Space Planning Manual for Public Colleges and Universities

Revised August 2002

DIVISION OF FINANCE, FACILITIES, & MIS

South Carolina Commission on Higher Education
1333 Main Street, Suite 200
Columbia, South Carolina 29201

SOUTH CAROLINA COMMISSION ON HIGHER EDUCATION

COMMISSION MEMBERS

Mr. Dalton B. Floyd, Jr. (Chairman)	Surfside Beach, SC
Ms. Rosemary H. Byerly	Inman, SC
Ms. Diane P. Chinnes (Vice Chair)	Columbia, SC
Ms. Susan R. Cole	Summerville, SC
Mr. Larry Durham	Lancaster, SC
Dr. John V. Griffith	Clinton, SC
Dr. Vermelle J. Johnson	Orangeburg, SC
Mr. James S. Konduros	Columbia, SC
Mr. Miles Loadholt	Barnwell, SC
Ms. DeLoris H. Oliver	Spartanburg, SC
Maj. Gen. Thomas R. Olsen, Sr.	Sumter, SC
Mr. Daniel Ravenel	Charleston, SC
Mr. Carl Solomon	Columbia, SC
Dr. Roger E. Stevenson	Greenwood, SC

FACILITIES ADVISORY COMMITTEE

TO THE COMMISSION ON HIGHER EDUCATION

MEMBERS

Col. Donald Tomasik	The Citadel
Mr. Bob Wells	Clemson University
Mr. Stan Godshall	Coastal Carolina University
Ms. Monica Scott	College of Charleston
Mr. O. Mitchell Martin	Francis Marion
Mr. Thomas Suttles	Lander University
Mr. John Malmrose	Medical University of SC
Mr. John Bowman	SC State University
Mr. Charles Jeffcoat	USC-Columbia
Mr. Tony Ateca	USC-Aiken
Mr. Rick Puncke, Jr.	USC-Spartanburg
Mr. J. P. McKee	Winthrop University

SOUTH CAROLINA COMMISSION ON HIGHER EDUCATION
1333 Main Street, Suite 200
Columbia, SC 29201
(803) 737-2260
(803) 737-2297 - FAX

Internet Home Page: URL HTTP://CHE400.SC.GOV

FACILITIES STAFF

Dr. C. Rayburn Barton e-mail: Rbarton@CHE.SC.GOV	Executive Director
Mr. John E. Smalls e-mail: Jsmalls@CHE.SC.GOV	Director of Finance, Facilities & MIS
Ms. Lynn W. Metcalf e-mail: Lmetcalf@CHE.SC.GOV	Program Manager for Facilities, Finance, & IPEDS
Ms. Jan Stewart e-mail: Jstewart@CHE.SC.GOV	Program Coordinator, Facilities & Admin.

FOREWORD

This manual has been developed to assist colleges and universities in space planning for campus facilities. It is intended as a basic guide that can assist postsecondary institutions in assessing the degree of effectiveness with which academic space is being utilized.

The Space Planning Guidelines represent South Carolina's adaptation of historically accepted measures of room utilization for colleges and universities. These guidelines will be used at the State level as an indicator of the adequacy of institutional space, and as an initial point of reference in considering facility requests for additional space. However, institutional and/or programmatic mission, quality of space, and suitability of space will also be weighed appropriately against these guidelines.

The higher education institutions in South Carolina each have, to some extent, differentiated missions that influence the need for different types of space. The guidelines presented in this manual will be used in the assessment of availability and adequacy of existing structures, and to justify the need for additional space.

ACKNOWLEDGEMENTS

The staff of the Commission on Higher Education would like to express its appreciation to members of the Facilities Advisory Committee for their assistance in selecting and adapting planning guidelines and space factors for use in South Carolina.

In preparing this manual, the staff of the Commission on Higher Education relied heavily on the following publications, which are cited in the bibliography:

1) Higher Education Facilities and Classification Manual, produced by the National Center for Education Statistics for the U.S. Department of Education;

2) Space Planning Guidelines for South Carolina Colleges and Universities, South Carolina Commission on Higher Education;

3) Space Planning Standards, University of North Carolina System;

4) Standards for College Libraries, 2000, Association of College and Research Libraries;

5) Standards for Community, Junior, and Technical College Learning Resources Programs, Association of College and Research Libraries;

6) Space Planning Guidelines, American Association of Physical Plant Administrators (APPA);

7) Space Projection Model for Public Health Related Institutions, Texas Higher Education Coordinating Board

Significant portions of these documents have been integrated verbatim into this manual. The manual will be updated as needed to reflect the most current standards and guidelines from these sources.

CHAPTER 1

INTRODUCTION

Historical Perspective

There have been numerous efforts to establish statewide and national estimates (or standards) for non-residential space needs, by type, for various categories of institutions. Such estimates for South Carolina public colleges and universities were first developed by the South Carolina Commission on Higher Education in Goals for Higher Education to 1980, published in 1972.

A major study of the needs for higher education facilities through 1990, conducted by the U.S. Office of Education under contract with Joseph Froomkin, Inc., of Washington, D.C., was published in 1974. In 1976 the Commission established a Capital Planning Task Force for the purpose of developing procedures to guide public institutions of higher learning in planning capital improvements. Although this task force did not reach closure, draft procedures were developed.

During 1979, the Commission's Master Plan Task Force on Facilities established subcommittees on "Criteria for Expansion and Improvement of Existing Facilities and Construction of New Facilities" and on "Usage of Current Facilities." The work of these subcommittees led to the establishment of an Advisory Committee on Facilities charged with the responsibility to:

1) Develop appropriate space and utilization standards for S.C. public institutions of higher learning in each category of space; and

2) Develop appropriate criteria for determining need for space.

Further, the Committee would be called upon periodically to advise the Commission in the area of facilities.

The Advisory Committee requested a review of estimates of space needs as developed in "Goals" in light of space standards developed in the Froomkin study. This resulted in preparation of Space Planning Guidelines for South Carolina Public Colleges and Universities in July 1982.

A Renewed Facilities Effort

During the decade of the 1980s, these standards and guidelines were used sporadically in analyzing facilities requests made to the Commission. In June 1989, the Commission formed the Task Force on Space Use and Space Needs to examine the adequacy of facilities data maintained at the Commission and its effect on decision-making. The report prepared by this task force was adopted by the Commission in April 1990. The report stated:

> "Facilities data currently gathered by the South Carolina Commission on Higher Education captures only a minor portion of the data necessary to perform analyses which would lead to more objective decisions based on quantifiable need, including measurements against national benchmark standards, as well as against data from selected peer group institutions."

This report lead to the re-creation of a comprehensive facilities database, to be maintained at the Commission, based on the Higher Education Facilities Inventory and Classification Manual. The facilities effort was eventually subsumed within the *Commission on Higher Education Management Information System (CHEMIS)*, which includes data on facilities, faculty, student enrollments and completions, and course offerings.

A manual of space planning guidelines was developed in 1992 but never formally adopted by the Commission. Given the need for a formal set of guidelines to use at both the institutional and the state level, CHE charged the Facilities Advisory Committee with examining the existing utilization guidelines, and making recommendations for a space planning manual. The Facilities Advisory Committee initiated a sub-committee on utilization for this purpose. The content of this manual is attributable to their efforts.

Standard classification systems for higher education facilities

Facilities in higher education are classified by room use codes established in 1973 as a part of the federal higher education data base (Higher Education General Information Survey or HEGIS) now referred to as the Integrated Postsecondary Education Data System (IPEDS). These three digit space categories allow colleges and universities to categorize space by its function, or use, as shown in Table 1.

Table 1 Room Use Codes	
100	Classroom Facilities
200	Laboratory Facilities
300	Office Facilities
400	Study Facilities
500	Special Use Facilities
600	General Use Facilities
700	Support Facilities
800	Health Care Facilities
900	Residential Facilities
000	Unclassified Facilities
WWW/XXX/YYY	Non-assignable Area

Each room use category has sub-categories that further categorize its use. For details on room use categories and sub-categories, refer to the South Carolina Higher Education Facilities Inventory and Classification Manual.

In addition, facilities are also categorized by the National Center for Higher Education Management Systems (NCHEMS) program classification codes as shown in Table 2.

