

**NEW GRADUATE DEGREE
FORM D**

UNIT PREPARES IN QUINTUPLICATE
Route as indicated below under approvals. Return to the
Scheduling Office once all signatures have been obtained.

Date: 26 April 2004
Charles Fleddermann
 (Name of Individual initiating new Graduate Degree)
Associate Dean, 7-1423
 (Title, position, telephone number)
School of Engineering
 (Department/Division/Program)

*** Allow 18 months for process to be completed**

RECEIVED/OGS
APR 28 2004

Note: Proposals for new graduate degrees need to follow a CHE approved format. Please call the office of Graduate Studies and ask for an outline. Revisions of graduate degrees also may need state approval, depending on the extent of changes proposed. Please consult the Office of the Provost for advice prior to initiating this form.

1. Give exact title in space provided and requirements for the new graduate degree as they should appear in the Graduate Bulletin.

Certificate in Systems Engineering

For requirements, see attached.

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FEB - 6 2006

2. Attach the complete proposal in the approved format.
3. Does this new degree affect any existing program? Yes ___ No X. If yes, attach statement.
4. Library impact statement. Name of individual consulted and attached signed impact statement.
5. CIRT impact statement. Name of individual consulted and attached signed impact statement.
6. Proposed date to admit new students: Semester Fall Year 2004

Required Signatures:	Department Chair <u>See attached Form C</u>	Date: _____
	Dean of Library Services <u>See attached Form C</u>	Date: _____
	Assoc. VP for CIRT <u>See attached Form C</u>	Date: _____
	College Curricula Committee <u>See attached Form C</u>	Date: _____
	College or School Dean <u>See attached Form C</u>	Date: _____
	FS Graduate Committee <u>see attached Form C</u>	Date: _____
	Office of Graduate Studies <u>Amy B. Wolbert</u>	Date: <u>11/15/05</u>
	FS Curricula Committee <u>Fu Hall</u>	Date: <u>2/3/06</u>
	Office of the Provost <u>Dr. W. W. W.</u>	Date: <u>2.13.06</u>
	Faculty Senate <u>Urian Valencia</u>	Date: <u>4/26/06</u>
Returned to	The Office of the Provost for presentation to following entities:	
	Board of Regents <u>(attested) Amy B. Wolbert</u>	Date: <u>5/10/05</u>
	Council of Graduate Deans _____	Date: _____
	Academic Council of Higher Education _____	Date: _____
	Commission of Higher Education _____	Date: _____
	State Board of Finance _____	Date: _____

Received _____ Entered (Mainframe) _____ Entered (Catalog) _____

For Scheduling Office ONLY

Mailed _____

DEGREE/PROGRAM CHANGE
FORM C

Date: February 16, 2004

Charles Fleddermann

(Name of individual initiating curricular change form)

Associate Dean 277-5521

(Title, position, telephone number)

School of Engineering

(Department/Division/Program/Branch)

CIP CODE

Assigned by
Associate Provost
for Academic Affairs

UNIT PREPARES IN QUADRUPPLICATE

Routing (All four copies)

1. Dean of Library Services (if necessary)
2. CIRT (Comp & Inform Res & Tech), (if necessary)
3. College Curriculum Committee (if necessary)
4. College or School Faculty
5. College or School Dean/Director of Instruction
6. FS Graduate Committee (if applicable)
7. FS Curricula Committee
8. Associate Provost for Academic Affairs
9. Faculty Senate

OFFICE OF THE REGISTRAR

* Plan for curricular process to take at least 12 months.

Graduate Programs in

This form is for School of Engineering
Name of New or Existing Program

This program is or would be located in current undergraduate/graduate catalog
on page(s) 375-376

Mark appropriate Program:

Undergraduate Degree Program

Graduate Degree Program (For existing degree only)

Mark appropriate category

	NEW:	REVISION OF:	DELETION:	NAME CHANGE:
Degree <u> </u> Type	<input type="checkbox"/> Undergraduate degree only	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Major	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Minor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Concentration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Certificate	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Emphasis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Department	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

* See New Units policy Guidelines book available from the Provost's Office.

Give exact title and requirements as they should appear in the catalog. See current catalog for format within the respective college (attach additional sheets if necessary). Identify in bracket form what is being changed.

Certificate in systems engineering

Reason(s) for Request (attach additional sheets if necessary).

