

**Proposal to Establish a New Degree:**  
**Bachelor of Science in**  
***Construction Systems Management***

by the  
**Food, Agricultural and Biological**  
**Engineering Department**

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Contact person:

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## PROPOSAL

### I. GENERAL INFORMATION

1. **Nature of the Proposal:** New degree Program to replace a current Major program (combines options 1 and 3). This is a new degree but one that will incorporate most of the curriculum and resources of the current Construction Systems Management major within the Bachelor of Science in Agriculture degree.

2. **Name of the Proposed Program:** Construction Systems Management

3. **Degree Title (tagged degree)**

Bachelor of Science in Construction Systems Management

4. **Indicate the proposed implementation date for the new major**

Winter Quarter 2009 or sooner if possible

5. **Departments or other units administering the degree**

The degree will be administered solely by the Department of Food, Agricultural and Biological Engineering (FABE) through the College of Food, Agricultural and Environmental Sciences (FAES).

In addition to the current Construction Systems Management major, the department offers an Agricultural Systems Management (ASM) major which also leads to a Bachelor of Science in Agriculture degree, plus minors in ASM and Landscape Construction. These programs are administered through the College of Food, Agricultural and Environmental Sciences. The department offers BS, MS and PhD degrees in Food, Agricultural and Biological Engineering (FABE). These engineering programs are administered through the College of Engineering and the Graduate School. The BS in FABE program meets the accreditation requirements of the Accreditation Board for Engineering and Technology, while the graduate programs are intended to enhance professional engineering skills and/or prepare students for positions in research and teaching. This graduate program is not available to CSM students unless they are willing to undertake much of the undergraduate engineering program first.

### II. RATIONALE / GOALS / OBJECTIVES

6. **Rationale of the degree program**

In 1991, the (then) Agricultural Engineering Department revised the Agricultural Mechanization and Systems major of the BS in Agriculture program and renamed it Agricultural Systems Management (ASM). At that time, the department also established a new major, Construction Systems Management (CSM), under the same BS in Agriculture degree program. The CSM major went through several changes since that time including a shift in emphasis from agricultural structures to residential and commercial construction. Enrollment in the CSM major has steadily increased. In 1996, the department changed its

name to Food, Agricultural, and Biological Engineering (FABE). Today, there are over 400 students in the CSM major offered within the FABE department. The reasons for converting the CSM major to a tagged BS in CSM degree are as follows:

**Curriculum design flexibility:** The current framework of the BS in Agriculture does not serve the CSM program well in several ways. Management and communication skills are essential parts of the CSM discipline. The major / minor requirement of the B.S. in Agriculture means that although most of our CSM students follow our advice to minor in Agribusiness or General Business, they do not have to and, in fact, some do not. Those pursuing other minors thus miss much of the management content considered vital for the field of Construction Systems Management. Academically, a better model would be to include three core blocks in the curriculum: (1) construction systems courses, (2) construction management supporting course requirements that could be met by a combination of agribusiness and general business courses lending more flexibility in scheduling, and (3) technical communications requirements. Free electives would still provide additional breadth, but the 3-part model would assure that all graduates have the core competencies they will need for future success in their chosen field.

**Student self-identification:** Students in the CSM major view themselves as construction students, not agriculture students. Employment opportunities for our graduates and interns continue to be very good and are strengthening, even in this current climate of general economic downturn. However, it is interesting to note how often we see construction students put “B.S. in Construction Management” on the resumes they are required to produce for their professional development classes. As instructors, we correct them of this misinterpretation, but it is clear that their self-identification is not linked to the agriculture title.

**Student job searches:** Several students have reported being turned down from consideration for employment because they (correctly) identified themselves as pursuing a B.S. in Agriculture. They were perceived to be less competitive by some potential employers. We believe a tagged degree in CSM would assist our students in obtaining employment and perhaps larger starting salaries.

**Truth in Advertising:** It is possible for a CSM student from an urban or suburban area to complete the requirements for this major and, if they do not choose either GEC courses in CFAES or a minor in the college, to earn a BS in Agriculture degree with no exposure to any agricultural concepts or systems. Since we grew the CSM out of an agricultural program and, until recently, the CSM oriented student took a number of courses (although often under protest) that were oriented toward agriculture, the use of the BS in Agriculture was justified at that time. However, it is now possible for a student in CSM to receive the BS in Agriculture degree and know virtually nothing about agriculture. Thus, the continued use of the BS in Agriculture as an umbrella for CSM seems unfair and misleading. It does seem that a BS in CSM conveys a much truer impression of the CSM student’s education, training, and interests than does a BS in Agriculture.

**Student credit hours:** Enrollment numbers in CSM are strong and steadily increasing. This is with minimal recruiting effort thus far. Recruitment would be enhanced by having a tagged

degree title, due to clearer communication to potential students and their parents of the true focus of this academic program.

**Industry support:** The construction industry advisory board for our CSM program is very supportive of a tagged BS in Construction Management. Nearly all of the companies represented on this board hire our graduates and provide internship opportunities for our students. A number of the representatives on the board themselves have earned BS degrees in Construction Management (CM) from other institutions and would like to see a tagged degree at the Ohio State University.

**Dual degree opportunities:** We have recently developed a dual degree program with Architecture. Their program emphasizes the theoretical design elements of their field, and they have been seeing an increased demand for graduates with additional practical skills in construction management. Their academic coordinators are supportive of a dual degree that would be a powerful recruitment tool, and would attract more students into both programs. It will be a win-win opportunity for both academic programs and much cleaner, self-explanatory, and a more easily marketed dual degree if both degrees are tagged than if one is tagged (B.S. in Architecture) and one is just a major (B.S. in Agriculture).

## **7. General and specific educational goals and objectives of the program**

**Goal:** To permit students to become well educated people having the attributes necessary for career success in the construction industry.

