)

➢ Make a priority to seek large grants from well-known foundations to increase both the funding and the visibility of Lehigh's academic programs (KAH, DBW)
➢ During AY '01-'02 submit a proposal to establish a University/Industry Center in Biotechnology to the Sloan Foundation (DBW, KAH)
➢ Examine the University's faculty leave policy with the goal of increasing the opportunities for proposals to Foundations (RKY)

6b. Involve Alumni Association in recruiting the class of 2006 and beyond

➢ See strategy under Goal 2b
➢ Develop an Alumni/Admissions Interview plan to identify and train Alumni in key geographic regions to conduct off campus Admissions interviews (CVM)
➢ Conduct Alumni/Admissions Yield Programs during March and April in key geographic regions to increase the percentage of students from identified regions (CVM)
➢ Alumni will contact prospective students by mail, e-mail, and phone that live in the same region. The goal being to establish a person connection with Lehigh and to increase yield (CVM)
8c. Involve, proactively, Alumni in continuing education and distance education

- Hire a Director of Alumni Education in the Alumni Association office to coordinate programs with the four College Deans (CVM)
- Market continuing education and distance education programs directly to segmented Alumni groups (CVM)
- Create “on the road” seminars and short courses that the Alumni Association and the Colleges can bring to the Alumni in various regions (CVM)

Goal #7: Innovation in Education – Lehigh should lead in developing more effective methods of education.

7a. Increase distance education program (BMT, JAB and Deans)

- Increase enrollments by 10%
- Raise web registrations up to 30% of distance education enrollment
- Increase number of satellite receive sites from 4 to 10

7b. Offer new programs that employ innovative teaching methodologies and platforms (Deans)

- Educational Technology
- Educational Leadership International Program
- MBA – targeted to specific corporations
- Mater Pac – Materials Pennsylvania Coalition
- A 15 hour certificate program in Supply Chain Management offered online in CBE

7c. Expand student exposure to Integrated Learning Experiences by increasing the number and variety of courses that adopt the client-team-project-report format (Deans)

7d. Establish the Lehigh Lab – a unit for assisting faculty with innovative uses of technology to enhance teaching, research, and student learning (BMT)

Staff Legend

JAB – Jim Brown, Director of Distance Education and Summer Sessions
BC – Bob Carson, Dean, College of Arts and Sciences
BSC – Bruce Correll, Registrar
RMD – Dick Durand, Dean, College of Business and Economics
MEA – Mohamed El-Aasser, Dean, P.C. Rossin College of Engineering and Applied Science
JBG – Bruce Gardiner, Interim Dean of Admissions and Financial Aid
KRH – Kristen Handler, Director of the Women’s Center
KSH – Karen Huang, Director of Graduate Student Life
KAH – Kathryn Humphries, Exec. Director, Corporate Foundation Relations & Career Services
NGM – Nelson Markley, Senior Vice President
CVM – Chris Marshall, LUAA Executive Director
JWS – John Smeaton, Vice Provost for Student Affairs
SKS – Stacy Stainbrook, Asst. to the Provost and Director of International Affairs
BMT – Bruce Taggart, Vice Provost for Information Resources
RNW – Rick Weisman, Associate Dean, Undergraduate Studies
RCEAS
SAW – Sally White, Dean, College of Education
DBW – Dave Williams, Vice Provost for Research
RKY – Roland Yoshida, Vice President for Academic Affairs and Provost