Table 2 NCHEMS Program Classification Structure	
10	Instruction
20	Research
30	Public Service
40	Academic Support
50	Student Services
60	Institutional Support (Administration)
70	Operation & Maintenance of Physical Plant
80	Student Financial Support
90	Independent Operations
00	Unassigned

Use of Space Planning Standards in Other States

There is growing interest in the use of space planning guidelines and/or standards. According to a study completed for the University of North Carolina in 1998,[1] information from 28 states indicated at least some level of space standards application. The variation of standards and the degree of use varied considerably, although most states rely on standard classification categories and units of measure.

Methodologies for Analysis

Space standards are typically expressed as allowances per units of use or need. Use or need is calculated in terms of clock hours of instruction, student Full-Time Equivalents (FTEs), employee FTEs, library volumes, and dollars of research expenditures, depending on the category of space being analyzed.

Based on the combination of standard allowances and standard per unit measures, an institution can determine how much space it needs in a particular category. This calculation can be used to indicate current need or projected needs based upon growth assumptions during a given time period.

Use of Space Planning Standards

South Carolina's space planning guidelines are intended to be used as guidelines for the institutions and at the state level to assist in the analysis of existing and projected space. Space planning standards are useful as guidelines but are not to be used as the only measure when making complicated decisions about facilities needs.

Purpose and Types of Space Planning Standards

There are several type of space standards used for planning, utilization and design. South Carolina's Space Planning Guidelines are to be used to assist institutions and the Commission in planning for new facilities and in determining the utilization of existing facilities. The information contained in this document is not intended for the programming and/or design of capital projects.

[1] The University of North Carolina Space Planning Standards, Copyright 1998, The University of North Carolina and Eva Klein and Associates, Ltd.

CHAPTER 2

SPACE PLANNING GUIDELINES

- Classrooms
- Class Laboratories

UTILIZATION OF INSTRUCTIONAL SPACE
GENERAL GUIDELINES

Elements of the CHEMIS Building, Room, and Course inventories are integrated to produce analyses of the utilization of instructional space at South Carolina's colleges and universities. This information is intended to provide a basis for space planning and decision making at the institutional and statewide levels. **All requirements for submitting Course data are detailed in the CHEMIS Manual**.

Definition of Courses to be Included for Room Utilization Analysis: The guidelines below indicate the course offerings eligible to be considered in utilization analysis. The inclusion of these offerings is the sole responsibility of each institution.

> In determining the utilization of instructional space, all courses offered for degree, diploma, or certificate credit will be considered.

Off-Campus Course Offerings Generally, all on-campus classroom and class laboratory space used by institutions will be included in utilization analysis, regardless of ownership. To be included, the course offering would have to be held in a valid classroom or class laboratory that carries the main campus site identifier for a given institution.

Date of Utilization Analysis The CHEMIS will use the fall term for each institution for utilization analysis – as of October 31 for all colleges and universities except for technical colleges with must submit data to SBTCE no later than October 15. The SBTCE will submit the data to CHE on behalf of the technical colleges.

SPACE GUIDELINE 1: CLASSROOMS

Description: Includes rooms generally used for scheduled instruction that require no special, restrictive equipment or configuration. These rooms may be called lecture rooms, lecture-demonstration rooms, seminar rooms, and general purpose classrooms. A classroom may be equipped with tablet armchairs (fixed to the floor, joined in groups, or flexible in arrangement), tables and chairs (as in a seminar room), or similar types of seating. These rooms may contain multimedia or telecommunications equipment. A classroom may be furnished with special equipment (e.g., globes, maps) appropriate to a specific area of study, *if* this equipment does not render the room unsuitable for use by classes in other areas of study.

Classroom facilities do not include any support rooms such as projection rooms, telecommunications control booths, preparation rooms, coat rooms, closets, storage areas, etc., that may serve the classrooms.

Room Use Code: 110

Guideline: The planning guideline for classrooms represents classrooms that are regularly scheduled for instruction. The guideline consists of four elements: weekly room hours of instruction, station occupancy percentage, student station size, and the calculated space factor.

- ***Student Station Size*** is the Assignable Square Feet (ASF) per Student Station;
- *Weekly Room Hours of Instruction* (WRH) is the hours per week that an available room is in scheduled use. [Does not include casual use.]
- ***Station Occupancy Ratio*** (SOR) is the average percent of student stations in the room that are occupied when the room is being used.
- ***Space Factor*** is a calculation that consolidates all three of the above into a single measure or factor. The Space Factor is calculated as follows:

$$\frac{\text{Student Station Size}}{(\text{Weekly Room Hours}) \times (\text{Station Occupancy Ratio})}$$

The space factor is the planning standard. It is multiplied by FTE students or weekly student clock hours to predict the institution's requirements or capacity (standard ASF) needs for classrooms. The higher the Space Factor, the more liberal the standard space allowances.

Weekly Room Hours	Station Occupancy Rate	ASF per Station
30	60%	22

Discussion: Weekly Room Hours of Instruction: The educational program, student requirements and faculty availability all influence the number of hours per week which a classroom can be utilized for scheduled instruction, so that weekly room hours will rates will vary around the 30 hour guideline. Although the guideline is applied to both the daytime and evening time periods, it is understood that the student mix (residential vs. commuter) of a given institution, along with other factors, will greatly influence class demand during these periods.

Station Occupancy Rate (SOR). On the average when classrooms are utilized for scheduled instruction, approximately 60% of the available stations will be occupied. The exact rate will depend on how well the institution can form the size of classes to fit the available classrooms.

ASF/Classroom Station: This is the total space necessary to accommodate one person for one period in a classroom, including a share of the space required for circulation, the instructor, and service areas. Classrooms with fewer stations require more floor space per station because the circulation and other space is proportionately greater. The shape of the rooms, location of doors, windows and blackboards, and architectural encroachment on floor space may affect the area available for seating.

In individual classrooms, the ASF/Station may vary from as low as 12 to as high as 35. On an institution-wide basis, the ASF/Classroom Station guideline is 22 ASF. In high efficiency rooms, such as lecture halls the ASF will be smaller. Technical colleges have fewer lecture halls so their ASF/station may be larger on average.

SPACE GUIDELINE 2: CLASS LABORATORIES

Description: A class laboratory is designed for or furnished with equipment to serve the needs of a particular discipline for group instruction in formally or regularly scheduled classes. The design of the space or equipment in the room normally limits or precludes its use by other disciplines. Included in this category are rooms generally called teaching laboratories, instructional shops, typing or computer laboratories, drafting rooms, band rooms, choral rooms, (group) music practice rooms, language laboratories, (group) studios, theater stage areas used primarily for instruction, instructional health laboratories, and similar specially designed or equipped rooms, *if they are used primarily for group instruction in formally or regularly scheduled classes.* Computer rooms used primarily to instruct students in the use of computers are classified as class laboratories if that instruction is conducted primarily in formally or regularly scheduled classes.

Class laboratory facilities include any support rooms such as projection rooms, telecommunications control booths, coat rooms, preparation rooms, closets, material storage, balance rooms, cold rooms, stock rooms, dark rooms, equipment issue rooms, etc., if they serve class laboratories.

Room Use Codes: 210 and 215

Guideline: The planning guidelines for class laboratory space are based on generally accepted national normatives for utilization of instructional space. The guideline consists of three components: room utilization rate, station occupancy rate, and assignable square feet per classroom station. Although the guideline is applied to both the daytime and evening time periods, it is understood that the student mix (residential vs. commuter) of a given institution, along with other factors, will greatly influence class demand during these periods.

Weekly Room Hours	Station Occupancy Rate	ASF per Station
average 24 hours wk.	75%	variable by discipline

Discussion: Laboratory Utilization Rate: The program and course level affect utilization. Normally laboratory periods are scheduled for longer duration than classroom periods. Also, preparation time before laboratory classes as well as clean-up after will dictate that laboratory utilization will never approximate the level of classroom rates. Generally, students in upper division courses spend more time in non-scheduled use of laboratories pursuing special research interests, and many upper division courses are specialized with comparatively low enrollment.

In a 45 hour academic week, laboratories used by regularly scheduled classes will be utilized from 22 to 24 hours in lower division courses to 16 to 18 hours in upper division courses.

Utilization rates for non-scheduled laboratories can vary widely and no ranges are suggested. It should be noted that laboratories utilized for scheduled instruction can often meet the requirements of students for individual work. The construction of special purpose laboratories for non-scheduled classes and individual practice or research by undergraduate students is influenced primarily by the academic programs and teaching philosophy of the institution.

