Appendix A
Projection of Space Needs using the UMBC Space Model

Introduction

UMBC's Space Model is a tool that allows the campus to continually evaluate its space needs at the macro-scale. It is built upon thousands of variables used to determine the amount of assignable and non-assignable area the campus requires to satisfy its mission and operate effectively. The model compares appropriate space quantities to the university's existing space and/or to a proposed plan.

Projections can be made for a variety of desired scenarios by changing any number of variables in the model. The model allows the campus to test planning scenarios and project facility impacts due to programmatic changes under consideration. Typical planning scenarios include changes in enrollment growth projections, evolving classroom and laboratory pedagogies and uses, new research emphases, staffing trends, demographic changes in the community or surrounding region, and increased campus housing capacity. When variables are changed, the model presents the resulting space impacts associated with the adjustments.

As such, the Space Model is a valuable tool to evaluate facility space impacts driven by strategic goals and objectives. The ability to provide sound data is particularly beneficial in an academic planning process, a strategic planning process, and especially, in long range facility planning.

Use of the Model

The Space Model was initiated specifically for the campus Master Plan Update. However, it is intended to be dynamic and used on an ongoing basis as a planning tool. It can be used for a variety of planning and prioritization processes.

As it was crafted, detail was incorporated in a way that allows the university to evaluate the impact of individual departments on space needs related to classroom demand, research activities, administrative functions, and student life activities. The Space Model provides very specific data at the departmental level for spaces such as classrooms, laboratories, and offices. The intent is not to identify the amount of space to be assigned to each department but rather quantify space needs driven by each department's programmatic requirements. It is important to view the results of this model from a macro perspective because of the varying levels of detail for each variable and the fact that most campus spaces are shared resources.

The Space Model is intentionally designed as a flexible tool to respond to changes in space guidelines and continually improve upon the space and personnel variables. The model is configured to permit

addition of other space factors, such as quality and condition, functional obsolescence, and adjacency issues. The facilities audit or facilities condition assessment can be incorporated into the model.

By adjusting the variables, the model provides a description of the space needs for the campus at any given time. Current, planned, and projected enrollment scenarios can be input. Adjustments on faculty and staff loads can be manipulated. Guidelines used to determine the space needs can be changed at any time as well. The "what ifs" are almost endless.

The Space Model directly ties into the physical master planning and long range facilities plans. It provides data necessary for each, and can also help identify priorities for project planning. However, the model is not intended to replace program level analysis and space issues associated with planning for specific projects should be dealt with on a case-by-case basis in the form of facility programs.

Development of the Model

UMBC enlisted the services of the consultant Joseph E. Bilotta of JBA, Inc. to guide the development and generate UMBC's Space Model. JBA, Inc. employed a consensus-built process over a period of a year directly engaging over 90 faculty, deans, staff, and students. Participants were assigned to one of ten space planning groups based upon their individual knowledge of and experience with specific space types. The space planning groups were:

- Animal Support Space
- Campus Open Space
- Classroom Space
- General Use and Special Use
- Housing and Food Service Space
- Instructional and Lab Space
- Library and Study Space
- Office Space
- Student Life Space
- Support and Service Space

Over a series of workshops with each space planning group, variables influencing and driving space needs were identified and defined for both interior building space and exterior infrastructure assets, such as recreation fields and courts. For interior building space, both assignable and non-assignable space variables were evaluated and establish.

Interior building space types were defined in accordance with the nationally recognized Postsecondary Education Facilities Inventory and Classification Manual developed and published by the National Center for Education Statistics (NCES). The NCES classification system defines ten major space use categories of assignable space and three major space use categories of nonassignable space as described on the website: http://nces.ed.gov/pubs2006/2006160.pdf.

In UMBC's Space Model, this classification system was modified slightly by combining the three nonassignable space use categories with the unclassified assignable space use category into a single category. The ten space categories employed in the model are:

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 Non-assignable & Inactive

The Maryland Higher Education Commission Space Guidelines for Four-Year Public Institutions formed the foundation of UMBC's Space Model. Variables were customized to reflect the campus' specific space needs applied at the department level to forecast each programs impact on the need for particular space types.

The Space Model was built upon an easy-to-use spreadsheet platform consisting of four worksheet categories: institutional data; space factors; space allowances; and summary data.

Institutional Data

The minimum institutional data required to be entered into the Space Model includes FTE enrollment, credit hours, employee data, and space inventory. All institutional data is keyed to unique department identification numbers that are common to all campus databases. By following this convention, periodic updates of institutional data and inclusion of new data will be straightforward.

FTE enrollment and credit hours are provided in terms of undergraduate and graduate students, and day and evening hours. The Space Model was crafted to run scenarios projecting the impact to facilities in changes to any combination of student factors. For the purposes of the projections developed for the 2009 Facilities Master Plan Update, only day FTE and credit hours were considered.