**Objectives:** Upon completion of the program, the CSM graduate will be able to:

1. Plan and manage the construction of buildings, infrastructure, and associated systems in cost effective ways to meet all major functional, safety and health, environmental, legal, and economic requirements.
2. Communicate and interact well with construction professionals and non-professionals who span diverse ethnic and cultural communities. Work effectively on teams and understand the broader societal impact of decisions made in the workplace.
3. Understand the business principles necessary to build and maintain a viable company serving the construction industry while demonstrating professionalism, integrity, and sound ethics.
4. Identify, analyze, develop and communicate creative solutions to emerging problems and needs in construction systems.
5. Anticipate and adapt to changes in construction methods and systems; have the essential skills necessary for sustaining lifelong learning, creative scholarship, and career success.

## **8. How program will help achieve goals and objectives of the university in terms of its role and mission**

The Ohio State University aspires to become one of the world's great public research and

teaching universities. The vision, stated in the Academic Plan, is “to advance the well-being of the people of Ohio and the global community through the creation and dissemination of knowledge.” It goes on to state that “Most of all, our graduates will be among the most sought after by the world's best employers and will become leaders in their communities and accomplished professionals in their chosen work. We will lead Ohio to a dynamic knowledge economy, and our research, widely known for its multidisciplinary programs, will help solve the most challenging social, cultural, technical, and health-related problems.”

The Bachelor of Science in Construction Systems Management will provide a focused BS level program of study at The Ohio State University for those students interested in professional management careers in the construction industry, one of the largest and most vital industries in the state and in the nation. These graduates will have the management skills, technical understanding, and communication abilities to become accomplished professionals in the construction industry and leaders in their communities. Our CSM students are already being sought after by some of the world’s best employers in the industry, and this will only be enhanced by establishing the proposed degree program.

**9. Unique characteristics or resources which make it particularly appropriate for Ohio State to offer the proposed program.**

The Food, Agricultural, and Biological Engineering Department has many decades of experience teaching technology concepts to non-engineering students. Moreover, it has the expertise, laboratory space, and specialized equipment for teaching basic construction and fabrication concepts and techniques. In addition, Ohio State has two units: the Fisher College of Business and the Department of Agricultural, Environmental, and Development Economics that offer strong business management courses at the undergraduate level which significantly complement the CSM program. Letters of support from both of these programs are included in Appendix A.

**10. Benefits for students, the institution, and the region or state.**

The BS in CSM program will provide (as the CSM major currently provides) a program of undergraduate study at The Ohio State University in construction systems management for those students interested in careers in the construction industry who do not have the interest or aptitude to become civil engineers (the other construction option at OSU). The university meets a need in the state by providing high caliber graduates with the essential skills required by the construction industry to manage the processes needed to create economical and well-built structures. These graduates will have the construction management skills, technical understanding, and communication abilities to interact with clients, investors, engineers, architects and trades people.

The significant increase in the number of construction students over the past few years, the success of recent graduates, and the enthusiastic support of the construction industry, all indicate that our current program is effectively filling a well-established need. The improved focus and added flexibility provided by evolving our current program into its own tagged BS program will make possible continued improvements to an already successful program.

**11. Similar academic programs offered in both public and private institutions in Ohio and the U.S. Explain how these differ from the one proposed.**

Among nearby land grant universities and OSU benchmark institutions, Michigan State University (Construction Management Program in the College of Agriculture & Natural Resources), Purdue University (Dept. of Building Construction Management in the College of Technology), and the University of Florida (School of Building Construction in the College of Architecture) have accredited undergraduate construction management programs with significant enrollments (200-500 students). In Ohio, the University of Cincinnati (Department of Construction Science in the OMI College of Applied Science) and Bowling Green State University (Construction Management Technology program in the College of Technology) have construction management programs leading to the baccalaureate degree. These programs are all accredited by the American Council on Construction Education (ACCE) which currently accredits sixty baccalaureate construction management programs in the country <<http://www.acce-hq.org/baccalaureateprograms.htm#top>>. Our program is pursuing ACCE accreditation and is currently one of eight candidate programs <<http://www.acce-hq.org/baccalaureateprograms.htm#candidate>>. Two other non-ACCE accredited construction engineering technology programs are offered in Ohio at the University of Toledo and University of Akron. None of these four other Ohio universities offering construction management degrees are within a 50-mile radius of OSU, nor do they have the resources of the state's flagship university behind them.

**12. Enrollment patterns of similar programs in Ohio or in the United States.**

The CSM major at OSU began in 1991-1992, had approximately 15-20 students in 1997, and has grown to 446 students today.

The University of Florida has one of the largest such programs in the country with a current enrollment of about 500 undergraduate students in its Building Construction major as well as 120 graduate students. Michigan State University's Construction Management program was begun in 1948 and has over 3000 alumni. There are currently over 300 students enrolled in that program.

Nationwide, 60 ACCE accredited Baccalaureate degree colleges and universities had a combined undergraduate enrollment of 10,353 students in 2000 (2 programs not reporting).

**13. Job opportunities and/or opportunities for graduate or professional study available to persons who complete the program.**

**A. Employment Opportunities**

Graduates of the CSM program can expect a variety of rich and diverse employment opportunities in today's construction job market. Construction is a 1 trillion dollar industry in the U.S., represents 8% of the gross domestic product, and employs over 8.3 million people in the public and private sectors. There are over 800,000 construction firms in the

U.S.<sup>1</sup> The U.S. Department of Commerce's Bureau of Labor Statistics (BLS) has estimated that construction managers held 431,000 jobs in 2004. In addition, they projected that employment of construction managers would increase by 9% to 17% over the 10-year time period ending in 2014. This equates to a total of 38,790 to 73,270 new construction management job openings being created by 2014.<sup>2</sup> Employers throughout the nation in the residential, commercial, institutional, heavy, and sales and service sectors express interest in CSM graduates. Employment of construction managers is expected to grow as a result of advances in building materials and complex construction methods, as well as a proliferation of laws dealing with building construction, worker safety, and environmental issues.