See Attached

Library Impact Statement. Name of librarian consulted and attached signed impact statement. (if necessary)

CIRT Impact Statement. Name of individual consulted and attached signed impact statement. (if necessary)

Budgetary and Faculty Load Implications (attach statements). Long-range planning statement.

Does this change affect in a significant way, any other departmental programs/branch campuses? Yes No X

If yes, have you resolved these issues with department/branch involved? (attach statement)

Effective Date of Proposed Change: Fall Semester, 2004 Year

Required Signatures:		Date:
Department Chairperson	<u>Charles Fleddermann</u>	<u>16 Feb 04</u>
Dean of Library Services (if necessary)	<u>[Signature]</u>	<u>3/25/04</u>
CIRT (if necessary)		
College Curriculum Committee (if necessary)	<u>Charles Fleddermann</u>	<u>16 Feb 04</u>
College or School Faculty (if necessary)	<u>Charles Fleddermann</u>	<u>16 Feb 04</u>
College or School Dean/Director of Instruction	<u>Charles Fleddermann</u>	<u>16 Feb 04</u>
FS Graduate Committee (if applicable)	<u>Grant Meyer</u>	<u>22 Sept 05</u>
FS Curricula Committee	<u>[Signature]</u>	<u>3/13/06</u>
Assoc. Provost for Academic Affairs	<u>See Attached Form D</u>	
Faculty Senate	<u>[Signature]</u>	<u>4/26/06</u>

KFSV on following memo

Received

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Mailed

FEB - 6 2006

[Signature] 2/13/06

**Proposal to New Mexico Commission on Higher Education
Systems Engineering Certificate Program
School of Engineering
University of New Mexico**

Executive Summary

The School of Engineering at the University of New Mexico proposes to offer a certificate program in Systems Engineering. Systems engineering is an emerging discipline within engineering that focuses on the analysis and synthesis of complex systems that arise in many engineering problems. This certificate will be offered within the context of the existing SOE MS and PhD programs, or can be earned as a stand-alone certificate. The primary clientele for this certificate will be civilian and military employees of the Air Force stationed at Kirtland Air Force Base- this program is being initiated at their request- but will also serve the needs of other engineering professionals employed in the Albuquerque area. Preliminary polling has indicated that there will be a large demand for this certificate. Admission will be open to any student enrolled in a graduate program within the School of Engineering, or to students who already have a graduate engineering degree from an ABET-accredited engineering program. Requirements for the certificate are completion of the four core courses listed in this proposal and completion of a systems engineering related project.

Proposal for UNM Systems Engineering Certificate

I. Introduction

The School of Engineering (SOE) at the University of New Mexico is proposing to establish a certificate program within the existing graduate programs in the area of Systems Engineering. Students will be able to earn the Certificate in Systems Engineering (CSE) in one of two ways: 1) By taking four core systems courses and doing a thesis or dissertation on a systems engineering topic within an MS or PhD program, or 2) By completing the four core courses and doing a systems engineering project (for students who already have a graduate degree in engineering either from UNM or from another approved school. The exact requirements for the certificate are described in Appendix III under the heading “Catalog Copy.” This proposal describes in detail the need for this program and describes how the program will be implemented and managed.

SOE does not currently offer courses in systems engineering, though one of the required core courses for this program is currently offered in the Department of Computer Science at UNM. The other three core courses will be created as part of the CSE program, and will be taught by regular UNM faculty, adjuncts with systems expertise from local industry and government laboratories, or via distance education from the Air Force Institute of Technology, an accredited engineering and science school in Dayton, Ohio.

II. Purpose of the Program and Mission of UNM

Systems engineering focuses on the analysis and synthesis of complex systems that arise in a wide variety of engineering problems. Training in systems engineering is a blend of the traditional engineering disciplines with management. The goals of systems engineering curricula are to train professionals who:

- (1) Understand the essential components of systems, and the inter-connective relationships within complex systems.
- (2) Understand the innovations that form the building blocks of the modern technological world.
- (3) Are able to design new systems to achieve cost-effective products based upon the needs of the stakeholders.

Systems engineering is a core competency essential for the functioning of both commercial and government engineering organizations. For example, the aerospace and defense industries utilize engineering professionals trained in the systems engineering approach to effectively design complicated systems such as modern aircraft. Likewise, government entities such as NASA and the U.S. military services employ systems engineers to design the complex technologies essential to their missions. Other engineering industries such as the automotive and semiconductor industries need engineers trained in systems.