Employee data within the Space Model is structured after the existing EE06 employee categories:

- Executive/Administrative/Managerial
- Faculty
- Professional Nonfaculty
- Secretarial/Clerical
- Technical/ Paraprofessional
- Skilled Crafts

- Service Maintenance Workers
- Graduate Assistant

The space inventory includes all campus spaces identified by department and space use category, in accordance with the structure developed for the Space Model. Within each of the ten major space use categories, there are subcategories following the nomenclature outlined in NCES' Postsecondary Education Facilities Inventory and Classification Manual. A total of 90 space use categories are employed in the Space Model.

Space Factors & Space Allowances

Space factors and space allowances worksheets are provided for each of the 10 space use categories employed in the Space Model.

100 Classroom Facilities

Classrooms are defined as any room generally used for scheduled instruction requiring no special equipment. At UMBC, this category includes classrooms, seminar rooms, and lecture halls. Classroom service space directly supports one or more classrooms as an extension of the classroom activities. Service includes audiovisual equipment closets, preparation areas, or storage rooms.

The Space Model projects the need for classroom space driven by each department based upon this set of utilization and efficiency factors:

- Percent Credit Hours in Classroom - This is the percentage of student credit hours supported by classrooms. The balance flows into the laboratories.
- Contact Hours per Credit Hour - This is the amount of time a person is in class to earn the credit.
- Hours per week available - This is the number of hours a classroom is typically available to teach. It is not necessarily when it is "open"; but the window in which scheduling typically occurs.
- Utilization Target - This is the percentage of the week in which the classrooms should be utilized to be determined in good use. The balance of the week is necessary for cleaning, scheduling flexibility, testing, meetings, and set up time.
- Efficiency Target - This is the percentage of stations that should be filled, on the average, every time a classroom is used.

The Percent Credit Hours in Classroom space factor was customized for each department and varies from 15% to 100%. For the remaining classroom facilities space factors, the model assumes that they remain constant for all departments as:

- Contact Hour per Credit Hour of 1:1
- Hours per week available of 40 hours from 8 am to 5 pm Monday through Friday
- Utilization target of 75%
- Efficiency target of 67%

For hours per week available, the model is crafted to accommodate day and evening windows. Only the day portion of the model is used at this time since it was determined that this is the primary force driving the need for classroom space. In essence, the same rooms needed during the day can be reused in the evening.

The Classroom Space Planning Group identified four classroom styles of different sizes as appropriate for UMBC's pedagogical approach. These include:

- Small seminar with 1 to 12 seats in conference room setting
- Large seminar with 13 to 24 seats in conference room setting
- Small classroom with 13 to 24 seats in table and chairs setting
- Medium classroom with 25 to 49 seats in table and chairs setting
- Large classroom with 50 to 100 seats in tablet arm chair setting
- Large lecture hall with over 100 seats in tiered fixed seating setting
- Active learning room with under 50 seats
- Active learning room with more than 50 seats

For each classroom type, the model assigns an appropriate area per station type and service area as a percent of the classroom. The station size represents the area needed to support the specific teaching pedagogies intended for the classroom style. The space per station also takes into account space needed for an instructor. Classroom service is a percentage of the classroom space needed.

Since each department has its own requirements for which classroom type is appropriate for their instructional material, the Space Model identifies by academic department the percentage of that department's credit hours which should be scheduled in each classroom type. In this way, the Space Model aligns teaching and learning pedagogies with classroom projections so that the needs of the programs are truly met.

The projections are calculated by first determining the percent of student credit hours that are typically held in a classroom setting versus a laboratory setting. This is then adjusted per the ratio of credit hours to contact hours. Space needs are determined by taking the contact hours produced by each department and dividing that by the department's efficiency and use variables. This determines the number of stations required. The model then determines the number of stations of each classroom style needed by applying the percentages established for each department. The area needed is then calculated by simply multiplying the number of stations for each classroom style by its own unique station size and adding the applicable percentage for classroom service.

200 Laboratory Facilities

NCES defines a laboratory as "a facility characterized by special purpose equipment or a specific space configuration that limits instructional or research activities to a particular discipline or a closely related group of disciplines". While laboratories are most often associated with science disciplines, laboratories are found in all fields of study including humanities, natural sciences, social sciences, engineering, and computer science.

Laboratory facilities are subdivided into three categories:

- An instructional laboratory is a specially configured and/or outfitted space used for scheduled instruction. Class laboratories serve the needs of particular disciplines for group instruction, participation, observation, experimentation, or practice in an academic discipline.
- An open laboratory is a specially configured and/or outfitted space supporting instruction but not formally scheduled. Instead, these spaces are used primarily for individual or group instruction that is informally scheduled, unscheduled, or open.
- A research/nonclass laboratory is a specially configured and/or outfitted space used for research, experimentation, observation, research training, or structured creative activity that supports extension of a field of knowledge. Included in this category are labs for faculty, staff, and students engaged in the conduct of research and controlled or structured creative activities related to a specific academic discipline.