Station Occupancy Rate: Variations in station occupancy rate primarily reflect different levels of study. In general since laboratory stations are comparatively few in number and teaching periods are comparatively long. In regularly scheduled classes, emphasis is placed on conforming the size of laboratory sections with the number of stations available. At the lower division station occupancy rates will range from 75% to 85% while upper division courses will range from 55% to 65%.

No station occupancy rates are suggested for laboratories utilized for non-scheduled classes or for individual study.

At the institutional level, utilization of all regularly scheduled teaching laboratories should be approximately 65%.

ASF/Class Laboratory Station: The nature of laboratory furniture and equipment varies among academic courses and course levels. For this reason no single range of values is suggested. Appendix I shows suggested ranges for

various programs of class and research laboratory space. Values selected should reflect actual space in existing facilities, and justified requirements in proposed facilities.

CHAPTER 3

SPACE PLANNING FACTORS *

- Research Laboratories
- Office Facilities
- Study Facilities
- Physical Education, Athletics and Recreation
- Media Production
- Clinic (Non-Medical)\Demonstration
- Field Buildings\Animal Quarters\Greenhouses
- General Uses
- Central Computer and Telecommunications
- Shop\Central Storage

* These factors are adopted from the Council for Educational Facility Planners. The factors for study facilities are attributable to the Association of College and Research Libraries and the Association for Educational Communications and Technology.

SPACE FACTOR 1: RESEARCH LABORATORIES

Description: A research laboratory is designed or equipped for faculty, staff, and students for the conduct of research and controlled or structured creative activities. These activities are generally confined to faculty, staff and assigned graduate students and are applicable to any academic discipline. Activities may include experimentation, application, observation, composition, or research training in a structured environment directed by one or more faculty or principal investigator(s). These activities do not include practice or independent study projects and activities which, although delivering "new knowledge" to a student, are not intended for a broader academic (or sponsoring) community (e.g., a presentation or publication). This category includes labs that are used for experiments or "dry runs" in support of both instructional and research activities.

Research laboratory facilities include those rooms that directly serve a research laboratory. Included are projection rooms, telecommunications control booths, coat rooms, preparation rooms, closets, material storage, balance rooms, cold rooms, stock rooms, dark rooms, equipment issue rooms, temporary hazardous materials storage areas, and similar facilities, if they serve research laboratories.

Room Use Codes: 250 and 255

Guideline: **Research Laboratory Formula #1**

The total amount of research laboratory space required by a department is based on the percent of masters and doctoral students, the percent of technicians, and the percent of faculty conducting research at any one time. These percentages are then applied to module sizes.

[(%conducting research x masters headcount) +
(% conducting research x doctoral headcount) +
(% conducting research x technician headcount) +
(% conducting research x faculty headcount)] x module size =
Departmental Research Laboratory Space

Specific Calculation

The percentages of masters and doctoral students and technicians conducting research are determined through discussions with academic departments. The percentage of faculty doing research is determined by the department's distribution of effort or faculty activity report. An FTE of one is applied when a single faculty member reports 40% or more effort in research.

The module sizes are based on the average requirement for each researcher within a department. The Planning Module Ranges (Appendix I) are suggested ranges for station module sizes by selected Classification of Instructional Program (CIP) groupings (or departments).

Special Note: This formula for teaching and research laboratory space applies only to the 200 series of room use types and does not apply to special use facilities such as aircraft hangars, greenhouses, animal quarters, audio-visual space, data processing rooms, wind tunnels, nuclear reactors, and herbariums.

Research Laboratory Formula #2

A second method of determining research laboratory space for each discipline is based on the sum of (a) the headcount of full-time resident faculty plus (b) the headcount of graduate faculty times the ratio of thesis plus dissertation graduate students per headcount graduate faculty (use 3.0 as a minimum) times the module size. The Planning Module Ranges (Appendix I) are suggested ranges for station module sizes by selected CIP groupings (or departments).

This method could be used by those institutions which do not have the data base to determine the percentage of faculty, masters and doctoral students, and technicians who conduct research at any given time.

Discussion: There are numerous methods used by institutions to determine the amount of research laboratory space required by each discipline. While there is some consensus as to the laboratory module size, the method of determining the number of persons doing research at any one time differs considerably.

Two formulas are presented here. An institution should select the one it feels produces the most desirable results.

Both formulas use the laboratory modules in Appendix I. Examples of both research laboratory formulas are provided in Appendix II.

SPACE FACTOR 2: OFFICE FACILITIES

Description: An office is typically assigned to one or more persons as a station or work area. It may be equipped with desks, chairs, tables, bookcases, filing cabinets, computer workstations, microcomputers, or other office equipment. Included are faculty, administrative, clerical, graduate and teaching assistant, and student offices, etc.

A conference room is typically equipped with tables and chairs. Normally it is used by a specific organizational unit or office area, whereas Meeting Rooms (680) are used for general purposes such as community or campus group meetings not associated with a particular department. If a room is used for both conference and meeting room functions, then the room should be classified according to its principal use. A conference room is distinguished from facilities such as seminar rooms, lecture rooms, and Class-rooms (110) because it is used primarily for activities other than scheduled classes. A conference room is intended primarily for formal gatherings whereas a lounge is intended for relaxation and casual interaction. This category includes teleconference rooms.

Also included are file rooms, break rooms, kitchenettes serving office areas, copy and FAX rooms, vaults, closets, private rest rooms, records rooms, office supply rooms, and private (restricted access) circulation areas that serve primarily offices and conference rooms.

Room Use Codes: 310, 315 and 350

Guideline: The total amount of office space required by an institution can be calculated by applying module sizes (in assignable square feet) to personnel requiring office space. Module sizes and FTE calculations differ by personnel type, but the general formula can be stated as follows:
Module Size x Number of Personnel =
Total Office and Service Space (300s) and Lounge Space (650s)

Table 1
Office Space Guidelines Sizes and Ranges

1.	Executive/Administrative	Headcount		
	- office			140-180
	- conference			40-60
	- service			15-30
	- lounge			5-10
2.	Faculty	Headcount > 0.5 FTE < 0.5		
	- office			110-140
	- service			15-30
	- lounge			5-10
3.	Professional Non-Faculty	Headcount		
	- office			120-150
	- service			15-30
	- lounge			5-10
4.	Technical/Paraprofessional	Headcount		
	- office			110-140
	- service			15-30
	- lounge			5-10
5.	Clerical/Secretarial	Headcount		
	- office			90-120
	- service			15-30
	- lounge			5-10
6.	Graduate Students	Headcount		
	- office only			40-70
7.	Part-time students	FTE		
	- office only			40-70
B.	**Special Needs Supplement**			
1.	Faculty requiring studio or extra space; e.g., music, law architecture, and art	HC > 0.5 FTE < 0.5		40-80
2.	Small departments (minimum requirements)			
	- 0-5 FTE staff (b) for reception			100-120
	- 6-15 FTE staff (b) for conference			150-200
	- 16-25 FTE staff (b) for conference		50-60	

(a) See Appendix III for descriptions

(b) Includes faculty, professional non-faculty and Technical/Paraprofessional listed in Part A above. These are cumulative numbers so a department with 22 FTE staff could have 120 square feet for reception and 150 square feet for a conference room.

Discussion: Table 1, entitled Office Space Guidelines Sizes and Ranges, suggests FTE calculations by type of staff and the ranges of module sizes by staff type and office need. Only those staff types requiring offices are included. For example, skilled Crafts and Service/Maintenance staff types are excluded totally (see Appendix III). Technical/Para-professional are included because some will require office space. How many of these personnel do in fact require offices depends on the type of department. For example, most hospital staff and such staff in laboratory research units will not. Another category of staff which does not in total require office space is graduate students. Only teaching assistants and non-laboratory science graduate assistants should be included in the calculations. The numbers of such personnel requiring office space can be determined in discussion with individual work units.

The full-time equivalent (FTE) calculation is headcount except for faculty. Faculty of 0.5 FTE or more should be counted as headcount; faculty of less than 0.5 FTE should be counted as FTE. This accommodates office sharing for part-time instructors and lecturers.

In addition to actual office space needs, the subtypes include supplements for special needs. A supplement of service needs (such as for files, copiers, reception, and conference) is included for each staff type except graduate students and part-time student workers. An additional supplement for private conference area is included for the executive/administrative/managerial staff type. A small supplement for lounge space (650) should be determined here. It should be noted, however, that this is space to which employees need access in the given building; departments need not be assigned individual space of this type. The small service supplements are predicted on medium to large departmental or administrative units. Small units will require additional supplements for reception and conference space, as noted in Table I. Additional supplements are needed for academic disciplines requiring in-office studies, drafting, or library space as well.