The primary purpose of establishing a systems engineering certificate program at UNM is to provide New Mexico-based government laboratories and engineering industry with engineering professionals trained in this important aspect of engineering. This program is in line with the mission of UNM. The UNM mission statement articulates the need for UNM to educate students who can make significant contributions to the state and national economies. The impetus for the certificate program in systems engineering comes from a need of the Air Force, especially its many technical organizations housed at Kirtland Air Force Base, as well as other facilities in New Mexico. In addition, local technology-intensive laboratories and industry including Sandia National Laboratories, Intel Corporation, and Eclipse Aviation have a need for engineers trained in the systems approach to design.

UNM is committed to establishing the Systems Engineering Certificate as evidenced by the signing of an MOU with the Air Force Institute of Technology in March of 2004 covering the sharing of course offerings in the systems engineering area between the two institutions.

III. Justification for the Program

a. Need Establishing a Systems Engineering program at UNM will serve a large need in the local community and the state of New Mexico. There are several Air Force engineering organizations housed on Kirtland Air Force Base with needs for systems-trained engineers. As mentioned above, the impetus for creating this program has come from the Air Force, which feels that there are numerous potential students, both military and civilian, employed at Kirtland Air Force base whose needs would be well met by this program. Currently, these potential students must relocate to Dayton in order to pursue an education in systems engineering at AFIT. By responding to the needs of this group of potential students, UNM will be perceived as helping the local engineering community meet its advanced educational needs. In addition, Sandia National Laboratories also has a need for systems engineers. It is expected that other engineering employers in the Albuquerque area such as Eclipse Aviation and Intel will also be interested in engineers trained in the systems approach.

To assess the potential market for this certificate program, a survey was done during spring of 2004. A sample of technical personnel working for the Air Force (both military and civilian) were asked to report their interest in establishing a systems engineering program at UNM. 38% of the respondents expressed a very strong interest in pursuing a certificate program in systems engineering at UNM. Extrapolating from the sample to all of the technical personnel at Kirtland Air Force base, it could be expected that the number of potential students interested in this program will be between 100 and 200. It should be noted that the military personnel are stationed at Kirtland generally for only 2-4 years, and are replaced by others. This constant rotation of personnel will mean that there will be sufficient students interested in this program in the long term to ensure its continued viability.

As a result of the survey that was sent out in spring 2004 along with a preliminary announcement of the program, numerous inquiries about the certificate program were received. The education office at Kirtland Air Force base received 38 inquiries from both Air Force personnel and Sandia National Laboratories employees. In addition, the graduate office in the Electrical and Computer Engineering department at UNM received over 30 inquiries about the program. It seems clear from this that there is a great deal of interest in this certificate program, and there will be sufficient students to make this a viable program at UNM.

Only a handful of universities nationally offer a program of any sort in systems engineering. Programs at the University of Southern California and George Mason University have been successful. We expect that there will also be students from elsewhere in the U.S. who will be attracted to UNM degree programs by the presence of this certificate program.

b. Duplication There are no existing programs offered in systems engineering at any institution in New Mexico.

c. Inter-Institutional Collaboration and Cooperation No other institutions in New Mexico currently offer courses that are appropriate for this certificate program.

IV. Clientele and Projected Enrollment

As mentioned above, it is expected that this certificate will primarily serve the educational needs of the civilian and military personnel employed by the Air Force at Kirtland Air Force base. However, we expect participation by students employed by other technical employers in the Albuquerque area, and the program should attract students from outside New Mexico. Recruiting will be focused on Air Force personnel as well as employees of Sandia Labs, Eclipse Aviation, and other Albuquerque-area high-tech industry. The systems certificate will also be prominently displayed on the School of Engineering web site to ensure visibility to potential students from around the country. The successful programs within the School of Engineering designed to facilitate the enrollment and retention of students from underrepresented groups will function for this program as well.

Requirements for entrance into the program are summarized below:

For the certificate with MS or PhD degree: Admission to a graduate program within one of the departments of the School of Engineering at UNM.

For the stand-alone certificate: Completion of an MS or PhD degree in engineering, computer science, or a physical science from an accredited school.