The Space Model projects the need for laboratory facilities driven by each department based upon a set of variables for each laboratory category. There are a set of general variables common to all three laboratory categories related to people data and demands for use. However, the space model factors and allowances for each type of laboratory facility are generally unique as described below.

The Space Model projects the need for instructional laboratory space driven by each department based upon a set of utilization and efficiency factors that are similar to those established for classroom facilities:

- Percent Credit Hours in Instructional Laboratory - This is the percentage of student credit hours supported by instructional laboratories. It is the balance of the credit hours not conducted in a classroom facility.
- Contact Hours per Credit Hour - This is the amount of time a person is in an instructional laboratory to earn the credit.
- Hours per week available - This is the number of hours an instructional laboratory is typically available to teach. It is not necessarily when it is “open” but the window in which scheduling typically occurs.
- Utilization Target - This is the percentage of the week in which the instructional laboratory should be utilized to be determined in good use. The balance of the week is necessary for cleaning, scheduling flexibility, testing, meetings, and set up time.
- Efficiency Target - This is the percentage of stations that should be filled, on the average, every time an instructional laboratory is used.

The Percent Credit Hours in Instructional Laboratory space factor was customized for each department and varies from 0% to 85%. For the remaining instructional laboratory space factors, the model assumes that they remain constant for all departments as:

- Contact Hour per Credit Hour of 2:1
- Hours per week available of 40 hours from 8 am to 5 pm Monday through Friday
- Utilization target of 50%
- Efficiency target of 75%

For hours per week available, the model is crafted to accommodate day and evening windows. Only the day portion of the model is used at this time since it was determined that this is the primary force driving the need for instructional laboratory space. In essence, the same rooms needed during the day can be reused in the evening.

The model assigns an appropriate area per lab station and service area as a percent of the instructional laboratory. The station size represents the area needed to support the specific teaching pedagogy intended for the lab setting. Since academic disciplines require varying amounts of space per station, the station sizes are tailored for each department. The space per station also takes into account space needed for an instructor. Instructional laboratory service is a percentage of the instructional lab space needed.

The projections are calculated by first determining the percent of student credit hours that are typically held in an instructional laboratory setting versus a classroom setting. This is then adjusted per the ratio of credit hours to contact hours.

Space needs are determined by taking the contact hours produced by each department and dividing that by the department's efficiency and use variables. This determines the number of stations required. The area needed is then calculated by simply multiplying the number of stations each department needs by its own unique station size and adding the applicable percentage for classroom service.

The Space Model projects the need for open laboratory space driven by each department based upon these space factors:

- Percent FTE for Open Labs - This is the percent of student FTE's in the department being used as a load to determine the number of stations for open laboratories.
- Percent Computational Labs – This is the percent of open lab stations that are required to be of the traditional computer lab style station.
- Percent Special Use Labs – This is the percent of open lab stations that are required to be configured to meet the needs of a particular department. Examples of this style include electronics labs and dance studios

The model assigns an appropriate area per lab station and service area as a percent of the open laboratory. The station size represents the area needed to support the lab style. While the station sizes could be tailored for each department, the Space Model assumed that the values remained constant across departments:

- Percent FTE for Open Labs at 10%
- Percent Computational Labs at 80%
- Percent Special Use Labs at 20%

Open laboratory space needs are determined by taking the FTE's for each department and calculating the number of open lab stations needed of each of the two styles. The area needed is then calculated by simply multiplying the number of stations of each style by the unique station size and adding the applicable percentage for open laboratory service.

The Space Model projects the need for research laboratory space driven by each department based upon these space factors:

- Percent Full Time Faculty for Research - This is the percent of employees of this type that conduct research for the specific department.
- Percent FT Professionals Non-Faculty for Research - This is the percent of employees of this type that conduct research for the specific department.
- Percent FT Technical for Research - This is the percent of employees of this type that conduct research for the specific department.
- Percent Graduate Student for Research - This is the percent of employees of this type that conduct research for the specific department.

The Instructional and Lab Space Planning Group identified four laboratory types as appropriate for UMBC's research activities. These research laboratory types include:

- Wet – These research labs are those where chemicals, drugs, or other material or biological matter are tested and analyzed requiring water, direct ventilation, and specialized piped utilities. While there may be one or more computers in the lab, the primary distinguishing feature is the requirement for piped utilities and possibly fumehoods.
- Dry – These research labs are those which do not require specialized piped utilities or fumehoods but do require special configuration or equipment. Examples includes a lab that uses primarily electronic equipment, for example, a robotics lab. A dry lab could also refer to a dance studio restricted to the use of faculty, staff, or students engaged in research. While there may be one or more computers in the lab, the primary distinguishing feature is that there are no piped utilities or fumehoods but there is special equipment or configuration for other non-computational activities.
- Computational – These research labs are ones in which computational or applied mathematical analyses are done on a computer-generated model to simulate a phenomenon in the physical realm.
- Special Use – These research labs include any that require exceptionally large space to accommodate over-sized equipment or materials.