Graduates of the CSM program are well-prepared for a variety of employment opportunities in the construction and allied industries. Graduates of the CSM program are especially well-qualified to secure the following positions:

1. Construction Managers/Representatives for general contractors, subcontractors, construction management firms, architectural and engineering firms, and governmental agencies at the federal, state, and local levels.
2. Superintendents or other front line manager positions for general and trade contractors.
3. Cost estimators, schedulers, contract administrators, and other pre-construction positions.
4. Facility managers.
5. Technical Salespersons/Representatives for supply and service companies involved in the construction industry.

Additionally, construction offers many opportunities, as compared to other industries, for individuals who want to own and run their own business. Self-employment opportunities exist in all segments of the industry. The need for trained construction professionals continues to be far greater than the supply of students graduating from construction management programs.

## **B. Graduate and Professional Study Opportunities**

The CSM program at OSU offers excellent preparation for graduate study at the master's and doctorate level in construction management. There are a number of universities throughout the U.S. that offer terminal master's degrees in construction management or closely allied (non-engineering) areas including Clemson University, Columbia University, Eastern Michigan University, Florida International University, Georgia Institute of Technology, New York University, Purdue University, Stevens Institute of Technology, University of Southern California, University of Southern Mississippi, University of Washington, and Western Carolina University. Additionally, only a few institutions have non-engineering PhD

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<sup>1</sup> Seidel, A. 2005. *Introduction To Construction Management*. Kendall/Hunt Publishing Company.

<sup>2</sup> Gehrig, G. B. 2005. A Survey of the Status of Baccalaureate Degree Awarding Construction-Related Programs within the United States. International Proceedings of the 41st Annual Conference of the Associated Schools of Construction, April 7-9, 2005, Cincinnati, Ohio.

programs in Construction Management including the Colorado State University, Michigan State University, Texas A&M, University of Florida, and Virginia Tech. Other graduate and professional study areas for which CSM students are well prepared (with carefully selected electives) include architecture, business and economics, technology education, logistics, and other fields that require knowledge of the complex construction process. The proliferation of laws associated with the construction industry makes the construction graduate an excellent law school candidate. The department is planning to develop a graduate program in CSM proposal as soon as this tagged Bachelor of Science in Construction Systems Management degree is approved.

**14. Any licensure or certification for which this program will prepare students.**

No licensure or certification is currently required for practice in the field of construction management. However, we are currently pursuing American Council on Construction Education (ACCE) accreditation for our BS in CSM program. ACCE is the leading global advocate of quality construction education programs. This organization accredits construction education programs in colleges and universities that meet its standards and criteria for excellence in construction education. ACCE is recognized by the Council for Higher Education Accreditation (CHEA) as the accrediting agency for four year baccalaureate programs in construction, construction science, construction management and construction technology. Accreditation by ACCE will add value to the OSU degree and will allow the program to attract top students from around the country. On August 8, 2007, OSU's construction systems management program was granted Candidate Status by the ACCE. An outside mentor has been assigned too help guide our program through the accreditation process. The next steps include development of a preliminary self-evaluation report and eventually an accreditation review team visit.

Students complete 30 hour OSHA training as part of the curriculum for the CSM 600: Construction Health and Safety course which is required for all CSM majors. In CSM 600, students are encouraged to consider taking courses in First Aid and CPR through the Builder's Exchange of Central Ohio or as taught by OSU's School of Physical Activity and Educational Services among their free elective choices leading to Red Cross certification in these areas.

Although not required, CSM graduates may pursue Design-Procurement-Construction Special Interest Group (SIG) certification available through the Project Management Institute. There is also a Construction Manager Certification program recognized by the American National Standards Institute (ANSI) and offered by the Construction Management Association of America (CMAA). In addition, Associate Constructor certification is available through the American Institute of Constructors.

**III. RELATIONSHIP TO OTHER PROGRAMS**

**15. Cooperative arrangements with other institutions and organizations that will be used to offer this major.**

None



**16. Articulation arrangements (direct transfer opportunities) with other institutions that will be in effect for the program.**

Articulated programs have already been developed with Columbus State Community College (CSCC) and OSU's Agricultural Technical Institute (ATI) where students would complete an Associate of Science degree in Construction then transfer to the OSU Columbus campus to complete their BS degree. This model will work with similar two-year institutions. We are currently working with Rhodes State and OSU Lima regional campus to develop similar arrangements.

We have also recently developed a dual degree program with OSU's Knowlton School of Architecture. Their program emphasizes the theoretical design elements of their field, and they have been seeing an increased demand for graduates with additional practical skills in construction management. There are currently five students enrolled in this dual degree program.

**17. The use of consultants or advisory committees in the development of the program.**

In 1999, the department established a Construction Advisory Board (CAB) comprised of representatives from a variety of construction and construction-related companies and organizations to advise its construction management program. This board meets three times per year and has enthusiastically supported this program and its development. This proposal was first presented in draft form on the May 17, 2006, meeting. Suggestions for improvement made at that meeting were incorporated in this final version of this proposal. Members of this board are eager to see a tagged degree program for CSM at OSU. Several letters of support from board members are included in Appendix A. Submission of this proposal was delayed in anticipation of a revised GEC template for all BS degrees at OSU.

The department also has an Industrial and Professional Advisory Group (IPAG) which meets twice a year and provides advice on the overall direction of the department. This group has been kept informed of this proposed tagged BS in CSM program and is in full support. A representative from CAB is also a member of IPAG, providing liaison between the two advisory committees.

**18. Any overlaps with other programs or departments within the University. Append letters of concurrence or objection from related units.**

The Department of Civil and Environmental Engineering and Geodetic Science has a construction option within the Bachelor of Science in Civil Engineering program. The construction courses in their program are intended for engineering students who have a much more extensive analytical, mathematical, and engineering science background than do the CSM students. The prerequisite for most of these courses is CE 431 which has at least a seven-course prerequisite string (Math 151, 152, 153, 254; Physics 131, ME 410 and 420) plus other courses required to become a CE major, none of which are required in the CSM major. The emphasis in CE is engineering and design while the emphasis in CSM is management of construction projects. Two letters of support from Department of Civil and Environmental Engineering and Geodetic Science are included in Appendix A.

The FAB Engineering Department currently advises students seeking information about its construction management program who either express an interest in or have test scores indicating an aptitude for engineering to carefully consider the Civil Engineering program before committing to the CSM major. The department plans to continue this practice after establishment of the CSM tagged degree program. The FAB Engineering Department would also welcome Civil Engineering's participation in the CSM program by offering appropriate non-engineering construction management courses as that department's resources and mission allow.

The College of Education's School of Teaching and Learning offers two courses for technology educators which cover construction topics: Ed PAES 231 Construction Practices I and Ed PAES 232 Construction Practices II. The focus of the Technology Education specialization is to train future educators, not construction managers. A letter of support from the School of Teaching and Learning are included in Appendix A.

**19. Indicate whether this program or a similar program was submitted for approval previously.**

This is the first proposal submitted to take this major to tagged B.S. degree program status. The CSM major proposal was submitted in 1991, approved in 1992, and offered until 1997 when it was combined with Agricultural Systems Management to create an ACSM major. As a result of increasing enrollment and better recognition, CSM was re-activated as a stand-alone major in 2004.

**20. Minimum requirements / qualifications a student must meet to be admitted into the program**

Students newly admitted to the university as first quarter freshman or transfer students may directly enroll in the CSM program. Students who are currently enrolled in other colleges and units in the university must have a minimum CPHR of 2.0 to transfer into the College of Food, Agricultural and Environmental Sciences and the CSM program. These minimum requirements may need to be increased in the future if enrollment trends continue and enrollment caps become necessary.

**21. Indicate where students will be drawn from, e.g., existing academic programs, outside of the University, etc. Estimate the mix of students entering the major internally and externally.**

The current major has over 400 students. In comparison, fewer than ten students per year enter the program as new first quarter freshmen (NFQF). About eight to ten students enter from the two-plus-two programs with Columbus State Community College (CSCC) and OSU's Agricultural Technical Institute (ATI) or transfer from other colleges and universities within Ohio. Information about the ATI and CSCC two-plus-two programs has only recently been put into the marketing and recruiting materials of those institutions, so these numbers are expected to increase in the future. The remainder of the current CSM population comes from a wide variety of other program areas within the university, most often after hearing about the program by word-of-mouth. A significant number of current CSM students have come from engineering programs.

#### **IV. STUDENT ENROLLMENT**

**22. Indicate the number of students you anticipate will be admitted to the program each year for the next four years.**

There are currently 446 students in the existing CSM major. Given that most of these construction students have transferred into this program from other areas of the university during their sophomore year or later suggests that approximately 150 students a year are currently entering this major. This demand is expected to continue in the foreseeable future, and if current course demand is any indication, increase over the next few years. Although the residential housing market is experiencing some challenges at present, the commercial and industrial sectors of construction are expanding and graduates of our program continue to be in high demand. Student credit hours taught in the department's Agricultural and Construction Systems Management programs have more than doubled (147% increase) since the 00 – 01 academic year. Most of this increase was driven by CSM enrollment which is about 90% of the Department's total undergraduate non-engineering majors.

#### **VI. DEGREE REQUIREMENTS**

**23. List the courses (department, title, credit hours, description) which constitute the requirements and other components of the major. Indicate which courses are currently offered and which will be new.** The following items are included in Appendix B:

1. Twelve-quarter program curriculum sheet
2. Curriculum sheet formatted for the College of Food, Ag, and Environmental Sciences
3. Course catalog (Book 3) listing of all CSM courses included in the curriculum

All New Course and Course Change forms are included in Appendix C. The required courses for the three proposed areas of the CSM program are:

##### **1. Construction Systems Core Courses (78 credit hours)**

CONSYSMT 205 Intro. to Construction Management	Existing course	(4 cr. hr.)
CONSYSMT 240 Basic Metal Fabrication	Existing course	(4 cr. hr.)
CONSYSMT 241 Construction Methods and Materials	Existing course	(4 cr. hr.)
CONSYSMT 305 Professional Development I	Existing course	(4 cr. hr.)
CONSYSMT 310 Electrical and Lighting Systems For Buildings	Existing course	(4 cr. hr.)
CONSYSMT 345 Mechanical Systems for Buildings	Existing course	(4 cr. hr.)
CONSYSMT 440 Construction Site Development	Existing course	(5 cr. hr.)
CONSYSMT 441 Construction Drawings and Estimating	Existing course	(5 cr. hr.)
CONSYSMT 489 Internship in Construction Systems Management	Existing course	(3 cr. hr.)
CONSYSMT 540 Estimating and Scheduling I	<b>Revision to existing course</b>	(4 cr. hr.)
CONSYSMT 541 Estimating and Scheduling II	<b>New course</b>	(4 cr. hr.)
CONSYSMT 545 Structures for Construction	Existing course	(4 cr. hr.)