The ranges of module sizes consider the different types of institutions. In general, two-year institutions will be in the lower end of the range and doctoral granting institutions will be at the upper end of the range.

Institutions with older buildings housing oversized offices which are not easily reducible may want to use actual square foot averages of the office as modules for departments occupying this type of space.

SPACE FACTOR 3: LIBRARIES

Description: Study space is classified into the following categories typically found within a college or university library:

Study Room: Includes study or reading rooms located in libraries, residential facilities, academic or student service facilities, study carrel and booth areas, and similar rooms which are intended for general study purposes. Study stations may be grouped, as in a library reading room, or individualized, as in a carrel. Study stations may include micro-computers, typewriters, computer terminals, microform readers, or other multimedia equipment. The category Study Room includes rooms commonly termed "learning labs" or "computer labs" if they are not restricted to specific disciplines by contained equipment or software. Study rooms are primarily used by students or staff for learning at their convenience, although access may be restricted by a controlling unit (e.g., departmental study room).

Stack: Stacks typically appear in central, branch, or departmental libraries and are characterized by accessible, arranged, and managed collections. Collections can include books, periodicals, journals, monographs, micro-materials, electronic storage media (e.g., tapes, disks, slides, etc.), musical scores, maps, and other educational materials.

Open-Stack Study Room: Seating areas include those types of station and seating arrangements described under Study Room (410). The stack areas of these rooms may include any of the educational material collections described under Stack (420).

Processing Room: A processing room is intended for specific library operations which support the overall library mission. Included are card, micro-fiche, and on-line catalog areas; reference

desk and circulation desk areas; bookbinding rooms; on-line search rooms; multimedia materials processing areas; interlibrary loan processing areas; and other areas with a specific process or operation in support of library functions.

Study facilities also includes storage rooms, copy rooms, closets, locker rooms, coat rooms, and other typical service areas that support a primary study facilities room (see 410, 420, 430, 440).

Room Use Codes: 410, 420, 430, 440, and 455

Guideline 1: As noted above, study space can be found in libraries, residential facilities, academic or student services facilities an other like areas. However, the following space factors refer only to study space found within an academic library. This space would be identified in an inventory by a 400 series room use code and a 041 (Library) function code.

The size of the college library building shall be calculated on the basis of a formula which takes into consideration the size of the student body, the size of the staff and its space requirements, and the number of volumes in the collections. To the result of this calculation must be added such space as may be required to house and service nonprint materials and microforms, to provide bibliographic instruction to groups, and to accommodate equipment and services associated with various forms of library technology.

a. *Space for users.* The seating requirement for the library of a college where less than fifty percent of the FTE enrollment resides on campus shall be one for each five students. That for the library of a typical residential college shall be one for each four FTE students. Each study station shall be assumed to require 25 to 35 square feet of floor space, depending upon its function.

b. *Space for books.* The space allocated for books shall be adequate to accommodate a convenient and orderly distribution of the collection according to the classification system(s) in use, and should include space for growth. Gross space requirements

may be estimated according to the following formula.

	Square Feet/Volume
For the first 150,000 volumes	0.10
For the next 150,000 volumes	0.09
For the next 300,000 volumes	0.08
For holdings above 600,000 volumes	0.07

c. *Space for staff.* Space required for staff offices, service and work areas, catalogs, files, and equipment, shall be approximately one-eighth of the sum of the space needed for books and users as calculated under a) and b) above.

Discussion: This formula indicates the net assignable area required by a library if it is to fulfill its mission with maximum effectiveness. "Net assignable area" is the sum of all areas (measured in square feet) on all floors of a building, assignable to, or useful for, library functions or purposes. (For an explanation of this definition see The Measurement and Comparison of Physical Facilities for Libraries, American Library Association, 1970.)

Successful library service presupposes an adequate library building. Although the type of building will depend upon the character and purposes of the institution, it should in all cases be functional, providing secure facilities for accommodating the library's resources, sufficient space for their administration and maintenance, and comfortable reading and study areas for users. A new library building should represent a coordinated planning effort involving the library director and staff, the college administration, and the architect, with the director responsible for the preparation of the building program.

The needs of handicapped persons should receive special attention and should be provided for in compliance with the Architectural Barriers Act of 1968 (Public Law 90-480), the Rehabilitation Act of 1973, Section 504 (Public Law 93-516) and the Americans with Disabilities Act (ADA) and their amendments.

Particular consideration must be given to any present or future requirements for equipment associated with automated systems or other applications of library technology. Among these might be provision for new wiring, cabling, special climate control and maximum flexibility in the use of space. Consideration should also be given to load-bearing requirements for compact shelving and the housing mixed formats including microforms.

Guideline 2:

ACRL/AECT Standards for Community, Junior, and Technical College Learning Resources Programs

Minimum Assignable Square Feet (ASF) for Learning Resources (excluding corridors, stairs, rest rooms, etc.)

FTE Students	Stack	Staff	User	Media Production	Storage, Viewing, & Other	Total User Space	Stations
To 200	2000	890	1925	3800	4561	13176	70
200-1000	3000	1380	4125	5000	7625	21130	150
1000-3000	4000	1800	9625	8000	15285	38710	350
3000-5000	6000	2500	14575	9500	22065	54640	530
5000-9000	9500	3900	26474	12500	35625	87500	720
9000-12000	10200	5300	33500	13250	44445	106695	960
12000-15000	14000	6980	43259	14000	53265	131504	1200
15000-19000	17000	8940	51225	15000	65025	157190	1520

Excellent ASF for Learning Resource Facilities

FTE Students	Stack	Staff	User	Media Production	Storage, Viewing, & Other	Total User Space	Stations
To 200	3000	1380	2340	4180	5020	15920	85
200-1000	4500	2080	4800	5500	8390	25270	175
1000-3000	6000	2920	11000	8800	16820	45540	400
3000-5000	8500	3760	16775	10450	24270	63755	610
5000-9000	12000	6000	22825	13750	39180	93765	830
9000-12000	17000	8100	30250	14575	48890	118815	1100
12000-15000	24000	10200	48950	15400	58590	157140	1780
15000-19000	29000	13280	59125	16500	71530	189435	2150

Discussion: The learning resources program should provide space for housing collections, for study and research, for public service and staff needs, and for basic production.

Flexibility is essential to cope with technological developments. Most services should be housed in a central location managed by a chief administrator. When components are located elsewhere, these should be located for the most efficient and effective access to these services. Facilities must be planned on a long-term basis, including space for an expanding collection, work space, machines and other equipment, storage, and the needs of users. Space planning must take into account the need for computer workstations, for transmission and retrieval of information by telecommunications, for media production, and for related

requirements within the building for electrical and conduit connections. Space needs of basic components require the minimum ASF stated above. Additional space should be provided when special services are included in the responsibilities of the learning resources program.

SPACE FACTOR 4: PHYSICAL EDUCATION, ATHLETIC AND RECREATION FACILITIES

Description: The distinction between physical education and recreational space is determined mainly by the intent of the area. Recreation rooms and areas are used for relaxation, amusement-type activities, whereas Athletic or Physical Education (520) facilities are typically used for the more vigorous pursuits within physical education, intercollegiate athletics, and intramural programs.

Physical Education and Athletic: Includes gymnasia, basketball courts, handball courts, squash courts, wrestling rooms, weight or exercise rooms, racquetball courts, indoor swimming pools, indoor putting areas, indoor ice rinks, indoor tracks, indoor stadium fields, and field houses. This category includes rooms used to teach dancing and bowling only if they are part of the physical education instructional program.

Also included are all support areas which generally serve a physical education, athletic, or recreational area.

Room Use Codes: 520, 525

Guideline: Indoor space for recreational/physical education activities. A core of space for recreation/physical education utilization is required regardless of the size of a campus. The core is then expanded as a proportional relationship to the total number of students to be served.

Predictor: Use Headcount (HC) number of students if below 2,000.
Use FTE Students when headcount of students is 2,000 or above.

Allowance: Core Requirement (1,000 students) = 20,000 ASF

Formula: Core Requirement plus number of students above core x 5 ASF = Recreational/Physical Education Space Requirement

Discussion: It should be noted that this projection excludes seating used for athletic events and any space used primarily for intercollegiate athletic activity. Facilities used for both intercollegiate athletics and recreation/physical education should be prorated based on the time used by each.