The model assigns an appropriate area per lab station and service area as a percent of the laboratory for each of the four research laboratory types. The station size represents the area needed to support the research activities intended for the lab setting. Since academic disciplines require varying amounts of space per station, the station sizes are tailored for each department.

Research laboratory space is calculated by applying the research variables to the FTE employment data to determine the number and type of persons involved in research for planning purposes. This load is then distributed across the lab types and an area is calculated based on station sizes for the specific laboratory type. Service is added as a percentage of total research laboratory type.

300 Office Facilities

Office facilities include the offices, office service, conference rooms, and conference service spaces assigned to academic, administrative, and service functions. Offices provide individual or multiperson workstations and are typically equipped with furniture, computers, or other office equipment. Office service space directly serves an office or group of offices and includes file rooms, copy and fax rooms, closets, break rooms, kitchenettes, student counseling rooms, testing rooms, and open and private circulation areas. Conference rooms serve an office complex and are used primarily for staff meetings and departmental activities. Conference service rooms include kitchenettes, storage rooms, and audio-visual equipment rooms that serve one or more conference spaces.

The Space Model projects the need for office facilities driven by each department based upon the number of people employed by the department in each of the eight EE06 employment classifications. The model assigns an appropriate area per office workstation based upon the employee category and whether an employee is full or part-time.

Table A-1

Area Assignments by Office Type

EE06 Ctgy	Adjusted Variables	Employment Type	ASF Per Station
1	Executive/Administrative/ Managerial	FT	225
		PT	120
2	Faculty	FT	135
		PT	75
3	Professional Nonfaculty	FT	125
		PT	70
4	Secretarial/Clerical	FT	100
		PT	60
5	Technical/ Paraprofessional	FT	120
		PT	70
6	Skilled Crafts	FT	25
		PT	10
7	Service Maintenance Workers	FT	25
		PT	10
9	Graduate Assistant	FT	80
		PT	40

Service is calculated as an allotment per employee to be used for work, file, copy, mail, etc. as a percentage of total office space. While conference and conference service is calculated for each department even though this space may be shared, especially among smaller departments.

400 Study Facilities

Study facilities encompass those spaces typically associated with library stack, process, and study areas as well as other study spaces located outside a library. The Space Model variables for study facilities are broken into space needed for materials and resources, study space, and service space for libraries:

- Current Inventory - This is the number of materials currently in the university's library collections.
- Physical Bound Volume Equivalent (PBVE) – This is a standard space planning measure for counting

library materials of various shapes and sizes. Typically, one PBVE is a bound volume book stock and bound periodicals.

- Conversion Factor - This converts the various types of materials in the inventory into the PBVE equivalent.
- Percent Growth - The projected growth of each material type.
- Percent Type of Storage - This breaks the materials into 3 different types of storage systems: low density browsable shelving, medium density browsable, and high density non-browsable.
- Area per Item - Provides an area per type of storage system per type of material.
- Percent Seats for Undergraduates and Graduates, Non-library – This is the percent of the total FTE per category of students for seating stations outside the Library.
- Percent Seats for Undergraduates and Graduates, Library - This is the percent of the total FTE per category of students for seating stations in the Library.

The Library and Study Space Planning Group identified eight seating types appropriate for UMBC's students:

- Individual Seating
- Seating (2-4 Stations)
- Seating (4-8 Stations)
- Small Study (4-6 Stations)
- Study Medium (6-8 Stations)
- Study Large (12 Stations)
- Carrels

The model assumes a distribution of seating across styles and client type (i.e. undergraduate, graduate, and public). Each seating type is assigned an appropriate station size.

The Space Model projects the need for study by calculating the number of seats necessary for study both in the Library and outside the Library. Space needs for seating are projected based on the percentage and type of seating in the planning variables with seating service a percent of the total seat space necessary.

The model projects the need for material storage space by applying the percentage to be stored in browsable shelving and compact storage. Additional space needed for library service and processing space is calculated as a percentage of the materials space accordingly. Space projections are currently only using the browsable figure since the campus does not intend to store materials in compact or high density shelving in the near future. When it does, the model can help identify the space saving accordingly.

500 Special Use Facilities

The special use facilities category captures spaces that are sufficiently specialized in their primary activity or function to merit a unique space code. Included in this category are armories, athletic facilities, media production, clinic, demonstration, animal facilities, and

greenhouse. Access to special use facilities is typically limited to a small group or special population.

