

**TECH 4395. Automated Manufacturing Systems I.**

This course primarily deals with automation in industrial systems. In particular, this course focuses on automation and control technologies in manufacturing systems at machine and device levels. Included in its structure are areas such as fundamentals of industrial automation, sensors and actuators, numerical control, robotics, and PLC.

Prerequisites: TECH 1393 and TECH 2310 or TECH 4373

**3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.**

**Course Attribute(s):** Lab Required

**Grade Mode:** Standard Letter

**TECH 4396. Automated Manufacturing Systems II.**

This course primarily deals with automation in industrial systems. In particular, this course focuses on automation and control technologies at a system level. This course includes topics such as simulation of manufacturing systems, flexible manufacturing systems, automated quality control, automated identification, and automated material handling. Prerequisites: TECH 4395

**3 Credit Hours. 3 Lecture Contact Hours. 3 Lab Contact Hours.**

**Course Attribute(s):** Lab Required

**Grade Mode:** Standard Letter

**TECH 4397. Special Problems.**

The investigation of a special topic by developing the problem, researching the topic, and presenting the findings as they apply to industry/technology. This course will be applicable to all areas of technology, and must be done only with the approval of the cooperating faculty member and Department Chair. Repeatable for credit with different emphasis

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Standard Letter

**TECH 4398. Senior Design.**

This course deals with application of technical and non-technical skills and knowledge using a multidisciplinary team-based approach for solving real-world problems related to product and process development. The topics include systematic product development, development of business plans, project management, cost estimation, documentation and presentation, prototyping, fabrication and concurrent engineering. Prerequisites: TECH 4395 or TECH 4372 or EE 3400 or GEO 4313. (WI)

**3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.**

**Course Attribute(s):** Lab Required|Writing Intensive

**Grade Mode:** Standard Letter

**TECH 4399. Seminar in Technology.**

The topics for this course will vary. The course will involve the identification of the topic, its nomenclature, its processes, tools, equipment or materials, and its application to technology. The topic may apply to either the certification program or technology program or to both. A final report summary or presentation will conclude each seminar. Repeatable for credit with different emphasis

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Standard Letter

# Bachelor of Science (B.S.) Major in Concrete Industry Management

**Minimum required: 120 semester hours**

## General Requirements

1. A minimum of 9 writing intensive hours and a total of 36 advanced hours are required to graduate. An advanced course is one that is numbered above 3000 and below 5000.

2. Departmental requirements that also satisfy general education core curriculum requirements:

MATH 2417	Pre-Calculus Mathematics	4
PHYS 1315	General Physics I	3
ECO 2314	Principles of Microeconomics	3

3. See the Core Curriculum (p. 50) section of this catalog for the English literature requirements.

4. If two years of the same modern language are taken in high school, then no additional language hours will be required for the degree. In the absence of such high school language, two semesters of the same modern language must be taken at the college level.

5. A Minor in Business Administration is required for this degree. Courses for the minor in Business Administration are included in the following degree plan.

**Freshman**

First Semester	Hours	Second Semester	Hours
US 1100	1	ENG 1320	3
ENG 1310	3	HIST 1310	3
POSI 2310	3	MATH 2417	4
CHEM 1335	3	PHYS 1315 & PHYS 111	4
CHEM 1141	1		
CSM 1260	2		
13		14	

**Sophomore**

First Semester	Hours	Second Semester	Hours	Summer	Hours
English Literature	3	POSI 2320	3	TECH 2190	1
HIST 1320	3	COMM 131C	3		
MATH 2321	3	MATH 2328	3		
ACC 2361	3	CSM 2313	3		
PHYS 1325 & PHYS 1125	4	CIM 3420	4		
16		16		1	

**Junior**

First Semester	Hours	Second Semester	Hours
CIM 3340	3	Select one of the following:	3
MGT 3303	3	ART 2313	3