Examples:
As institution with 2,100 students would require 25,500 assignable square feet. This would produce the following facilities:

1 Gymnasium	15,000 ASF
1 Aerobics/Exercise Room	4,000
2 Locker Rooms	3,500
2 Handball/Racquetball Courts	1,600
1 Equipment Storage Room	900
	25,500 ASF

An institution with 9,500 students would require 62,500 assignable square feet. This would produce the following facilities:

1 Gymnasium	22,500 ASF
1 Weight Room	800
1 Golf/Archery Room	800
1 Aerobics/Exercise Room	4,000
1 Swimming Pool	9,500
6 Handball/Racquetball Courts	4,800
1 Track Area (could be located above the gym area)	12,000
Locker Rooms/Showers	6,500
Storage Areas	1,600
	62,500 ASF

SPACE FACTOR 5: MEDIA PRODUCTION

Description: Includes rooms generally called TV studios, radio studios, sound studios, photo studios, video or audio cassette and software production or distribution rooms, and media centers. These rooms have a clearly defined production or distribution function that serves a broader area (e.g., department, entire campus) than would a typical service room.

Also includes film, tape, or cassette libraries or storage areas; media equipment storage rooms; recording rooms; engineering maintenance rooms; darkrooms; preparation rooms; studio control booths; and other support areas that specifically serve a media production or distribution room.

Room Use Codes: 530, 535

Guideline: The requirement for space in this group is represented by a basic core of space plus an additive factor. The core of space is determined by analysis of typical functions to produce an amount of space which each institution should allocate in accordance with its specific program elements. The core guideline of 9,800 assignable square feet (asf) is developed in consideration of the following requirements.

Graphics	1,200 ASF
Photography	1,200
Equipment and Materials Circulation	1,400
Equipment Maintenance	600
Studio	2,000
Television/Audio Distribution	1,200
Audio, Service and Radio	1,000
Instruction Development	1,200
TOTAL	9,800

This core of space will accommodate 4,000 FTE students. Additional undergraduate FTE would necessitate additional space at a rate of approximately 1 ASF per FTE. Graduate FTE would generate space at a rate of 2 ASF per FTE.

Square footage beyond that generated by this formula would depend upon the television instruction program of the institution. A commitment to such instruction would necessitate individually justified space requirements.

Discussion: **Space Definitions**

1. Equipment maintenance space is similar to an electronic repair shop. The amount of space depends on the volume of work handled and the number of technicians required.

2. Production space varies with the type of studios required. Motion picture production generally requires very large spaces and substantial amounts of service for processing and editing. Television studios vary greatly in size, but they generally require large, high ceiling rooms plus large amounts of control and equipment space. Tape, film, and photographic reproduction facilities are largely determined by equipment. Graphics arts production can vary from very little space to a substantial area for equipment and construction.

SPACE FACTOR 6: CLINIC (NON-MEDICAL)\DEMONSTRATION

Description: Clinical space includes patient or client examination rooms, testing rooms, and consultation rooms. Clinics are typically associated with such educational areas as psychology, law, speech, hearing, and similar areas.

In Demonstration space, the key criterion is practice activity within an instructional program which closely simulates a real-world or occupational setting. This includes demonstration day care and development centers, laboratory schools and home economics or management houses, when these facilities are used for practice as a part of collegiate training or instruction.

Also included are all support areas which generally serve clinical or demonstration areas.

Room Use Codes: 540, 545

Guideline: Five assignable square feet per FTE student within each department requiring this type of space.

Discussion: Clinical space which is categorized as 540/545 usually consists of examination rooms, testing rooms, consultation rooms served by waiting rooms, observation, and control rooms. The final determination of need for space of this type is dependent upon the level and complexity of program offerings in such areas as psychology, speech and hearing, etc.

Demonstration space (550/555) is difficult to project as it depends upon program development in the area such as child development and home economics.

The formula outlined above will accommodate general needs in the 540/550 categories. Special programs may require additional space.

Example:

FTE students -	Home Economics	400
	Psychology	750
		1,150 x 5 = 5,750 ASF

SPACE FACTOR 7: FIELD BUILDINGS\ANIMAL QUARTERS\GREENHOUSES

Description:

Field Buildings: Includes barns, animal and poultry shelters, sheds, silos, feed units, and hay storage. Structures are typically of light-frame construction with unfinished interiors and are frequently located outside the central campus area. Also includes storage space for farm vehicles and implements.

Animal Quarters: Includes animal rooms, cage rooms, stalls, wards, and similar rooms for instruction and research.

Greenhouses: The primary criterion here is the combination of structural design as a greenhouse and the use for cultivation or protection. An example would be a greenhouse that serves as a laboratory or service area for a botany or vocational (e.g., horticulture) educational program.

Also included are all support areas which generally serve field buildings, animal quarters, or greenhouses.

Room Use Codes: 560, 570, 575, 580, 585

Guideline: Three ASF x total FTE students plus 25 ASF x FTE students within selected disciplines (departments)* plus 100 ASF x FTE faculty doing research within selected disciplines (departments).*

*These would include disciplines such as Biological Sciences, Agriculture, Veterinary Medicine, Psychology and Medicine.

Discussion: Field buildings (560), animal quarters (570), and greenhouses (580) are specialized facilities which are calculated in a composite fashion. Demand for these spaces varies greatly and depends to a great degree upon the programmatic nature of an institution.

SPACE FACTOR 8: GENERAL USE FACILITIES

Description: General use facilities are characterized by a broader availability to faculty, students, staff, or the public than are Special Use Facilities (500 series), which are typically limited to a small group or special population. Together, general use facilities comprise a campus general service or functional support system (assembly, exhibition, dining, relaxation, merchandising, recreation, general meetings, day care) for the institutional and participant community populations.

Assembly: Includes theaters, auditoria, concert halls, arenas, chapels, and livestock judging pavilions that are used primarily for general presentations (speakers), performances (dramatic, musical, dance), and devotional services. Seating areas, orchestra pits, chancels, arenas, aisles, and stages (if not used primarily for instruction) are included in and usually aggregated into the assembly space.

Exhibition: Includes both departmental and institution-wide museums, galleries, and similar exhibition areas which are used to display materials and items for viewing by *both* the institutional population *and* the public.

Lounge: A lounge facility is typically equipped with upholstered furniture, draperies, or carpeting, and may include vending machines. A general use lounge (see 650) differs from an office area or break room lounge (see 315) by virtue of its public availability. If a room is open for use by people visiting or passing through a building or area, it is coded Lounge (650). Such a room may have vending machines if the primary use of the room is rest, relaxation, informal socializing and not for eating (see 630).

Merchandising: Includes product and service sales areas such as bookstores, student supply stores, barber or beauty shops, post offices, campus food stores, walk-away vending machine rooms, and central ticket outlets servicing multiple facilities or activities. Also included are all support areas which serve general use facilities.

Room

Use Codes: 610, 615, 620, 625, 650, 655, 660, 665

Guideline and Discussion: Several different approaches were employed for development of space guidelines in the general use categories. Food facilities (630) are not addressed as they are primarily a function of market demand.

Assembly/Exhibition (610/620)

This guideline considers the differing levels of need for assembly (610) and exhibition (620) areas as the size of an institution increases. A basic core of space is required on all campuses, regardless of size. Space would increase when degree programs in speech/theater and music are offered.

A. Basic Core

The basic core of space is developed to accommodate the primary exhibition needs of an institution. Generally oriented towards a campus with an FTE enrollment of 2,000, this core is designed for a limited Fine Arts program.

1. Seating area 1-400 seats @ 10 ASF each 4,000
2. Stage and Wings 1,200
3. Control room.....200
4. Storage 200
.....5,600 ASF

B. Enhanced Core

The core described above is increased to reflect the needs of a small college or university with an active Fine Arts program.

1. Seating area 1-400 seats @ 10 ASF each 4,000
2. Stage and Wings 3,000
3. Control Rooms.....300
4. Costume and Storage 1,500
5. Scene Shop/Sets and Props Storage.....2,500
6. Lighting, Design, Storage and Repair 400
7. Sound Effects Production 150
8. Rehearsal Room.....1,500
9. Make-up and Dressing Rooms.....750
10. Green Room..... 400
.....14,500

General Exhibition Space 1,500
.....16,000 ASF

C. Larger Core

The larger core is designed in recognition of the needs of a college or university with a minimum of 5,000 FTE and an active Fine Arts program. A degree program in speech/theater would be accommodated with the large stage and rehearsal facilities described.