Many of the special use variables are specific to a unique space and specific department. Variables are independent of many other variables and stand alone when being used to project special use facilities needs.

The Space Model projects the need for sports related facilities space based on the actual number of participants in recreation, intramurals, physical education, athletics, and club sports. The number of participants in recreation and intramurals are based on a percentage of the student body. While the number of participants in physical education, athletics, and club sports was based on actual counts or planned figures.

The model projects the need for clinic stations as a percent FTE of faculty of departments engaged in clinic activities. Similarly, the need for animal space is projected based upon the percent of faculty in departments utilizing animal protocols in their research or as part of an instructional program; and an average number of animals of each species per faculty.

The need for other special use facility types are similarly developed based upon evaluating the programmatic drivers impacting the need for the unique space type.

600 General Use Facilities

General use facilities include all those facilities characterized by their broader availability to faculty, staff, students, and campus visitors. Spaces in this category include theaters, auditoria, exhibit halls, food facilities, day care, public lounges, merchandising establishments, meeting rooms, and indoor recreation space.

The classification of athletic and recreation space at UMBC is particularly challenging since most areas are shared by athletic teams and recreational users. Therefore, the space could be classified as either special or general use.

The model projects the need for general use space similar to the methodology for special use space. Each general use space type has its own unique set of programmatically driven variables driving the need for the space. The calculation of demand is based upon the number of stations needed, the area per station, and a service percentage for the specific space type.

700 Support Facilities

Support facilities include centralized spaces supporting various auxiliary support systems and services required to maintain and operate the campus. Included in this space category are centralized computer or telecommunication centers, shops, vehicle storage, general storage and supply, mail facilities, and hazardous material areas.

The Support and Service Space Planning Group identified which departments required support facilities and customized variables based upon the needs of these departments. For example, while the need for shop facilities is generally understood to be driven by the activities of facilities management operations, it was also identified as being driven by academic departments. Shop space is needed for fabrication of research equipment, manufacture of devices as part of nationwide student competitions, and production of materials (e.g. floats) by student life organizations. The number of shop workstations was then estimated as a

percentage of FTE students in specific departments; and an appropriate station size applied to project space needed to support these activities.

For support and service spaces relate to vehicle storage, the Space Model variables relate to storage for service vehicles and areas to maintain and service vehicles. The variables include the number, area, and percent service of vehicles for each department requiring vehicles to conduct their business. These include the Department of Facilities Management, Athletics, Student Life, Residential Life, and some academic and administrative units.

The space required to support general campus storage needs space was projected based on the total student body and the university's employees, with an additional percent of space on the campus for non people driven needs.

A variety of other space issues includes both the demand variable to measure the number of stations as well as the area per station and service percentage for the specific space type. This includes data centers, hazardous materials storage and central service support.

800 Health Care Facilities

The health care facilities space category includes those areas for patient care located in separately organized and budgeted health care facilities. The space factors driving the need for these facilities revolve around the demand for health center and wellness activities. The Space Model projects space needs in this category by determining the number of beds and wellness stations as a percent of the total student population. Each bed and station type is assigned an appropriate station size.

900 Residential Facilities

Residential facilities are defined as housing for students, faculty, staff, and campus visitors that are owned or controlled by the institution. Within this category, the Space Model projects the need for residential facilities based upon the following ten housing types:

- Residence Hall Singles, no bath
- Residence Hall Doubles, no bath
- Residence Hall Singles, w/ bath
- Residence Hall Doubles, w/bath
- Residence Hall Triples, no bath
- Residence Hall Triples, w/bath
- Residential Suite Style, 2 bedrooms
- Residential Suite Style, 4 Bedrooms
- Apartment Style, 4 Bedrooms w/ Kitchen
- House

The model projects space needed for each of these housing types by projecting the number of bed spaces planned for each of the basic undergraduate student class levels, the graduate

student class, faculty, staff, and visitors.

For the purposes of the 2009 Facilities Master Plan Update, the Space Model assumes that the university will provide housing for:

- 40% of its total undergraduate population
- 75% of its entering freshman
- Less than 2% of its graduate students
- None of its faculty and staff

It was further assumed that visitors primarily need housing in the summer when there are sufficient vacancies in the existing housing inventory.

The model assigns a bed station size for each of the ten housing types. These station sizes account for bed and bath space and their associated service areas. The other types of spaces (e.g. study rooms and offices) found in most residence halls are not projected as part of this space category but in the appropriate appropriate space category (e.g. 400 Study Facilities and 300 Office Facilities).

Space needs for residential facilities are determined by applying the station sizes to the number of beds identified as being driven by the population to be housed on campus.