ACC 2362	3	DAN 2313	
TECH 2351	3	MU 2313	
CIM 3330	3	TH 2313	
		ECO 2314	3
		CIM 3366	3
		CIM 4330	3
	15		12

**Senior**

First Semester	Hours	Second Semester	Hours
MKT 3343	3	TECH 3364	3
CIM 4398	3	TECH 4380	3
CIM 4310	3	FIN 3325	3
CIM 4340	3	BLAW 2361	3
CSM 4369	3	PHIL 1305 or 1320	3
ECO 2315	3		
	18		15

Total Hours: 120

# Bachelor of Science (B.S.) Major in Construction Science and Management

**Minimum required: 120 semester hours**

## General Requirements

1. A minimum of 9 writing intensive hours and a total of 36 advanced hours are required to graduate. An advanced course is one that is numbered above 3000 and below 5000.
2. If two years of the same modern language are taken in high school, then no additional language hours will be required for the degree. In the absence of such high school language, two semesters of the same modern language must be taken at the college level.
3. A Minor in Business Administration is required for this degree. Courses for the minor in Business Administration are included in the degree plan below.
4. Effective Fall 2010: No "D" grades received at other institutions will be credited towards the major.
5. Effective Fall 2010: Students will enter the 30 semester hour Pre-Construction Curriculum, which will consist of:

MATH 2328	Elementary Statistics	3
MATH 2417	Pre-Calculus Mathematics	4
PHYS 1315 & PHYS 1115	General Physics I and General Physics I Laboratory	4
CHEM 1335 & CHEM 1141	Engineering Chemistry and General Chemistry Laboratory I	4
PHYS 1325 & PHYS 1125	General Physics II and General Physics II Laboratory	4
CSM 1260	Introduction to the Construction and Concrete Industry	2
CSM 2313	Architecture Design I - Construction Documents	3
CSM 2342	Construction Materials and Processes	3

CSM 2360	Residential Construction Systems	3
Total Hours		30

No grade lower than a "C" will be accepted and a 2.5 GPA must be maintained in these classes before a student will be allowed to enroll in advanced level Construction courses.

6. After completing the Pre-Construction Curriculum, students will be allowed to enter the Bachelor of Science Degree in Construction Science and Management, and will be allowed to enroll in the following Construction classes:

CSM 2160	Introduction to Construction Surveying and Site Layout	1
CSM 3360	Structural Analysis	3
CSM 3361	Commercial Building Construction Systems	3
CSM 3363	Heavy, Civil and Highway Construction Systems	3
CSM 3366	Soils and Foundations	3
CSM 3367	Mechanical, Electrical and Plumbing Systems	3
CSM 4360	Senior Construction Management Capstone	3
CSM 4361	Construction Estimating	3
CSM 4364	Construction Project Management and Scheduling	3
CSM 4368	Environmentally Conscious Design and Construction	3
CSM 4369	Construction Contracts, Liability and Ethics	3
Total Hours		31

**Freshman**

First Semester	Hours	Second Semester	Hours
CSM 1260	2	MATH 2328	3
PHYS 1315 & PHYS 111	4	PHYS 1325 & PHYS 111	4
MATH 2417	4	CSM 2342	3
US 1100	1	ENG 1320	3
ENG 1310	3	CSM 2313	3
POSI 2310	3		
	17		16

**Sophomore**

First Semester	Hours	Second Semester	Hours	Summer	Hours
ACC 2301	3	COMM 1310	3	TECH 2190	1
CHEM 1335 & CHEM 114	4	TECH 2351	3		
BLAW 2361	3	HIST 1310	3		
POSI 2320	3	PHIL 1320	3		
CSM 2360	3	CSM 3361	3		
		CSM 2160	1		
	16		16		1

**Junior**

First Semester	Hours	Second Semester	Hours
CSM 3360	3	CSM 3367	3
CSM 3363	3	CSM 4313	3
CSM 3366	3	CSM 4361	3

## The Bachelor of Science in Technology major in Engineering Technology

The Bachelor of Science in Technology major in Engineering Technology provides students with the technical background to work with engineers in planning production processes, developing tooling, establishing quality assurance procedures, developing safety programs, establishing work methods, and setting time standards. Students can specialize in Electrical Engineering Technology, Civil Engineering Technology, Environmental Engineering Technology, Manufacturing Engineering Technology, and Mechanical Engineering Technology. The Bachelor of Science in Technology major in Industrial Technology prepares students for work in industry in materials, processes, industrial safety, and concepts of industrial management. This degree has program majors in Manufacturing, and General Technology. The General Technology major, under Industrial Technology, can be customized to meet specific student needs offering opportunities in electronics, industrial safety, education, etc. Students interested in exploring such opportunities should see an Engineering Technology Department advisor for more details.