Managers I		
CONSYSMT 546 Structures for Construction	Existing course	(4 cr. hr.)
Managers II		
CONSYSMT 600 Construction Safety and Health	Existing course	(3 cr. hr.)
CONSYSMT 605 Professional Development II	Existing course	(2 cr. hr.)
CONSYSMT 641 Construction Project Management	Existing course	(3 cr. hr.)
CONSYSMT 642 Construction Control - Contracts and Documents	Existing course	(3 cr. hr.)
CONSYSMT 643 Construction Management Capstone	Existing course	(3 cr. hr.)
CONSYSMT 660 Heavy Construction Management	Existing course	(4 cr. hr.)
CS&E 105: Computer-Assisted Problem Solving for Construction Management	Existing course	(4 cr. hr.)
EN Graph 121: Graphic Presentation I	Existing Course	(3 cr. hr)

**2. Construction Management Supporting Courses (22 to 26 credit hours)**

*Principles of Management: choose one of the following courses:*

AED ECON 401 Principles of Agribusiness Management	(4 cr. hr.)
BUS-MHR 400 Foundations of Management and Human Resources	(4 cr. hr.)

*Accounting: choose one of the following courses:*

ACCT&MIS 211 Introduction to Accounting I (choose only if take 211+212)	(5 cr. hr.)
ACCT&MIS 310 Foundations of Accounting (recommended)	(5 cr. hr.)

*Business Law: choose one of the following courses:*

AED ECON 470 Agricultural Law (includes ag construction examples)	(4 cr. hr.)
BUS-FIN 510 Legal Environment of Business	(4 cr. hr.)
ENR 752 Environmental Science and Law	(4 cr. hr.)

*Finance: choose one of the following courses:*

AED ECON 403 Principles of Agribusiness Finance	(4 cr. hr.)
BUS-FIN 420 Foundations of Finance	(4 cr. hr.)
IND ENG 504 Engineering Economic Analysis	(3 cr. hr.)

*Human Resources: choose one of the following courses:*

AED ECON 460 Human Resource Management in Small Businesses	(3 cr. hr.)
BUS-MHR 660 Managing Human Resources	(4 cr. hr.)

*Other Construction Management Supporting Courses, choose one of the following courses (If students want to take more than one, they may count toward free elective hours):*

ACCT&MIS 212 Introduction to Accounting II	(5 cr. hr.)
AED ECON 402 Principles of Agribusiness Marketing	(4 cr. hr.)
AED ECON 421 Salesmanship in Agriculture	(3 cr. hr.)
BUS ADM 555 Introduction to International Business	(4 cr. hr.)
BUS-FIN 590 Entrepreneurial Finance	(4 cr. hr.)
BUS-FIN 670 Real Estate and Urban Land Economics	(4 cr. hr.)
BUS-FIN 775 Real Estate Law	(4 cr. hr.)
BUS-M&L 450 Foundations of Marketing Management	(4 cr. hr.)
BUS-M&L 490 Entrepreneurial Marketing	(4 cr. hr.)
BUS-MGT 430 Foundations of Operations Management	(4 cr. hr.)
BUS-MHR 390 Innovation and Entrepreneurship in Modern Business	(4 cr. hr.)
BUS-MHR 490 New Venture Creation	(4 cr. hr.)

BUS-MHR 590 Leading High-Performance Ventures	(4 cr. hr.)
BUS-MHR 704 Concepts and Competencies for Managing People	(4 cr. hr.)

Note: All of the courses in the business management core are provided by programs outside of the FABLE department. It is anticipated that as new courses are developed by these other programs which would be appropriate for the BS in CSM, they will be added to these "baskets" of courses. The identities of the five named baskets themselves will not be altered.

**3. Technical Communications Core Courses (15 credit hours)**

ENGLISH 110: English Composition	(5 cr. hr.)
xxx 367: Second Writing Course (xxx = offered in many depts.)	(5 cr. hr.)

*Speech and Oral Communications: choose one of the following two courses:*

AGR COMM 390: Oral Expression in Agriculture	(5 cr. hrs)
COMM 321: Principles of Effective Public Speaking	(5 cr. hrs)

(Note: communications are also stressed in significant portions of CONSYSMT 305, 489, 600, 605, 641, 642, and 643)

***How other requirements are met:***

- **Social Diversity in the U.S.** - Sociology 101 or Rural Sociology 105 is required.
- **International Languages and Cultures** - met within the GEC by students required to select courses meeting this requirement. Currently marked on curriculum sheets as \* (one required) and ♦ (or second \* is required). Students are particularly encouraged to participate in Study Abroad opportunities, including one that our Department offers on Sustainable Housing for Informal Settlements in South Africa. A second one is in the planning stages which we have tentatively titled "The Construction Industry and Hispanic Culture in Mexico."
- **Third writing course component** - CONSYSMT 305 and 605 are used to meet this requirement. Both are required courses and include significant feedback and revision of communication assignments. The internship course, CONSYSMT 489, also has these features, including written reporting, multiple revisions, and oral presentations, and it is required for the major but not listed as part of the 3<sup>rd</sup> writing requirement since it is used to fulfill the college's internship requirement.
- **Capstone** – CONSYSMT 643 is used to meet this requirement. This courses will build substantially upon most of the other construction courses the students are required to take as reflected in its prerequisite string.

**24. State the minimum number of credits required for completion of the degree.**

The minimum number of credit hours for the proposed BS in CSM is 185, five fewer hours than is currently required for the CSM major. Based on data over the program's 16-year history, students who start as new first quarter freshmen in the major complete their degrees in 11 quarters, on average. Given the program's educational goals, national consensus on what constitutes construction management education, and accreditation requirements (e.g., ACCE requires a minimum of 75 hours in construction courses

including engineering graphics), it was not deemed possible to reduce the hours below 185 and still have the flexibility and academic enrichment of including a few free electives.