1. Seating Areas		
Up to 500 seats @ 10 ASF each	5,000	
2. Stage and Wings	3,500	
3. Control Rooms	400	
4. Costume and Storage	2,000	
5. Scene Shop/Sets and Props Storage	5,000	
6. Lighting, Design, Storage and Repair	400	
7. Sound Effects Production	150	
8. Rehearsal Room	2,000	
9. Make-up and Dressing Rooms	1,000	
10. Green Room	500	
	19,950	
Exhibition Space	2,500	
	22,450	ASF

D. Music Option

On a larger campus, the addition of an extensive music program alters facility needs. An additional core component 5,000 ASF should be added to the appropriate core space when such a program exists. This allocation provides space for recital activities.

A square feet-per-FTE factor is added to the core figures in recognition of additional needs in relation to enrollment. Over 5,000 FTE, use 6 ASF per all FTE over 5,000.

Formula:
Core requirement (plus music option if appropriate) plus ASF-per-FTE factor.
Example:
For an institution with 20,000 FTE students and with an extensive music program the space requirement would be 117,450 ASF.

Core requirement	22,500	ASF
Music option	5,000	

15,000 FTE students over the core 90,000
.....117,450 ASF

Lounge/Merchandising

Lounge (650) and merchandising (660) space is evaluated in several different ways. These distinctions were developed in an effort to assist in the proper distribution of this space on a campus.

1. Departments
   Lounges associated with department offices are projected in the office guideline model.

2. Libraries
   Lounge space in libraries is calculated as a component of the library guidelines.

3. Individual Buildings
   For individual buildings, lounge space is generated as a function of its potential total occupants. It is based upon the number of student instructional stations plus the number of non-office employees (technical/ paraprofessional, skilled crafts, and service and maintenance). Only those employees not included as part of the departmental office and lounge calculation are intended to be in this formula.

Formula:
Total classroom and instructional laboratory stations plus headcount employees (non-office) x 1 ASF =
Total building lounge and merchandising space requirement.

This formula is not designed to calculate student services space in a student union building. (Refer to guideline below). Lounges located in residence halls are excluded and should be developed as needed.

Student Services

This guideline provides a means of evaluating required space for student space for student service functions in a student union facility. Lounges (650), merchandising (660), recreational rooms (670), and meeting rooms (680) are examples of spaces included in this category. This formula also accounts for additional meeting rooms, locker areas and recreational rooms often located in buildings other than the student union.

Recreation areas usually consist of billiards rooms, game and arcade rooms, bowling alleys, table tennis rooms, dance or ballrooms, chess rooms, card playing rooms, hobby rooms, TV rooms, reading (non-study) rooms, and music listening rooms that are used for recreation and amusement and not for instructional purposes.

Formula:
FTE students x 9 ASF = Student Services Space Requirement

Student service space located in residence halls is excluded from this formula.

SPACE FACTOR 9: CENTRAL COMPUTER\TELECOMMUNICATIONS

Description: A Central Computer or Telecommunications room may be one of a *group* of rooms which constitute a *center* for delivering computer-based data processing or telecommunications services to various levels of user groups. Although the ongoing *primary activity* of this category is tied more closely to equipment than human activity, these areas require technical support staff, and physical access may be restricted to these personnel. These central equipment rooms appear most frequently at the campus-wide and large organizational unit levels and are generally subject to environmental and security controls and procedures limiting users to electronic terminal, telephone or modem access. Includes rooms housing a center's computer or computers (e.g., large mainframe, minicomputers, etc.), peripheral input (e.g., data entry terminals, input tape or disk drives, data reading equipment, etc.) and output (e.g., printers, output tape or disk drives, etc.) devices. This category also includes rooms in a central computer complex which are primarily or exclusively dedicated to data or program code entry or job submissions through one or more terminals.

Computer-based telecommunications equipment rooms, ranging from micro-driven LAN (local area network) to the larger PBX (private branch) network centers, including rooms housing satellite signal reception or transmission equipment, should be assigned the 710 code. This equipment may be dedicated to data, audio or telephone, video or any combination of these electronic transmissions.

Also included are all support areas which generally serve central computer and telecommunications facilities.

Room Use Codes: 710 and 715

Guideline: **General Formula**

Core Space of 4,500 ASF + (ASF rate x FTE>5,000) =

Central Computer and Telecommunications space (710 and 715)

Specific Calculation

A core space factor for a central computing area for a campus of 5,000 FTE students is based on the following:

Computer Room	2,000
Maintenance Engineering	400
Ready and Dispatch Rooms	1,600
Keypunch Room and Auxiliary Equipment	500
	4,500 ASF

Additional needs will range from 1 to 3.5 ASF per FTE students over the 5,000 student base.

Space in excess of these two factors should be justified independently, as discussed above.

Discussion: This is a difficult category to project in that technology and utilization of such equipment is changing so rapidly. Certainly, adjustments to the basic formula will be made to justify larger needs due to intricate program mix, large research components, instructional approaches, and/or institutional philosophy in favor of heavily computerized operations and data base management systems. Computer and Information Science Instructional Laboratories are not included here. Space for these are determined as part of the Teaching Laboratories formula.

SPACE FACTOR 9: SHOP\CENTRAL STORAGE

Description:

Shop: Includes carpenter, plumbing, HVAC, electrical and painting shops, and similar physical plant maintenance facilities. This category also includes centralized shops for construction or repair of research or instructional equipment, and repair and maintenance of multimedia equipment and devices. Special purpose shops (e.g., glass blowing, machining) supporting multiple rooms for scientific instruction and research are included in this category.

Central Storage: The concept of *central* or *general* is key to applying this code correctly. The vast majority of storage rooms on a campus are service rooms (e.g., 115, 215, 355, 615, etc.) that directly support a primary activity room or room group; for example, a paper storage room (see 315) can serve several offices (see 310) in an area. Service storage rooms are somewhat close to the areas they serve and are used more than occasionally. Central storage areas include areas commonly called warehouses, surplus storage, central campus supply or storage and inactive storage. A storage room incidentally used to store janitorial supplies would remain in this category. It also includes storage rooms in a building or building area that serve multiple room use types and which are used for general or surplus (e.g., furniture, equipment) collection or storage. The 730 code can usually be used for all storage areas that do not qualify as service rooms.

Vehicle Storage: Includes structures, buildings, and rooms generally called garages, boathouses, and airplane hangars. The definition of "vehicle" is broadly interpreted here to include forklifts, moving equipment, and other powered transport devices or equipment.

Also included are all support areas which generally serve shop, central and vehicle storage facilities.

Room Use Codes: 720, 725, 730, 735, 740 and 745

Guideline: Space (ASF) calculated for room types 100 through 715 plus 800's and 900's times eight percent = shop and storage space required.

Discussion: Shop and storage space is developed as a percentage of all other space to be maintained. Existing square footage in the 720, 730, and 740 categories is excluded from the calculation process.

Square footage used in development of this formula should be actual, not that amount generated by guidelines in this manual. Parking structures are excluded from this formula since they are justified on an institutional basis.