000 Nonassignable & Inactive

Non-assignable space is defined as those areas not available for assignment to an occupant or for a specific use, but necessary for the general operation of the building. Nonassignable areas include building areas required for pedestrian circulation, mechanical operations, building service, and to contain structural building elements. Some examples of nonassignable space includes mechanical and electrical rooms, telecommunication closets, janitorial closets, elevators, stairs, restrooms, hallways, vestibules, lobbies, loading docks, trash room, shafts for ductwork, and walls.

The space model incorporated unclassified spaces into this space category. Unclassified space includes areas unavailable for assignment due to renovation activities or to a condition that renders it inhabitable.

Space needs for nonassignable and inactive areas are projected as a percentage of the total of all the assignable space needs combined. These percentages add to approximately 37.5% of the total gross space needs.

Summary Data

The Space Model has a series of summary data sheets which display the results of planning scenario. These sheets include space projections and space deficits for each of the 90 space use categories, as well as rolled up summaries for the ten major space use categories. Charts and tables present high-level information suitable for administrative use and presentation.

Results of the Model

Initial Planning Assumptions

The base year for the model is Fall 2009. The Office of Institutional Research provided all student, faculty, and staff data frozen on the 10th day of the Fall 2009 semester. The Department of Facilities Management provided the existing space inventory based upon the completion of a campus-wide space survey completed in December 2009.

Based upon the Fall 2009 campus-wide space survey, the total existing space on campus was 3,289,422 square feet of which 1,973,573 was assignable.

Table A-2

Fall 2009 Space Inventory by Space Type

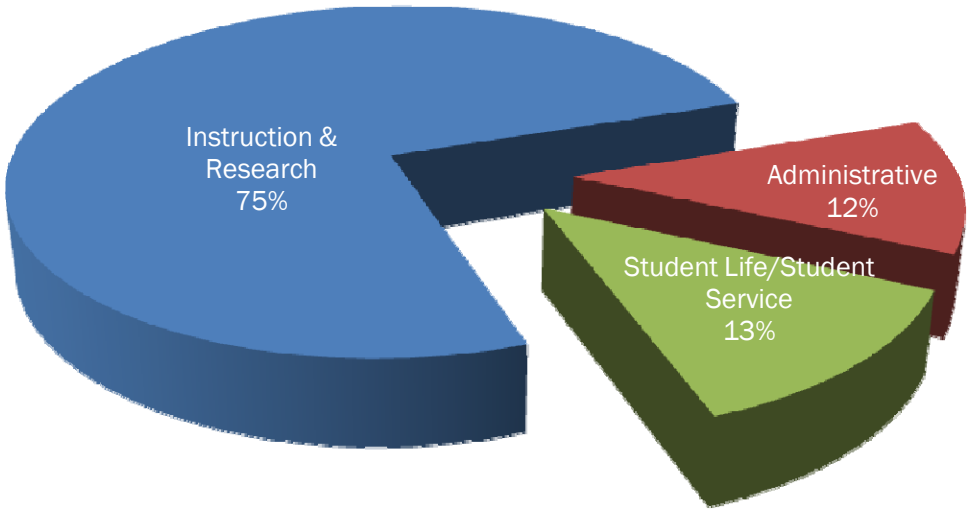
Space Type	Existing Space
Classroom	99,491
Laboratories	292,934
Office	385,300
Study	146,390
Special Use	103,896
General Use	156,636
Support	71,427
Health	2,982
Residential	714,517
Total NASF	**1,973,573**
Non-Assignable[a]	1,315,850
Total GSF	**3,289,422**

* Includes approximately 1,300 nasf of inactive space.

Excluding campus housing, the majority of existing space is devoted to instruction and research. Space devoted to student life and student services constitute only 13% of the total space; and administrative functions such as financial services, human resources, procurement, police, and facilities management comprise only 12% of the total existing space.

Figure A-1

Distribution of Space in Fall of 2009 (excluding housing)



Projected Space Need

Two planning scenarios were considered in the development of the 2009 Facilities Master Plan Update:

- Scenario A – Projected space need based upon a ten year enrollment growth of 10.4%
- Scenario B – Projected space needed for full build-out of the campus to support 16,000 to 17,000 students

Scenario A

The space model was employed to determine the amount of space that would be needed to support one possible enrollment growth scenario. This scenario assumes the following:

- Enrollment growth of 2% per year for the first five years and 0% per year for the second five years for a total growth of 10.4% over ten years
- The enrollment growth applies to both undergraduate and graduate students across all academic programs
- Current student to faculty ratios will be maintained
- Current student to professional nonfaculty ratios will be maintained
- Modest increase in all other full-time and part-time staff positions
- Current FT Faculty to Graduate Assistants (employed) will be maintained

The space model projected a total need for over 2.5M of net assignable square feet and nearly 4.2M of gross square feet. Nearly half of the projected space need is to support instruction and research programs; and 49% of the projected space deficit is in support of campus housing and student life programs.

Table A-3

Projected Space Need and Deficit in Fall 2019 for One Scenario

Space Type	Existing Space	Projected Space	Deficit
Classroom	99,491	136,262	-36,772
Laboratories	292,934	410,837	-117,903
Office	385,300	437,687	-52,388
Study	146,390	180,269	-33,878
Special Use	103,896	245,775	-141,879
General Use	156,636	207,578	-50,942
Support	71,427	123,616	-52,189
Health	2,982	7,993	-5,011
Residential	714,517	846,486	-131,969
Total NASF	**1,973,573**	**2,596,503**	-622,930
Non-Assignable	1,315,850	1,563,610	-247,760
Total GSF	**3,289,422**	**4,160,113**	-870,690

Figure A-2

Projected Space Need and Deficit in Fall 2019 for One Scenario

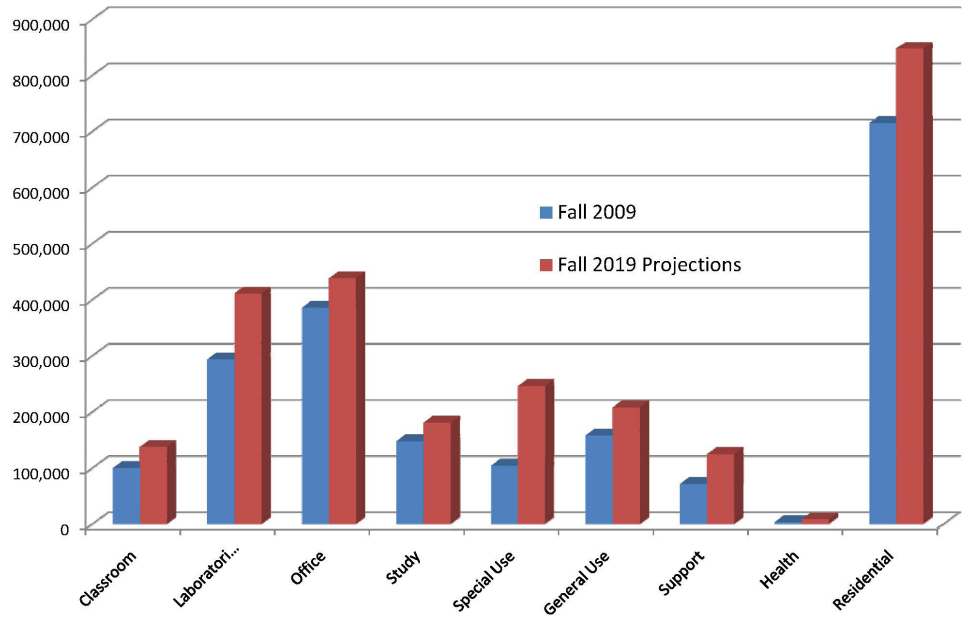
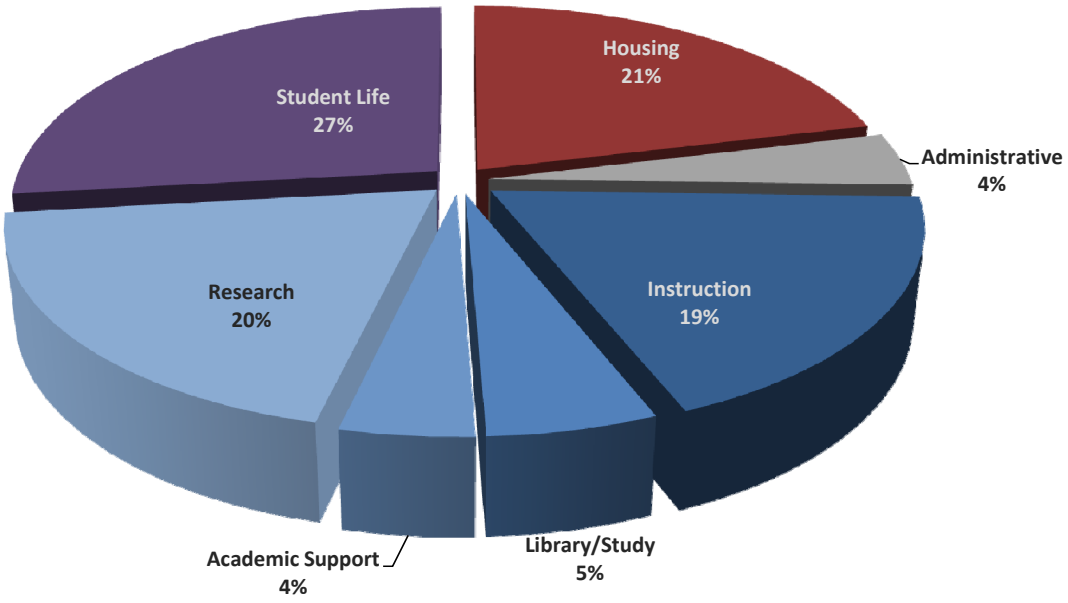


Figure A-3

Projected Space Need and Deficit in Fall 2019 for One Scenario



Scenario B

The space model was employed to determine the space needed for full build-out of the campus to support 16,000 to 17,000 students. This scenario assumes the following:

- The proportion of undergraduate and graduate students will be maintained
- Current student to faculty ratios will be maintained
- Current student to professional nonfaculty ratios will be maintained
- Modest increase in all other full-time and part-time staff positions
- Current FT Faculty to Graduate Assistants (employed) will be maintained

The space model projected a total need for 3.4M NASF and 5.5M GSF. As compared to Scenario A, a greater percentage of the projected space need is for campus housing as would be expected with a significant increase in student enrollment.

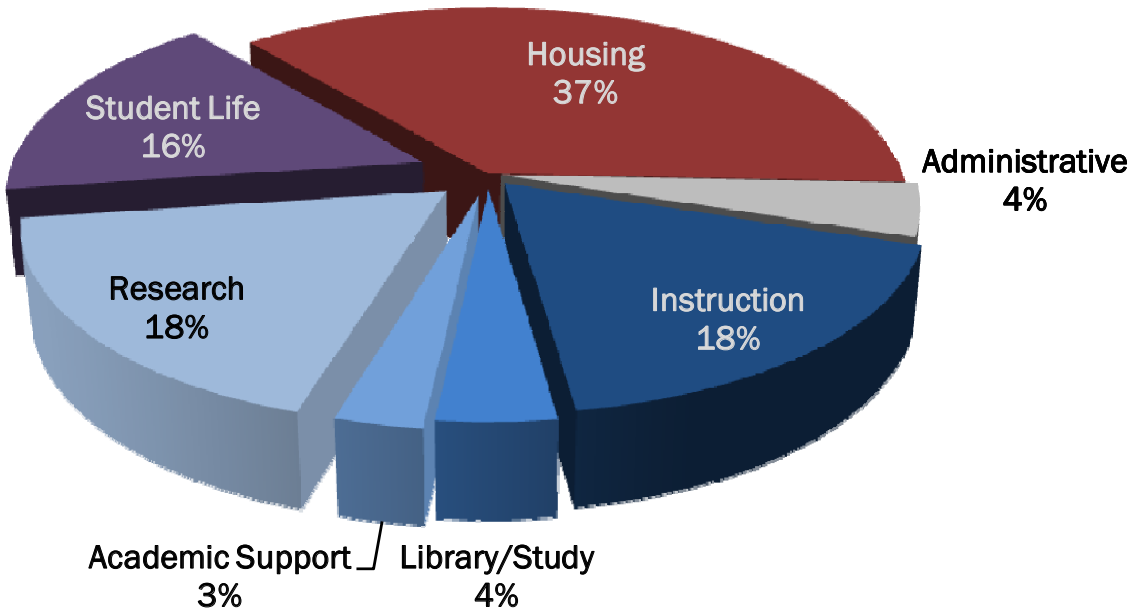
Table A-4

Projected Space Need and Deficit for Full Build-out of Campus

Space Type	Existing Space	Projected Space	Deficit
Classroom	99,491	182,861	-83,371
Laboratories	292,934	545,853	-252,919
Office	385,300	553,070	-167,771
Study	146,390	204,618	-58,228
Special Use	103,896	272,259	-168,363
General Use	156,636	269,343	-112,707
Support	71,427	151,086	-79,659
Health	2,982	10,235	-7,253
Residential	714,517	1,253,877	-539,360
Total NASF	**1,973,573**	**3,443,202**	-1,469,629
Non-Assignable	1,315,850	2,073,747	-757,897
Total GSF	**3,289,422**	**5,516,948**	-2,227,526

Figure A-4

Projected Space Need and Deficit for Full Build-out of Campus



Conclusions

The UMBC Space Model developed in conjunction with the 2009 Facilities Master Plan provides a means of quantitatively analyzing impacts of changes in enrollment projections, programmatic direction, and strategic policy. Reliability of the projections for space needs is dependent upon the quality of the institutional data entered into the model, the degree of thoughtfulness applied to development of assumptions, and the appropriateness of the space standards used.

The Space Model projections appear to be consistent with the space allowances calculated using the state's guideline application report, supporting its reliability as a planning tool. One major advantage of the UMBC's Space Model over the state report is that it provides greater diversity and flexibility to the university. The Space Model is a dynamic and versatile tool that instills confidence that space planning and long-range planning is driven by programmatic requirements.

For the 2009 Facilities Master Plan Update, the Space Model provided valuable space planning data directly employed in the development of the proposed implementation plan and campus build-out plan. The university was able to extract sufficiently detailed information from the Space Model to inform the scope and size of proposed buildings- and assure the university that it is moving forward in the right direction.