**25. State the average number of credits expected for a student at completion of the degree.**

The average number is expected to be 190 or more, mainly due to the large number of students who transfer into CSM from other programs and bring with them varying amounts of unrelated and unusable credit.

**26. Give the average number of credits taken per quarter by a typical student. Estimate the average for each year.**

		Year 1	Year 2	Year 3	Year 4
Full-time	per quarter	15	16	16	17
	per year	45	48	48	49
Part-time	per quarter	8	8	8	8
	per year	24	24	24	24

**27. Give the number of credits a student is required to take in other departments.**

<u>Department</u>	<u># of Credits</u>	<u>Level</u>
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General Education Requirements - *This follows the BS in Agriculture's newly approved template for GECs with the exception of the minor; the spirit of a minor is reflected by requiring the construction management supporting courses and technical communications core in the BS in CSM.*

Writing and Oral Expression	15	Lower division
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Quantitative and Logical Reasoning:		
Math 148	4	Lower division
Data Analysis	5	Lower division

Natural Sciences:		
<i>Required:</i> Physics 111 or 131	5	Lower division

Choose one of the following biological sciences:	5	Lower division
Animal Sci 310; Anthro 200; Biology 101, 102, 113, 114, H115, H116; Entomology 101, 102; EEOB 232, 235; ENR 201; Food Sci&Tech 201; H&CS 200, 300; Human Nutr 210; Microbiol 509; PCMB 101, 102, 300		

Choose one of the following two-course sequences:	10	Lower division
Biology 101/102 or 113/114 or H115/H116, Chemistry 101/102 or 121/122 or 121/125, Earth Sci 121/203 or 121/210 or 121/ENR 300.01 <u>and</u> 300.02 (must take both), Physics 111/112 or 131/132 or 111/Arch 426		

Choose one (or two if the sequence chosen above overlaps with one of the two required physics and biological science courses) other natural science courses from approved list:	5	Lower division
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Biological Sciences courses listed above; Chem 101, 102, 121, 122, 123, 125, H201, H202, H203; Earth Sci 121, 122, 203, 210; ENR 300.01 and 300.02 (must take both); Math 151; Physics 112, 132, 133

Social Sciences:	AED ECON 200 or ECON 200	5	Lower division
	RURL SOC 105 or SOCIOL 101	5	Lower division
	Social Science elective (from approved list)	5	Lower division
Historical study		5	Lower division
Arts and Literature:	Literature	5	Lower division
	Visual and Performing Arts	5	Lower division
Survey	e.g., FAES 100	1	Lower division
<u>From requirements for major</u>			
	EN GRAPH 121	3	Lower division
	CS&E 105	4	Lower division
	Business or AED ECON	22 - 26	Mixture

**28. Give number of credits a typical student might take as electives in other departments.**

<u>Department</u>	<u># of Credits</u>	<u>Level</u>
Free electives	1-5	Mixture

Students will be encouraged (but not required) to consider the following courses when selecting their free electives:

From other departments:

AEE 342 Fundamentals of Leadership	(3 cr. hr.)
AVIATION 694 Airport Systems Planning, Design & Development	(4 cr. hr.)
BUS-FIN 220 Personal Finance	(3 cr. hr.)
Business: Any of the suggested “Other Topics” from the Construction Management Supporting Courses list (section 23, #2)	
C&R PLAN 310 Introduction to City and Regional Planning	(4 cr. hr.)
C&R PLAN 320 Planning for Housing	(4 cr. hr.)
C&R PLAN 597 City Planning in the Contemporary World	(5 cr. hr.)
C&R PLAN 724 Planning for Sustainable Development	(5 cr. hr.)
ECON 201 Principles of Macroeconomics	(5 cr. hr.)
EDU PAES 102 First Aid	(2 cr. hr.)
EDU PAES 122 Techniques in Cardiopulmonary Resuscitation	(1 cr. hr.)
H&CS 294 The Latino Workforce in Land-based Industries	(3 cr. hr.)
PSYCH 522 Organizational Psychology	(4 cr. hr.)
SOCIOL 464 Work, Employment, and Society	(5 cr. hr.)
SPANISH 101 Elementary Spanish I	(5 cr. hr.)
SPANISH 506 Latin American Culture in a Business Context	(5 cr. hr.)

From the FABE department:

AGSYSMGT 232 Small Air-Cooled Engines	(4 cr. hr.)
AGSYSMGT 550 Pollution Control and Waste Utilization	(3 cr. hr.)
CONSYSMT 489 (a second) Internship in Construction Systems	(3 cr. hr.)

**29. Describe other major requirements in addition to course requirements, e.g., examinations, internships, final projects.**

Each student is required to complete one documented internship for three credit hours (CONSYSMT 489). They are encouraged to seek additional similar experiences before graduation, especially by undertaking two internships in a row thereby giving them a full 6 to 7 month co-op experience. The second internship can count as a free elective.

**30. Specific methods for evaluating the program**

The BS in CSM program will be evaluated on a regular basis using a variety of methods and feedback mechanisms including but not limited to:

1. Graduating seniors complete a web based survey and have an exit interview with the department chair or designee.
2. Biennial follow-up surveys to alumni two and three years after graduation.
3. Monitoring evaluations and comments by supervisors of students on internships
4. Monitoring job placement statistics
5. Soliciting feedback from companies represented on the department's construction industry advisory board (most of whom hire graduates and interns from the program).
6. Monitoring student achievement in capstone course (CONSYSMT 643).
7. SEIs and written course evaluations are shared with department chair during annual performance and planning reviews.

Appropriate summaries of this feedback data will be presented to the faculty and construction industry advisory committee annually for analysis and planning purposes.