APPENDIX I

Class and Research Laboratory Planning Module Ranges

CIP Code	Discipline	Assignable Square Feet: Class Laboratories						Research Laboratories
010000	Agriculture Business & Production							
010103	Agriculture Economics	30	to	40	40	to	60	
020000	Agriculture	40	to	80	250	to	300	
020200	Animal Sciences	60	to	90	250	to	350	
020402	Agronomy	65	to	70	250	to	400	
020206	Dairy Science	60	to	70	250	to	350	
020209	Poultry Science	60	to	65	250	to	350	
020403	Horticulture	50	to	65	200	to	300	
030000	Conservation & Renewable Resources							
030200	Natural Resource Management	35	to	50	140	to	160	
040000	Architecture	60	to	80	80	to	120	
260000	Biological Sciences	50	to	65	275	to	350	
520000	Business and Management	30	to	40	60	to	80	
090000	Communications	40	to	50	50	to	100	

CIP Code	Discipline	Assignable Square Feet: Class Laboratories			Research Laboratories		
110000	Computer and Information Science	40	to	60	50	to	80
130000	Education	35	to	40	60	to	90
140000	Engineering	80	to	120	300	to	375
140201	Aerospace and Aeronautical Engineering	80	to	140	325	to	425
140301	Agricultural Engineering	100	to	125	325	to	425
140701	Chemical Engineering	90	to	120	250	to	350
140800	Civil/Transportation	100	to	120	325	to	425
141001	Electrical/Electronics/Communications	80	to	100	250	to	350
141901	Mechanical Engineering	100	to	140	300	to	375
141701	Industrial Engineering	70	to	120	200	to	300
142001	Metallurgical Engineering	90	to	120	300	to	375
140601	Ceramic Engineering	100	to	120	300	to	375
142801	Textile Engineering	100	to	120	300	to	375
142101	Mining and Mineral Engineering	140	to	160	350	to	450
141101	Engineering Mechanics	120	to	150	250	to	350
500000	Visual and Performing Arts						
500701	Art	60	to	80	150	to	200
500703	Art History	30	to	35	40	to	50
500901	Music	45	to	60	40	to	50
500301	Dance	100	to	150	75	to	125
160000	Foreign Languages	30	to	40	60	to	90

CIP Code	Discipline	Assignable Square Feet: Class Laboratories						Research Laboratories
510000	Health Professions (except Medicine)		60	to 80		200	to 300	
511600	Nursing	55	to	65	40	to	50	
510600	Dentistry		60	to 70		150	to 250	
511700	Optometry		70	to 80		225	to 275	
512000	Pharmacy		60	to 70		220	to 250	
512400	Veterinary Medicine		60	to 90		275	to 375	
190000	Home Economics	50	to	60	150	to	200	
220000	Law		40	to 50		65	to 85	
270000	Mathematics		20	to 30		65	to 85	
040000	Physical Sciences	60	to	75	275	to	350	
400801	Physics		60	to 75		275	to 375	
400501	Chemistry		60	to 75		275	to 375	
400201	Astronomy		50	to 60		150	to 200	
400601	Geology	50	to	60	275	to	375	
400701	Metallurgy		70	to 90		275	to 325	
420000	Psychology		40	to 50		175	to 225	
450000	Social Sciences		30	to 50		75	to 100	
450201	Anthropology		50	to 60		100	to 200	
450601	Economics		30	to 40		75	to 100	
450801	History		20	to 30		75	to 100	
450701	Geography		50	to 60		75	to 100	
451001	Political Science		30	to 40		75	to 100	
451101	Sociology		30	to 40		75	to 100	

APPENDIX II

Examples of the Research Laboratory Formulas for Estimating Chemistry Research Lab Space

Formula #1

20 Masters students x .70	=	14	
110 Doctoral students x .80	=	88	
30 Post-doctoral/technical x 1.00	=	30	
30 Faculty x .90	=	27	
		159	Total researchers
		x 325	Module size
		51,675	Assignable square feet

Formula #2

30 Faculty	=	30	
24 Graduate faculty x 5.4 (ratio of thesis plus dissertation graduate students per headcount graduate faculty)	=	130	
		160	Total researchers
		x 325	Module size
		52,000	Assignable square feet

APPENDIX III

Staffing Categories

These classifications can be used in the formulae to project office space needs (room use code 300) and lounge and merchandising space needs (room use codes 650 and 660).

I. The following occupational groups are used to project office space:

Executive/Administrative/Managerial: Persons whose assignments require primary (and major) responsibility for management of the institution or a department or subdivision thereof, and whose assignments require the performance of work directly related to management policies or general business operations of the institution or subdivisional unit. All officers are included (president, vice president, dean, director) as well as officers subordinate to these with titles such as associate dean, assistant dean, or chairman. (Supervisory personnel of the technical, clerical, craft, and service/maintenance force will be reported within the specific categories of the personnel they supervise.)

Faculty: Persons whose specific assignments customarily are made for the purpose of conducting instruction, research, or public service as a principal activity and who hold academic rank of professor, associate professor, assistant professor, instructor, lecturer, or the equivalent. Does not include student teaching or research assistants.

Professional/Non-Faculty: Persons whose assignments require either college graduation or experience of such kind and amount as to provide a comparable background. Also includes staff members with assignments requiring specialized professional training who are not reported under executive or faculty, and who should not be classified under any of the following four "nonprofessional" categories of activities.

Clerical/Secretarial: Persons whose assignments typically are associated with clerical activities or are specially of a secretarial nature, including personnel who are responsible for internal and external communication, recording and retrieval of data (other than computer programmers), and/or information and other paperwork required in an office, such as bookkeepers, stenographers, clerk typists, office-machine operators, statistical clerks, payroll clerks, sales clerks, and library clerks who are not recognized as librarians.

II. The following occupational group is used to project office space and lounge/merchandising space. Those individuals requiring office space should be used for that projection; those who do not require office space should be used for projecting lounge/merchandising space.

Technical/Paraprofessional: Persons whose assignments require specialized knowledge or skills which may be acquired through experience or academic work, such as if offered in many two-year technical institutes, junior colleges, or job training programs. Such personnel include computer programmers and operators, drafters, engineering aides, junior engineers, mathematical aides, nurses (licensed practical, or vocational), dietitians, photographers, radio operators, scientific assistants, technical illustrators, and technicians (medical, dental, electronic, physical sciences).

III. The following occupational groups are used to project lounge/merchandising space:

Skilled Crafts: Persons who assignments typically require special manual skills and a thorough and comprehensive knowledge of the processes involved in the work, acquired through on-the-job training and experience or through apprenticeship or other formal training programs. Includes mechanics and repairers, electricians, stationary engineers, skilled machinists, carpenters, compositors, and typesetters.

Service/Maintenance: Persons whose assignments require limited degrees of previously acquired skills and knowledge and who perform duties which result in or contribute to the comfort, convenience, and hygiene of staff and students or who contribute to the upkeep and care of buildings, facilities, or grounds of the institutional property. Includes chauffeurs, laundry and dry cleaning operators, cafeteria and restaurant workers, truck drivers, bus drivers, garage laborers, custodial personnel, gardeners and grounds keepers, refuse collectors, construction laborers, and security personnel.

APPENDIX IV

Definitions and Calculations

Student Clock Hours - is a measurement of the total weekly hours of scheduled instruction for all of an institution's students. It is computed for each course by multiplying the number of times the course meets each week by the number of hours of each course meeting (rounded to the nearest half hour) and multiplying that product by the number of students. Thus, if a course with 20 students meets Tuesdays and Thursdays from 9:00 a.m. until 10:30 a.m., the number of student clock hours generated by that class would be 60 (2 meetings/week x 1.5 hours/meeting x 20 students).

Capacity Enrollment Ratio - The C/E ratio is the amount of instructional and library space on campus divided by the total fall term student clock hours of that institution. The C/E ratio relates the amount of space directly used in an institution's instructional programs to the instructional activity of the campus.

In analyzing and comparing C/E ratios, a relatively low ratio generally indicates a high level of space utilization. However, the level of an institution and the types of instructional programs it offers will affect the amount of space required and, therefore, the C/E ratio.

Instructional and Library Space – is defined in terms of program codes and room use codes. It is the sum of the areas of all rooms which carry both a program designation of 11-18 (instruction), 41 (library services), or 01 (unassigned, capable of use), and one of the room use codes listed below, with the exception that office space is omitted from program 01:

110 Classroom
115 Classroom Service

210 Class Laboratory
215 Class Laboratory Service

220 Open Laboratory
225 Open Laboratory Service

310 Office
315 Office Service

410 Study Room
420 Stack
430 Open-Stack Study Room
440 Processing Room
455 Study Service

510 Armory
515 Armory Service

520 Athletic or Physical Ed.
525 Athletic or Physical Ed. Service

The formula for calculating the C/E ratio is:

$$\text{Capacity/Enrollment Ratio} = \frac{\text{instructional \& library space}}{\text{total weekly student clock hours}}$$

Full-Time Equivalent (FTE) Enrollment – is computed by dividing the number of credit hours for which a student is enrolled by a standard number of hours per student level - 15 (undergraduate or first professional level) or 12 (master's level) or 9 (doctoral level).

Academic Facilities – The term *"academic facilities"* is a broader concept that "instruction and library space" (page 47). It includes all space used for instruction, research, and the administration or support of instruction or research.

Academic facilities can be more precisely defined in terms of program codes and room use codes. The term refers to an institution's total assignable area less the square footage of all rooms bearing programs codes 42 (Museums and Galleries), 52 (Social and Cultural Development), 91 (Student Auxiliary Services), 93 (Intercollegiate Athletics), 92 (Faculty and Staff Auxiliary Services), 65 (Public Relations/Development), 101-102 (Independent Operations), and 02 (Incapable of Use). In addition, space with program code 63 (General Administration and Logistical Service) is deleted if it also has room use code 750 (Central Service), 755 (Central Service Support), 760 (Hazardous Materials), or 765 (Hazardous Materials Service). Space with program code 01 (Unassigned, Capable of Use) and any of the following room use codes is also excluded from academic facilities: 523 (Athletic Facilities Spectator Seating), 630 (Food Facility), 635 (Food Facility Service), 660 (Merchandising), 665 (Merchandising Service), 750 (Central Service), 755 (Central Service Support), 760 (Hazardous Materials), 765 (Hazardous Materials Service), all of the 800s (Health Care Facilities), and all of the 900s (Residential Facilities).

The formula for calculating Square Feet of Academic Facilities per FTE Student is:

$$\text{Square Feet of Academic Facilities per FTE Student} = \frac{\text{Square Ft. of Acad. Facilities}}{\text{FTE Enrollment}}$$

Average Weekly Room Hours of Instruction in Classrooms – is the average number of hours each week that an institution's classrooms are used for instruction each week. The average weekly room hours of classroom instruction can serve as an indicator of the adequacy of the number of classrooms at an institution.

The total room hours of instruction in classrooms is the number of hours each week that each classroom is used for regularly scheduled classes. A classroom which is used Mondays, Wednesdays, and Fridays from 9:00 a.m. until 1:00 p.m. and on Tuesdays and Thursdays from 8:30 a.m. until noon would generate 19 room hours (4hours/day x 3 days/week + 3.5 hours/day x 2 days/week).

A classroom (110) is defined as a room used to conduct classes that do not require special-purpose equipment for student use. It could be used for teaching the lecture portion of any course. If a room is used for regularly scheduled classes but has special equipment which ties it to a particular subject matter, then the room is a

class laboratory and would not be counted in this calculation. The calculation for average weekly room hours of instruction is:

Average Weekly Room Hours of Instruction in Classrooms =

$$\frac{\text{Total Rooms Hours of Instruction in Classrooms}}{\text{Total Number of Classrooms}}$$

Average Weekly Room Hours of Instruction in Class Laboratories – is the average number of hours each week that an institution's class laboratories are used for instruction each week. The average weekly room hours of classroom instruction can serve as an indicator of the adequacy of the number of classrooms at an institution. South Carolina's standard is 30 weekly room hours per week for both day and evening classes.

The total room hours of instruction in class laboratories is the number of hours each week that each class laboratory is used for regularly scheduled classes. A laboratory which is used Mondays, Wednesdays, and Fridays from 9:00 a.m. until 1:00 p.m. would generate 12 room hours (4hours/day x 3 days/week).

A class laboratory (210) is defined as a room used primarily for regularly scheduled classes that require special-purpose equipment for student participation, experimentation, observation, or practice in a field of study. Room used for regularly scheduled classes which have no special-purpose equipment (i.e., classrooms) and rooms with special-purpose equipment that are not used for regularly scheduled classes (i.e., other types of laboratories) would not be counted in this calculation.

The average weekly room hours of instruction in class laboratories can provide some indication of the adequacy of the number of class laboratories at a particular institution. However, since the data reflect the utilization of all class laboratories, it is impossible to determine whether an institution's apparent shortage (or surplus) of these rooms is limited to certain types of is "across the board."

Because each class laboratory is designed for use in a particular field of study, most are not used as frequently as classrooms.

The calculation for average weekly room hours of instruction in class laboratories is:

Average Weekly Room Hours of Instruction in Class Laboratories =

$$\frac{\text{Total Rooms Hours of Instruction in Class Laboratories}}{\text{Total Number of Class Laboratories}}$$

Average Weekly Use of Student Stations in Classrooms – is calculated by dividing the total number of student clock hours in classrooms by the total student stations in classrooms. The average weekly use of student stations can serve as an indicator of the adequacy of the number of student stations in classrooms.

Average Weekly Use of Student Stations in Classrooms =

$$\frac{\text{Total Student Clock Hours in Classrooms}}{\text{Total Student Stations in Classrooms}}$$

Average Weekly Use of Student Stations in Class Laboratories – is calculated by dividing the total number of student clock hours in class labs by the total student stations in class labs. This calculation serves as an indicator of the adequacy of the number of stations in class laboratories.

Average Weekly Use of Student Stations in Class Laboratories =

$$\frac{\text{Total Student Clock Hours in Class Labs}}{\text{Total Student Stations in Class Labs}}$$

Percent student station utilization in classrooms (or class labs) – indicates the percentage of student stations that are occupied when classrooms (or class labs) are occupied when classrooms or class labs are in use. It is calculated by dividing the student clock hours generated in the classrooms (or class labs) by the potential student clock hours of class rooms (or class labs) and multiplying by 100 to convert to a percentage. Potential student clock hours are calculated on a room by room basis by multiplying the number of student stations in each room by the number of hours of instruction generated by the room. It indicates the number of student clock hours that would be generated if every room were filled to capacity (i.e. the number of students equaled the number of stations) each time a course met in the room.

The percent station utilization assesses the utilization of rooms only when they are in use. This figure is therefore a helpful indicator of how close to capacity an institution's courses are to the rooms in which they are scheduled. It does not, however, indicate the overall efficiency of utilization since it does not take into consideration how frequently a room is used. The higher percentage for labs assumes that these rooms, although used less frequently because of special frequency or configuration and/or equipment, are usually closer to being filled to capacity when being used.

Percent student station utilization in classrooms (or class labs) =

$$\frac{\text{Student Clock Hours in Classrooms (or Class Labs)}}{\text{Potential Student Clock Hours in Classrooms (or Class Labs)}}$$

Space Factors – A space factor is the average assignable square feet per student station of a given type of space divided by the product of the average weekly room hours multiplied by the percent station utilization. Space factors must relate to a specific type of space, i.e. classrooms or labs but not a combination of the two.

$$\text{Space Factor} = \frac{\text{Assignable Square Ft. per Stu. Station}}{\text{Avg. Weekly Room Hours X Percent Station Utilization}}.$$

Since the average assignable square footage per station in class laboratories varies widely among different types of labs, South Carolina does not recommend a particular guideline for class laboratories.

Net-to-Gross Ratio - the assignable (or net) area of a building or group of buildings divided by the gross area.

Gross Area - the sum of the floor areas of the outside faces of its exterior walls for all of the building's stories (or areas that have floor surfaces).

Assignable (or net) area - the sum of all areas on all floors which are assigned to, or available for assignment to, and occupant or specific use. More specifically, it is the building's gross area less its building service, circulation, mechanical, and structural areas.

> If a renovation can increase the amount of assignable space in a building, then part of the cost of the renovation can be justified purely on a cost savings basis. For example, if construction costs average $110 per GSF, and the average net-to-gross ratio is .62, then new construction costs are approximately $192 per ASF. Thus, every ASF created through a renovation can be viewed as saving the institution $192 in new construction costs.

APPENDIX V

South Carolina Space Planning Guidelines used for Evaluating Capital Requests -

CLASSROOMS:

Average Weekly Room Hours of Instruction		
- Classrooms (Day & Night)		**30**
Percent Station Utilization		
- Classrooms		**60%**
Assignable Square Feet per Student Station		
- Classrooms		**22**
Space Factor for Classrooms -		**1.22**

ACADEMIC SPACE ASF:

Square Feet of Academic Facilities per FTE	**Research**	**136**
	Teaching	**93**
	Two-Year	**70**

BIBLIOGRAPHY

Higher Education Facilities and Classification Manual, produced by the National Center for Education Statistics for the U.S. Department of Education. Washington, D.C.: U.S. Government Printing Office, 1992.

Space Planning Guidelines for South Carolina Colleges and Universities, South Carolina Commission on Higher Education, 1982.

Space Planning Guidelines, Council for Educational Facility Planners, 1985.

Standards for College Libraries, 1986, Association of College and Research Libraries, 1986.

Standards for Community, Junior, and Technical College Learning Resources Programs, Standards Document, Association of College and Research Libraries, Association for Educational Communications and Technology.

Space Planning Guidelines, American Association of Physical Plant Administrators (APPA).

Space Projection Model for Public Health Related Institutions, Texas Higher Education Coordinating Board.