Enrollment projections: Based on the polling performed during spring 2004, and conversations we've had with potential students, we anticipate a cohort of 10 students starting this program during the first year (either the 2005-06 academic year, or the 2006-

07 academic year, depending on when the program receives approval), with a new ten-student cohort starting every subsequent year. We estimate that of these ten students, seven will be pursuing the MS degree and three pursuing the stand-alone certificate. MS students will require two years to complete the program, and stand-alone certificate students will require one year to complete the program. It is expected that only a handful of students will pursue the PhD degree in conjunction with the systems certificate, so all estimates of enrollment are based on MS and stand-alone certificate students only. Based on these numbers, the table below summarizes the expected number of students and student credit hour production expected for this program.

Academic Year	MS students	Stand-alone certificate students	SCH production
2005-06	7	3	234
2006-07	14	3	423
2007-08	14	3	423
2008-09	14	3	423
2009-10	14	3	423

Notes: 1) SCH hours are based on the assumption that MS students will take 12 credit hours each semester, and 3 hours during the summer. Stand-alone certificate students will take 6 hours each semester and 3 hours during the summer. 2) It is assumed that there will be 7 returning and 7 new MS students during each academic year after the first year of the program. Since the stand-alone certificate program will take only one year, it is expected that there will be no returning students in this category each year. 3) This table is based on MS students enrolling full time in the program, and stand-alone certificate students enrolling for two courses each semester and one course in the summer. Based on our polling, we expect that most MS students will pursue the certificate full-time- if a significant number pursue this part time, the SCH production will be somewhat lower during the first few years of the program, but will rapidly reach the numbers projected for the latter years.

V. Institutional Readiness for the Program

The resources required to institute this certificate program are already in place at UNM.

A. Faculty

No new permanent faculty will be required to implement this program. The bulk of the students seeking the certificate will be pursuing the MS or PhD in one of the engineering programs. These programs already have faculty to provide advising, teaching of courses, and project/thesis supervision. The numbers of students projected for the systems certificate will not place an undue burden upon the current faculty resources. In addition, the four core courses related to the systems certificate will be cross-listed with similar courses offered by the AFIT. These courses will initially be offered via distance education from AFIT. (The copy of the MOU signed with AFIT in spring of 2004 covering the offering of these courses is shown in Appendix I.) UNM has high-quality

distance education facilities that have the necessary capacity to offer these courses to UNM students.

In the longer term, the School of Engineering at UNM will begin to offer the four systems core courses taught at UNM. In order to do this, we will have to hire one to two adjunct faculty members each semester to cover these courses. The academic departments in the school of engineering already employ several adjunct faculty from the local community each semester, and the current budget is adequate to handle the adjuncts required to teach these core courses. These adjunct faculty are highly qualified engineering practitioners from the local community who enrich our teaching mission by bringing an industrial or government perspective to the classroom. Qualified adjuncts already employed by Sandia Labs or the Air Force Research Labs will be available to serve as adjunct faculty for these courses.

B. Physical resources

No new classrooms, library, or computer facilities will be required for this program. The library already has sufficient holdings in this area to support the program. Departmental and SOE computing resources are already adequate to support the proposed program. There is no additional laboratory space requirement for the systems certificate program. Classroom space at UNM is tight, but there shouldn't be a problem scheduling classroom space for the small number of core courses required for the certificate program.

C. Staff

The number of students expected in this program will not require any additional staff support within the School of Engineering. Handling of admissions and advising of students in this program will be handled by existing staff positions.

D. Costs of the program

In the short term, the costs to implement this program are expected to be minimal. Since no new faculty, staff, or equipment will be needed, no additional resources will be required. There will be costs associated with recruiting and marketing of the program—these costs are expected to be less than \$1,000 per year.

For the long term, when UNM begins to offer the systems-related core courses, there will be costs associated with hiring adjunct faculty to teach these courses. At most, 4 adjuncts will be hired each academic year to cover this need. Our current payment to adjuncts is \$4,000 per course, so at most we would be spending \$16,000 per academic year on adjunct faculty to support this program. This is well within the current budget for adjunct hiring. In addition, since these courses will be cross-listed with AFIT and sometimes these courses will be offered by AFIT faculty via distance education, some offerings of these courses will not require the hiring of adjuncts.

As the systems certificate program matures, it is anticipated that future faculty hires within the existing engineering faculty would include faculty members with the required expertise to teach the systems core courses, thus eliminating the need to hire adjuncts dedicated to teaching in this program. Since we anticipate covering these courses using a combination of AFIT distance education courses, local adjuncts, and permanent UNM faculty with systems expertise, we don't anticipate significant personnel costs associated with this program.