## Teacher Certification

A student seeking certification to teach at the secondary level must take:

CI 3325	Adolescent Growth and Development	3
CI 4332	Secondary Teaching: Curriculum and Technology	3
CI 4343	Instructional Strategies for the Secondary Teacher	3
CI 4370	Classroom Management, Ethics, and Legal Issues in Secondary Teaching	3
RDG 3323	Teaching Reading in the Content Areas	3
EDST 4681	Student Teaching 8-12	6

The student who has further questions should see the undergraduate advisor in Engineering Technology.

## Bachelor of Science (B.S.)

- Major in Concrete Industry Management (p. 524)
- Major in Construction Science and Management (p. 525)
- Major in Technology Management (Electronics Technology Concentration) (p. 526)
- Major in Technology Management (Manufacturing Technology Concentration) (p. 526)
- Major in Technology Management (Teacher Certification in Technology Education, Grades 6-12) (p. 527)

## Bachelor of Science in Technology (B.S.T.)

- Major in Engineering Technology (Civil Engineering Technology Specialization) (p. 528)
- Major in Engineering Technology (Electrical Engineering Technology Specialization) (p. 528)
- Major in Engineering Technology (Environmental Engineering Technology Specialization) (p. 529)
- Major in Engineering Technology (Manufacturing Engineering Technology Specialization) (p. 530)
- Major in Engineering Technology (Mechanical Engineering Technology Specialization) (p. 530)

## Minor

- Technology (p. 531)

## Certificate

- Driver and Traffic Safety Education (p. 531)

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Information about graduate programs can be found in the Graduate Catalog (p. 550).

**Subjects in this department include: CIM (p. 518), CSM (p. 519), TECH (p. 520).**

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## Courses in Concrete Industry Management (CIM)

### CIM 3330. Concrete Construction Methods.

This course covers forming, shoring, placing and reinforcing operations. Transporting, placing, consolidating, finishing, jointing and curing concrete for cast-in-place foundations, pavements, slabs on ground, structural frames, and other structural members are studied. Other topics include waterproofing concrete foundations and erecting precast concrete members. Prerequisite: CIM 3420

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

### CIM 3340. Understanding the Concrete Construction System.

A detailed look at how the concrete construction industry works. The course includes a review of model building codes, building officials and their function, concrete industry codes and standards, concrete construction processes, quality assurance systems, contract documents, estimating, construction scheduling and concrete construction markets. Prerequisite: MATH 2328 and CIM 3420

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

### CIM 3366. Applications of Concrete in Construction.

This course is a detailed study of the many uses of concrete in the construction of buildings, pavements and other facilities. Emphasis will be placed on the advantages, disadvantages, and unique problems faced by materials suppliers, contractors and design professionals when concrete is chosen for specific applications. Prerequisite: CIM 3330

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

### CIM 3420. Fundamentals of Concrete: Properties and Testing.

This course examines effects of concrete-making materials (aggregates, cements, admixtures, etc.) on the properties of fresh and hardened concrete. Concrete mixture proportioning calculations and statistical analysis of strength tests are also studied. Prerequisite: CSM 2342

**4 Credit Hours. 3 Lecture Contact Hours. 2 Lab Contact Hours.**

**Course Attribute(s):** Lab Required

**Grade Mode:** Standard Letter

**CIM 4310. Senior Concrete Lab.**

This course provides students with an opportunity to further develop their technical and laboratory knowledge and pursue a project of individual interest. A formal report/presentation will be required at the conclusion of the course. Prerequisites: CIM 3366 and CIM 3420 with grades of C or better

**3 Credit Hours. 1 Lecture Contact Hour. 3 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**CIM 4330. Management of Concrete Products – Ordering and Scheduling.**

This course is designed to provide the student with a basic understanding of managing the ordering and delivery process common to all concrete products. Emphasis will be in planning, organizing and controlling at both the first-line supervisory and managerial levels.