**31. Identify from which specialized professional association(s) accreditation will be sought. List any additional resources that will be necessary to gain such accreditation.**

There are currently 60 construction management programs around the country that are accredited by the American Council on Construction Education (ACCE). A table comparing the proposed CSM program to the ACCE's accreditation criteria is included in Appendix B (Table 1). The FABE Department is seeking accreditation in conjunction with



this proposal for the tagged B.S. degree. The current CSM major within the BS in Agriculture would not meet all accreditation requirements.

**32. Describe the number and qualifications of full-time and part-time faculty. List current faculty and areas of expertise. Describe number and type of additional faculty needed.**

Name	Areas of Expertise	Rank	FT or PT	Highest Degree	Institution from which Highest Degree Earned & Year
Dennis Albery*	Residential construction, building technologies	4	FT	B.S.	OSU 1978
Beverly Barrick*	Academic advising	4	FT	M.A.	OSU 2005
Thomas L. Bean	Safety systems, agricultural safety	1	FT	Ed.D.	WVU 1982
Larry C. Brown	Agricultural water management, drainage, irrigation	1	FT	Ph. D.	Purdue 1988
Michael Brugger*	Construction, agricultural structures	2	FT	Ph.D.	UW 1979
Victoria Chen*	Construction management	3	FT	Ph.D.	Va Tech 2007
Ann D. Christy*	Bio-environmental, environmental controls in buildings	2	FT	Ph.D.	Clemson 1991
Eric Desmond*	Hydrology, construction site preparation	4	FT	Ph.D.	OSU 2003
Mary Faure*	Business communications, project management	4	FT	M.A.	OSU 1987
Robert Gustafson	Electric power, residential wiring. (Currently serving as Associate Dean in the College of Engineering)	1	FT	Ph. D.	Michigan State 1974
Larry Heckendorn*	Welding engineering	4	FT	B.S.	OSU 1973
Gönül Kaletunç	Food engineering	2	FT	Ph.D.	U of Mass 1985
Dee Jepsen	Safety and health, agricultural safety	3	FT	Ph.D.	OSU 2006

Harold Keener	Composting, biomass combustion	1	FT	Ph.D.	OSU 1973
Yebo Li	Bio-processing and bio-energy systems	3	FT	Ph.D.	China Agricultural University 1993
Michael Lichtensteiger*	Ag machinery, electrical systems	4	FT	Ph.D.	OSU 1982
Peter Ling	Greenhouse engineering	2	FT	Ph.D.	Texas A&M 1989
Karen Mancl*	Wastewater treatment; water supply	1	FT	Ph.D.	IA State 1982
Jay Martin	Ecological engineering	2	FT	Ph.D.	LSU 2000
Frederick Michel	Composting, bioremediation	2	FT	Ph.D.	MSU 1992
Erdal Ozkan	Pesticide application technology	1	FT	Ph. D.	Univ. of Missouri 1979
Randall Reeder	Conservation tillage; machinery systems	2	FT	MS	WVU 1969
Michael Rowan*	Wastewater treatment	4	FT	Ph.D.	OSU 2004
Sudhir Sastry	Food engineering	1	FT	Ph.D.	U of FL 1980
William Shepherd*	Civil engineering	4	PT	B.S.	Univ of Toledo 1965
Alfred Soboyejo	Probabilistic methods	2	FT	Ph.D.	Stanford 1965
Andy Ward	Environmental hydrology	1	FT	Ph.D.	U of KY 1981
Lingying Zhao*	Air quality, building environment	3	FT	Ph. D.	UIUC 2000

Notes: \* = Teach or help teach courses taken by CSM students

Rank 1 = Full professor, 2 = Associate Professor, 3 = Assistant Professor, 4 = Lecturer, Academic Program coordinator, or other non-tenure track position

## **VI. PROGRAM DESCRIPTION**

### **33. Description of the program as it would appear in the college bulletin**

Construction Systems Management (CSM) at The Ohio State University is the study of the technological and managerial aspects of the construction industry. The program focuses on developing managers who can coordinate and direct the activities involved in constructing built environments ranging from commercial facilities and residential subdivisions to other infrastructure needed in today's world. Students in the program will take courses in

construction methods and materials, mechanical and electrical systems, building codes, safety, structural design, surveying, site development, estimating, scheduling, project management and documentation, communication, construction management, accounting, finance, and law. The program requires one formal internship; however, students are strongly encouraged to complete additional internships. After graduation, excellent employment opportunities exist with a wide variety of construction companies ranging from local firms to companies with national and international operations. Many of these positions have potential for rapid advancement.

**VII. PROGRAM COSTS AND FUNDING**

**34. One-Time and Continuing Costs**

The CSM major is an existing program, therefore no new one-time costs are anticipated upon its becoming a BS in CSM degree program.

One-Time Costs

	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>
Faculty	\$0	\$0	\$0	\$0
Graduate Students	\$0	\$0	\$0	\$0
Other Staff	\$0	\$0	\$0	\$0
Supplies/Services	\$0	\$0	\$0	\$0
Equipment	\$0	\$0	\$0	\$0
Computing	\$0	\$0	\$0	\$0
Space Renovation	\$0	\$0	\$0	\$0
<b>TOTAL</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>

Continuing (Annual Rate) Costs

	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>
Faculty	\$ 75,000	\$ 77,244	\$ 79,572	\$ 81,960
Graduate Students	\$ 60,000	\$ 61,800	\$ 63,650	\$ 65,560
Other Staff	\$240,106	\$247,309	\$254,728	\$262,370
Supplies/Services	\$ 33,762	\$ 33,762	\$ 33,762	\$ 33,762
Equipment	\$0	\$0	\$0	\$0
Computing	\$0	\$0	\$0	\$0
Space Renovation	\$0	\$0	\$0	\$0
<b>TOTAL</b>	<b>\$408,868</b>	<b>\$420,115</b>	<b>\$431,712</b>	<b>\$443,652</b>

The figure for Faculty Year 1 represents the salary for one faculty member who has a 100% teaching appointment. It does not include the partial appointments teaching because they are difficult to sort out in a chart. There are 15 people teaching across all three majors offered by FA&B Eng in both colleges. There are two FTE's of graduate students and Graduate Students Year 1 represents the tuition and stipend for the two FTE's.

**35. Cost Savings and Adjustment**

The CSM major is an existing program, therefore no cost savings are anticipated upon its becoming a BS in CSM degree program.

Cost Savings and Adjustment

	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>
Faculty	\$0	\$0	\$0	\$0
Graduate Students	\$0	\$0	\$0	\$0
Other Staff	\$0	\$0	\$0	\$0
Supplies/Services	\$0	\$0	\$0	\$0
Equipment	\$0	\$0	\$0	\$0
Computing	\$0	\$0	\$0	\$0
Space Renovation	\$0	\$0	\$0	\$0
<b>TOTAL</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>

**36. Proposed Sources of Funding**

Continuing (Annual Rate) Support

	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>
Home dept.	\$283,868	\$345,115	\$406,712	\$442,652
Other depts.	\$0	\$0	\$0	\$0
College	\$ 125,000	\$ 75,000	\$ 25,000	\$0
OAA	\$0	\$0	\$0	\$0
Other internal (specify)	\$0	\$0	\$0	\$0
External (specify)	\$0	\$0	\$0	\$0
<b>Net Requirement for continuing funds</b>	<b>\$408,868</b>	<b>\$420,115</b>	<b>\$431,712</b>	<b>\$443,652</b>

Note: These figures reflect part of the current departmental general funds expenditures, proportional to the number of student credit hours generated by the CSM program. College support follows a previously agreed upon pattern of conversion from college to departmental support for CSM.

One-Time and Start-Up Support

	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>
Home dept.	\$0	\$0	\$0	\$0
Other depts.	\$0	\$0	\$0	\$0
College	\$0	\$0	\$0	\$0
OAA	\$0	\$0	\$0	\$0
Other internal (specify)	\$0	\$0	\$0	\$0
External (specify)	\$0	\$0	\$0	\$0
<b>Net Requirement</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>

## **VIII. FACILITIES AND EQUIPMENT REQUIREMENTS**

### **37. Facilities / equipment requirements:**

The Department is housed in a modern 97,000 square foot facility which was completed in 1986. This building, called the Agricultural Engineering Building, has an excellent range of laboratory and classroom facilities which are used in our teaching program.

Included in this space is a computer laboratory which is part of the College of Engineering's computer network, and three classrooms which are part of the University's classroom pool. These resources are used by our students and other students and faculty in the College of Engineering and College of Food, Agricultural and Environmental Sciences. There are two other classrooms which are used almost exclusively in teaching courses provided by the Department.

The classrooms have capacities which range from 30 (Room 142) to 100 (Room 100) and are nicely furnished, have extensive blackboard space, and a range of multi-media equipment. Most laboratories are shared between teaching and research. Typically, they are spacious and well suited for teaching purposes.

In addition to classroom and laboratory space, the building has a nice undergraduate Learning Resources Center which is primarily used as a study lounge. A well equipped vending area includes tables and chairs and a microwave oven. Faculty have spacious offices (about 140 square feet) which are slightly larger than the University norm and have sufficient furniture and space for interactions with 2-3 students. There are three conference areas and a kitchen which are primarily used by the faculty, staff, and graduate students.

Four of the FABE faculty are located at the Ohio Agricultural Research and Development Center facility in Wooster, Ohio, about 90 miles northeast of OSU's Columbus campus. These faculty hold appointments that are primarily research and extension. Our undergraduates have opportunities to interact with these faculty through summer internships at the Agricultural Engineering Building in Wooster and through those faculty giving guest lectures in Columbus classrooms.

Initially, there will not be a major impact as the number of students who will pursue this degree will be approximately the same as in the existing CSM major. These students are being offered classes and advised within the department now. Teaching responsibilities will be covered by existing faculty plus full-time and part-time staff instructors.

### **38. Additional university resources that will be required for the new program.**

In the near term (next five years), the department believes it can effectively administer the BS in CSM degree with current university resources provided that there are no dramatic enrollment increases.

### **39. Classrooms**

In the near term, the department believes it can effectively administer the BS in CSM degree with current classroom resources provided that there are no dramatic enrollment increases.

**40. Laboratory, studio, and other special facilities**

In the near term (next five years), the department believes it can effectively administer the BS in CSM degree with current laboratory resources. Computer lab resources are being stretched to the limit. As enrollment steadily increases, additional resources will be required to maintain present quality of instruction.

**41. Office space**

In the near term (next five years), the department believes it can effectively administer the BS in CSM degree with current resources.

**42. Special space requirements**

In the near term (next five years), the department believes it can effectively administer the BS in CSM degree with current resources.

## APPENDICES

### **Appendix A: Support**

Letters of support from:

- Construction Advisory Board members and construction companies
- Current students (two petitions dated 6/1/06 and 2/15/08)
- OSU Fisher College of Business
- OSU Department of Agricultural, Environmental, and Development Economics
- OSU Department of Civil and Environmental Engineering and Geodetic Science
- OSU School of Teaching and Learning

### **Appendix B: Curriculum**

1. Twelve-quarter program curriculum sheet
2. Curriculum sheet formatted for the College of Food, Ag, and Environmental Sciences
3. Course catalog (Book 3) listing of all CSM courses included in the curriculum
4. Table comparing the proposed CSM program to ACCE's accreditation criteria

### **Appendix C: Courses**

New Course and Course Change forms, plus concurrence forms:

- CONSYSMT 540 (revised course)
- CONSYSMT 541 (new course)