VI. Quality and Assessment of Program

The quality of this proposed systems certificate program is assured in two ways:

1) The MS/PhD program with the certificate is basically the same as our existing MS and PhD programs. These have been recognized for years to be high-quality programs, many of them earning high rankings in the annual US News and World Report rankings of graduate programs. The systems component of the program is modeled after a program currently being taught by AFIT. The AFIT systems program is part of an accredited program, so we are assured that this is a program that meets minimal national standards for quality.

The systems certificate at UNM will not be accredited. ABET, the Accreditation Board for Engineering and Technology only accredits UNM's undergraduate programs, so no accreditation for the proposed certificate program will be available.

Quality of the program will be assured through the periodic review of our engineering graduate programs through UNM's program review procedure. It is expected that the systems certificate will be reviewed as part of the overall review of our graduate programs. A significant component of this review is the ongoing assessment of our graduate courses and programs. This assessment will be performed on the systems certificate program as well. The individual courses offered as part of the systems certificate will be monitored using the student evaluation process (ICES, or its successor) currently used at UNM.

VII. Administration of the Program

This program will be administered like any other graduate program at UNM. Admissions to the program will be handled through the Office of Graduate Studies, with admissions decisions being made by the individual SOE department that the student is applying too. Admissions decisions regarding students pursuing the stand-alone certificate will be made by the SOE department most appropriate to that student's background and experience.

Overall and ongoing guidance for the systems certificate program will be provided by the SOE Graduate Committee and the SOE Associate Dean for Academic Affairs. This is the current structure for supervising SOE graduate programs- the addition of the certificate program should not increase this administrative burden substantially.

Appendix I

Letter of Support from Department of the Air Force



DEPARTMENT OF THE AIR FORCE
AIR FORCE RESEARCH LABORATORY (AFMC)

JUL 16 2004

Dr. Charles Fleddermann
Associate Dean for Academic Affairs
School of Engineering
University of New Mexico
Albuquerque, NM 87131-1351

Mr. Joe Sciabica
Associate Director for Space Technology
3550 Aberdeen Avenue S.E.
Kirtland AFB, NM 87117-5776

Dear Dr. Fleddermann

I am writing to communicate my support for the newly established Systems Engineering program with the Air Force Institute of Technology (AFIT) and the University of New Mexico. We have received a great response throughout our Kirtland Air Force Base community from the announcements we have hosted. We currently have over 60 people we are interacting with that are interested in starting the program in the fall. This response is just from our initial "pilot program". We will promote further with the goal of bringing many students to UNM.

AFIT has established the Center for Systems Engineering at the direction of the Secretary of the Air Force, Dr. James Roche. The Air Force aims to revitalize and strengthen the application of systems engineering within our present and future workforce. The Air Force Research Laboratory, through the Phillips Technology Institute, has embraced the program here in the Albuquerque area by bringing together UNM with AFIT to offer this critical program.

We look forward to continuing our successful relationship with the School of Engineering.

Sincerely

A handwritten signature in black ink, appearing to read "Joe Sciabica", is written over a horizontal line.

JOE SCIABICA, SES
Associate Director for Space Technology

Appendix II

Memorandum of Understanding Between the

University of New Mexico

and the

Air Force Institute of Technology

1. Background

The University of New Mexico (UNM) has had a long history of providing graduate education to Air Force officers and civilian employees, on both a part and full-time basis, and conducting research under Air Force support. The Air Force Institute of Technology (AFIT) has been the primary source of graduate education in engineering, science, and management for the Air Force for over fifty years. AFIT faculty and students conduct research for a wide variety of Air Force and Department of Defense agencies. While most AFIT students are Air Force officers assigned to AFIT to pursue their education on a full-time basis, the Institute does offer degrees on a part-time basis to students at its facility located at Wright-Patterson AFB. Completing a graduate program on a part-time basis typically requires four or more years. Air Force military personnel usually have three-year assignments and hence find it difficult to start and complete a program during an assignment.

2. Purpose

The purpose of this Memorandum of Understanding (MOU) is to: (1) provide a framework for UNM and AFIT to jointly offer part-time graduate programs primarily to Air Force officers and civilian employees and, (2) provide a mechanism for sharing distance education offerings between the two institutions and, (3) encourage research collaboration between the institutions. The underlying goal of the MOU is to remove administrative barriers between the institutions in order to facilitate the graduate education of Air Force officers and civilians.

3. Policy

Both UNM and AFIT have longstanding policies that limit the number of credit hours that can be transferred from another university and accepted toward a masters or

doctorate degree. At UNM the limit is 50%, and at AFIT this limit is typically 12 quarter-hours. Further both institutions require approval for each transfer request. Under this Memorandum of Understanding, both institutions would agree to allow students to meet degree requirements for programs covered by this agreement with up to fifty percent of the course credits required for a degree coming from courses taken at the other institution. Further, while these courses must be part of an approved program, they would not be considered as transfer credit but rather part of the program.

- a. UNM and AFIT will identify program areas (MS and PhD) that are covered by this agreement. The first area covered by this agreement will be systems engineering. A list of those programs will be published and reviewed annually by both parties for completeness and currency.
- b. Once programs have been identified as part of the agreement UNM and AFIT will annually publish guidelines detailing the programs covered and procedures to be followed. For the purposes of this agreement, posting on the institutional web sites will satisfy the publishing requirement. These will include:
 - i. Degree requirements for each program offered and sample programs showing possible course combinations between the schools. In particular, examples showing programs initiated at one of the institutions and being completed at the other.
 - ii. Names of points-of-contact at each university for each program covered.
- c. One institution (the Home Institution, chosen by the student as the degree-granting institution) is to maintain the transcript for that student, to include courses taken at the other institution. It should be noted that this is a fundamentally different concept than accepting courses from the other institution by transfer.
- d. In choosing a Home Institution a student must meet all requirements for entry into that institution and will be required to meet the degree requirements of that institution. Students wishing to switch Home Institution are not automatically guaranteed admission to the new institution but must be admitted to that institution.
- e. Once a student has chosen a Home Institution work completed at the other institution is treated exactly as work completed at the Home Institution, subject to the limitation that at least fifty percent of the course work

(excluding thesis or dissertation work) for the degree must be taken at the Home Institution.

- f. A student must complete a thesis or dissertation at their Home Institution.
- g. A member of the graduate faculty of either institution may be appointed to thesis or dissertation committees at the other institution. Only a member of the graduate faculty of the Home Institution may Chair a thesis or dissertation committee. It is noted that all graduate faculty from either institution appointed to a thesis or dissertation committee will be voting members of that thesis or dissertation committee.
- h. The Home Institution will maintain an approved course of study (educational plan) that has been coordinated with the other institution. This plan may be completed before the student starts a program but in all cases will be completed when the student has completed twelve semester-credit hours (UNM) or twelve quarter-credit hours (AFIT).
- j. Recognizing the difference between the length and content of semesters and quarters, it is agreed that 3 quarter-hours credit is equivalent to 2 semester hours credit.
- k. The parties recognize that there are detailed business issues that must be negotiated regarding registration and fee structure and payment for distance courses offered to the other institution. It is the intent of the parties to negotiate mutually acceptable guidelines that facilitate the equitable sharing of courses and the associated fees.

4. Institutional Autonomy

Other than for the agreement above on accepting courses as if offered at the Home Institution, the degree requirements of both institutions remain unchanged. Additionally both institutions retain their own entry requirements and all rules and regulations of the institutions with respect to student conduct and performance are unchanged by this agreement.

5. Review

This agreement will be reviewed annually and may be changed at any time with the agreement of both parties.

6. Effective Date and Termination of Agreement

This agreement will become effective upon execution of the agreement by the parties and will continue through until terminated by either party by providing written notice of intent to terminate to the other party at least 60 days prior to the proposed termination. Such termination will not affect students who have already completed credit hours at either institution in an approved course of study.

Joseph L. Cecchi
Dean, School of Engineering
University of New Mexico

Robert A. Calico, Jr.
Dean, Graduate School of
Engineering and Management
Air Force Institute of Technology

Louis Caldera
President
University of New Mexico

Brig. Gen. (Select) David W. Eidsaune
Commandant
Air Force Institute of Technology

Appendix III
Other required UNM forms

Catalog Copy

Certificate in Systems Engineering
For School of Engineering MS and PhD Programs

The Certificate in Systems Engineering (CSE) is a graduate program open to students seeking the MS or PhD degrees in the School of Engineering. The participating departments are: Electrical and Computer Engineering, Mechanical Engineering, and Nuclear Engineering. The certificate is a credential in addition to the MS or PhD degree. To complete the CSE program, students must:

- Be admitted to one of the graduate programs within the School of Engineering.
- Complete all degree requirements of their home department.
- Complete the four core courses listed below. The four core courses will be taken as electives within the existing degree programs, so no additional course work is necessarily required for the systems engineering certificate.
- Master's students: complete a thesis (Plan I) or project (Plan II) in the area of systems engineering. These projects may be supervised by a UNM faculty member, or may be a collaboration with an adjunct faculty member from local industry or government laboratories.
- Normal UNM rules regarding the chair of thesis committees will apply.
- PhD students: complete a dissertation in the area of systems engineering. The dissertation project may be a collaboration with an adjunct faculty member from local industry or government laboratories.
- Normal UNM rules regarding the chair of dissertation committees will apply.

Students intending to obtain the Certificate in Systems Engineering as part of their MS or PhD program should indicate this on their application to the graduate program.

A post-degree Certificate in Systems Engineering is also available for students who already have an MS or PhD in an engineering discipline from an accredited engineering or computer science program. To complete the post-degree CSE program, students must:

- Complete the four core courses listed below.
- Complete a project supervised by an SOE faculty member, or by an adjunct faculty member from local industry or government laboratories.

Core Courses

Engr 501	System Engineering Design
Engr 502	System Architecture
Engr 503	Systems Engineering Management
CS 460	Software Engineering

The core courses can also be taken via distance education programs offered through the Air Force Institute of Technology (AFIT) in Dayton, OH.

Forms B for New Core Courses Required for the Certificate in Systems Engineering

Catalog Copy

Engr 501, 502, and 503 are intended primarily for students who are pursuing the Graduate Certificate in Systems Engineering.

Engr 501 Systems Engineering Management (3)

An overview of the systems engineering management process. Topics include technical planning, cost estimating and budgeting, risk management, project control, trade-off analysis and decision making. Prerequisite: Admission to the Certificate in Systems Engineering Program or permission of instructor.

Engr 502 Systems Engineering Design (3)

A broad introduction to systems engineering and the structured approach necessary for the design of complex systems. The formulation of systems problems and the approach to their solution is emphasized. Topics include mathematical techniques for systems engineering, requirements driven design process, and decision analysis tools. Prerequisite: Admission to the Certificate in Systems Engineering Program or permission of instructor.

Engr 503 Systems Architecture (3)

The foundations for developing and evaluating architectures for systems. The process for generating a functional, physical, and operational architecture from a top level operations concept. Topics include: structured analysis, object oriented approaches, generation of executable architecture models. Prerequisite: Admission to the Certificate in Systems Engineering Program or permission of instructor.

Library Impact Statement

Creation of these new courses for the Certificate in Systems Engineering program will have no impact on the library. The Centennial Engineering and Science Library already has titles and periodicals on systems engineering in its collection. No additional acquisitions will be required.

interoffice

M E M O R A N D U M

to: Linda Lewis, Collection Management Officer
from: Bruce Neville *BN*
subject: Forms B and C for Certificate Program in Systems Engineering
date: March 22, 2004

The program and courses addressed in the attached Forms B (3) and Form C for a certificate program within the School of Engineering for Systems Engineering at the graduate level should have no significant impact on current library collection activities. Systems engineering is an evolving interdisciplinary field that is currently being supported by several departmental allocations, and a general engineering fund exists to purchase materials that are not purchased by individual departmental activities.

The Forms B and C prepared by the School of Engineering indicate that the current journal collection is sufficient to support the program. **It should be emphasized, however, that projected journal funding in the immediate short term is not considered adequate to support the current journal collection and that, failing additional, long-term funding to support serials acquisitions in the sciences and engineering, library support for both existing and new programs is in jeopardy.**

CIRT Impact Statement

Creation of these new courses for the Certificate in Systems Engineering program will have no impact on CIRT. Computing needs for the program will be handled through existing SOE departmental computing resources.

Budgetary and Faculty Load Implications

The CSE program will be taught by existing SOE faculty and adjuncts hired from the community. Most of the courses required for the program will come from courses that already exist and are being taught on a regular basis. Three of the core courses are new to UNM, but will be taught via distance education through an MOU with AFIT, or will be taught by existing SOE faculty or SOE adjuncts recruited from the Albuquerque community. The various SOE departments already hire several adjuncts from the local community with minimal budgetary impact, so no new budgetary implications will result from the CSE program. At most, one or two additional adjuncts will be hired by the department each semester (approximate cost will be \$4-8 thousand/semester) and can easily be accommodated through existing departmental and SOE budgets.