Prerequisites: CIM 3340 and MGT 3303

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**CIM 4340. Concrete Problems: Diagnosis, Prevention and Dispute Resolution.**

Course involves diagnosing/preventing problems related to concrete production, testing, construction and performance. Students learn to identify causes of fresh and hardened concrete problems, i.e. fast and slow setting, air content variations, low strength, cracking and scaling. Pre-job conferences and dispute resolution methods are examined.

Prerequisite: CIM 3366

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**CIM 4398. Capstone.**

An intensive study of a problem(s) appropriate to the major/student's career interests. Requires knowledge from previous technical/business coursework. Solution(s) for the problem(s) will be presented to an industry committee. Presentation must emphasize depth of analysis, completeness/effectiveness of solution, and presentation skills.

Prerequisite: CIM 4330. (WI)

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing|Writing Intensive

**Grade Mode:** Standard Letter

## Courses in Construction Science and Management (CSM)

**CSM 1260. Introduction to the Construction and Concrete Industry.**

This is an introductory course for Construction and Concrete Industry Management (CIM) majors. Residential, commercial, heavy, civil and highway construction is explored including the concrete industry. The role of the contractor, architect/engineer and owner are covered including contracts, careers, sustainability and economic importance of the construction industry

**2 Credit Hours. 2 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**CSM 2160. Introduction to Construction Surveying and Site Layout.**

Common construction surveying and site layout techniques are studied using both optical levels and total stations. Benchmarks, building lines, property lines, differential and profiling are discussed in lecture with applied exercises performed in the laboratory. Prerequisite: Pre-Construction or Instructor's Approval

**1 Credit Hour. 1 Lecture Contact Hour. 1 Lab Contact Hour.**

**Course Attribute(s):** Lab Required

**Grade Mode:** Standard Letter

**CSM 2313. Architecture Design I - Construction Documents.**

Students are introduced to the language and process of producing architectural construction documents in residential projects utilizing computers and CAD software. Site plans, floor plans, sections, elevations, and details are drawn individually and as a team as orthographic projection theory and its importance in resolving complex building geometry are covered

**3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.**

**Course Attribute(s):** Lab Required

**Grade Mode:** Standard Letter

**CSM 2342. Construction Materials and Processes.**

This course will introduce students to various types of construction materials including ceramics, ferrous, non-ferrous, and organic materials used in construction. Their properties, working characteristics and processes used to manufacture and assemble these materials are studied. Laboratory activities are used to reinforce lecture material.

Prerequisites: PHYS 1315/PHYS 1115 or PHYS 1410 or PHYS 1430 with grades of "C" or higher

**3 Credit Hours. 3 Lecture Contact Hours. 1 Lab Contact Hour.**

**Course Attribute(s):** Lab Required

**Grade Mode:** Standard Letter

**CSM 2360. Residential Construction Systems.**

A residential construction course, which deals with interpreting plans and specifications, along with studying site work, foundations, walls, roofing, ceilings, floor and finishing systems. Also, residential MEP systems are covered along with applicable building codes and construction financing.

Prerequisite: CSM 2342 or Instructor's Approval

**3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.**

**Course Attribute(s):** Lab Required

**Grade Mode:** Standard Letter

**CSM 3360. Structural Analysis.**

This is a structural engineering fundamentals class to include design loads, reactions, force systems, functions of a structure, and both the analysis and design of determinate structures by classical and modern techniques. Prerequisites: Completion of Pre-Construction coursework and TECH 2351 with a grade of "C" or higher, or Instructor's Approval

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**CSM 3361. Commercial Building Construction Systems.**

This is a commercial building construction systems class that deals with soils, site work, heavy foundations, steel, reinforced concrete and pre-cast structures along with common assemblies. Commercial MEP's are studied along with CSI master format, as-built and shop drawings, schedule of values, AIA documents and appropriate building codes.

Prerequisite: Pre-Construction or Instructor's Approval

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter