



**1. Proposal Summary**

(Summary is generally less than one page. Briefly: state what is proposed with a summary of rationale and highlights. Additional rationale may be attached.)

Some of our power and process plant contractors have suggested that we introduce a course in Power and Process Plant Construction into the curriculum. They have said that power plant construction will be a growing area of construction over the next ten to fifteen years. Therefore, we are developing this course in response to our Construction Advisory Committee suggestion as an alternative to CONM 423 Construction Management Professional Methods. CONM 423 is a writing intensive course therefore, the CONM 490 will also be writing intensive.

This course may also lead into a new B.S. in Power Generation.

**2. Summary of All Course Action Required\***

**a. Newly Created Courses to FSU:**

| Prefix | Number | Title                                |
|--------|--------|--------------------------------------|
| CONM   | 490    | Power and Process Plant Construction |

**b. Courses to be Deleted From FSU Catalog:**

| Prefix | Number | Title |
|--------|--------|-------|
|--------|--------|-------|

**c. Existing Course(s) to be Modified:**

| Prefix | Number | Title |
|--------|--------|-------|
|--------|--------|-------|

**d. Addition of existing FSU courses to program**

| Prefix | Number | Title |
|--------|--------|-------|
|--------|--------|-------|

**e. Removal of existing FSU courses from program**

| Prefix | Number | Title |
|--------|--------|-------|
|--------|--------|-------|

\*Contact Senate Secretary or UCC Chair if spaces for additional courses are needed.

## NEW COURSE INFORMATION FORM

*See Sample: Limit to One Page.*

### Course Identification:

|                |               |                                      |
|----------------|---------------|--------------------------------------|
| <b>Prefix:</b> | <b>Number</b> | <b>Title</b>                         |
| CONM           | 490           | Power and Process Plant Construction |

### Course Description:

Study of the construction and basic engineering design of power generating plants and process plants. Review of major equipment and facility requirements with plant layout and arrangement. Emphasis on construction of power and process plants including field construction materials and methods as well as on-site management of the construction process. Writing Intensive.

### Course Outcomes:

Upon completion of this course each student will be able to perform basic power plant engineering activities, apply thermodynamic principles, identify the various sources of energy, describe the numerous power generation systems, layout an equipment arrangement for a conventional power plant, identify the auxiliary equipment necessary for a power plant to operate, describe the various components for process plants in the pharmaceutical, food processing, water treatment, wastewater treatment industries, etc; describe the materials and methods for process and site piping, identify the testing methods that must be performed on the major components of process plants, read pump and fan curves, select piping materials from specification data, describe the quality assurance and quality control methods for piping work, layout basic pipe support systems, state the concrete placement methods for numerous foundation methods, describe the erection procedures for multi-level steel framing systems, describe basic equipment installation methods, calculate basic rigging methods, review shop drawings for process piping and equipment, and be able to describe the broad requirements for commissioning and decommissioning power and process plants. The student will also write technical papers on various power and process plant construction techniques.

### Course Outline including Time Allocation:

|   | Time Weight<br>Lecture hours |
|---|------------------------------|
| 1. Introduction and orientation             | 1                            |
| 2. Oral & Written Communication Assignments | 2                            |
| 3. Basic plant engineering                  | 3                            |
| 4. Sources of energy                        | 2                            |
| 5. Power systems                            | 4                            |
| 6. Conventional power plants                | 3                            |
| 7. Auxiliary equipment                      | 3                            |
| 8. Process plants                           | 3                            |
| 9. Process and site piping                  | 4                            |
| 10. Foundations and structural systems      | 2                            |
| 11. Construction erection                   | 5                            |
| 12. Construction on-site management         | 5                            |
| 13. Field trips and guest speakers          | 4                            |
| 14. Examinations                            | 3                            |
| 15. Holidays                                | 1                            |
| <b>TOTAL</b>                                | <b>45</b>                    |

# CREATE A NEW COURSE

Course Date Entry Form

FORM F  
Create Course  
rev. 2/14/05

## I. ACTION TO BE TAKEN: CREATE A NEW COURSE

Notes

1. Complete each item in section I and section II.
2. : If this course is to be used as a prerequisite for other university courses, Form Fs that reflect the prerequisite change must be submitted for those courses as well.

Term Effective: a. Semester  Fall  b. Year  2008  See instructions.

## II. PROPOSED FOR NEW COURSE: Complete all sections of this part through Prerequisites. See instructions in manual for further clarification.

a. Course Prefix  **CONM**      b. Number  **490**      c. Enter Contact Hours or check Independent Study (X).  
 LECTure  hr/week    LAB  hr/week    INDEpendent Study   
 Practicum:  hr/semester      Seminar:  hr/week

d. Full Course Title: **Power and Process Plant Construction**

e. Abbreviated Course Title: . (Abbreviate only if necessary. Use Arabic numerals. Limit to 26 characters and spaces.)

f. Semester(s) Offered:  Fall (See instructions for listing.)      g. Max. Section Enrollment :  25

Credit Hours: Check (x) type and enter maximum and minimum hours in boxes.

h. Type:  Variable  Fixed      i. Maximum Credit Hours       j. Minimum Credit Hours

k. Grade Method: Check (x)  Normal Grading       Credit/No Credit only (Pass/Fail)

m. May Be Repeated for Added Credit: Check (x)  Yes       No

n. Levels: Check (x)  Undergraduate  Graduate  Professional

o. Does proposed new course replace an equivalent course? Check (x)  Yes       No

p. Equivalent course: Prefix       Number       See instructions on Replacement courses.

q. CATALOG DESCRIPTION – Limit to 75 words – PLEASE BE CONCISE.

**Study of the construction and basic engineering design of power generating plants and process plants. Review of major equipment and facility requirements with plant layout and arrangement. Emphasis on construction of power and process plants including field construction materials and methods as well as on-site management of the construction process. Writing Intensive course.**

r. Prerequisites: (if no prerequisites, write "None") Limited to 60 spaces. **BCTM 223; HVAC 337.**

UCC Chair Signature/Date: \_\_\_\_\_

Academic Affairs Approval Signature/Date:

*Donald Fleck*      3/3/08

To be completed by Academic Affairs Office: - Standard & Measures Coding and General Education Code

Basic Skill (BS)  General Education (GE)  Occupational Education (OC)  G.E. Codes

### Office of the Registrar use ONLY

Date Received: \_\_\_\_\_ Date Completed: \_\_\_\_\_ Entered: SIS [125 \_\_\_ 1D4 \_\_\_ 12R\_\_\_, 131\_\_\_]

Ferris State University  
College of Technology  
Construction Department

**PROPOSED COURSE OUTLINE**

COURSE TITLE: Power and Process Plant Construction

COURSE DESIGNATION: CONM 490

COURSE DESCRIPTION: Study of the construction and basic engineering design of power generating plants and process plants. Review of major equipment and facility requirements with plant layout and arrangement. Emphasis on construction of power and process plants including field construction, materials and methods as well as on-site management of the construction process. Writing Intensive course.

CREDIT HOURS: Three (3) semester hours (3 + 0)

CONTACT HOURS: Lecture - Three hours per week

PREREQUISITES: BCTM 223-Mechanical/Electrical Plans & Specifications  
HVAC 337 – Mechanical/Electrical Building Systems  
Building Information Modeling Module

TEXTBOOKS: To Be Determined  
Relevant Codes Provisions (ASME/ACI/NEC/ et. al.)

SUPPLEMENTAL MATERIALS: Project plans, specifications, commissioning documents

## Power and Process Plant Construction

### UNITS OF INSTRUCTION:

|   | Time Weight<br>Lecture hours |
|---|------------------------------|
| 1. Introduction and orientation             | 1                            |
| 2. Oral & Written Communication Assignments | 2                            |
| 3. Basic plant engineering                  | 3                            |
| 4. Sources of energy                        | 2                            |
| 5. Power systems                            | 4                            |
| 6. Conventional power plants                | 3                            |
| 7. Auxiliary equipment                      | 3                            |
| 8. Process plants                           | 3                            |
| 9. Process and site piping                  | 4                            |
| 10. Foundations and structural systems      | 2                            |
| 11. Construction erection                   | 5                            |
| 12. Construction on-site management         | 5                            |
| 13. Field trips and guest speakers          | 4                            |
| 14. Examinations                            | 3                            |
| 15. Holidays                                | 1                            |
| TOTAL                                       | 45                           |

TOPICAL OUTLINE OF MAJOR UNITS OF INSTRUCTION:

1. Introduction and orientation
  - a. Course syllabus
  - b. Course objectives
  - c. Course policies
  - d. Relevance of course material to the construction industry
2. Oral and Written Communication Assignments
  - a. Research Paper Objectives
  - b. Presentation Procedures
3. Basic plant engineering
  - a. Machinery layout and arrangement
  - b. Power transmission
  - c. Lubrication
  - d. Measurements
  - e. Thermodynamic principles
4. Sources of Energy
  - a. Fossil fuels
  - b. Nuclear fuel
  - c. Coal
  - d. Hydropower
  - e. Geothermal
5. Power systems
  - a. Steam
  - b. Diesel and Gas engines
  - c. Nuclear
  - d. Gas Turbines
  - e. Coal
  - f. Other
6. Conventional power plants
  - a. Layout and machinery arrangement
  - b. Boilers
  - c. Turbines
  - d. Generators and Motors
  - e. Heat transfer devices
7. Auxiliary Equipment
  - a. Piping and Fittings and appurtenances
  - b. Valves
  - c. Pumps and fans
  - d. Specialty systems

8. Process Plants
  - a. Pharmaceutical
  - b. Food production
  - c. Water and Wastewater
  - d. Other
  
9. Process and Site Piping
  - a. Materials of construction
  - b. Methods of construction
  - c. Site coordination and inspection
  - d. Testing methods and acceptance procedures
  - e. Layout and support
  - f. Valve selection and installation
  
10. Foundations and Structural Systems
  - a. Mass foundations
  - b. Caisson foundations
  - c. Equipment support
  - d. Machinery vibrations
  - e. Nuclear concrete enclosure
  - f. Multi-level structural steel systems
  - g. Seismic requirements
  
11. Construction Erection
  - a. Shop drawings
  - b. Equipment installation
  - c. Site logistics
  - d. Rigging and Moving equipment
  
12. Construction On-Site Management
  - a. Delivery systems
  - b. Commissioning
  - c. De-commissioning
  - d. Site security
  - e. Regulatory issues
  
13. Field Trips and Guest Speakers
  - a. Power plant
  - b. Pharmaceutical plant
  - c. Water or wastewater treatment plant
  - d. Guest speakers

STUDENT LEARNING GOALS FOR EACH MAJOR UNIT OF INSTRUCTION

1. Introduction and orientation
  - a. Know the course policies, goals and requirements
  - b. Know the course grading criteria
2. Oral and Written Communication Assignments
  - a. Write three 5-page research papers on assigned topics
  - b. Present the topics to the class
3. Basic plant engineering
  - a. Know the principles of machinery layout
  - b. Know the engineering principles of power transmission
  - c. Know the basic types of equipment lubrication
  - d. Know the principles of engineering measurements
  - e. Know practical applications of the Laws of Thermodynamics
  - f. Know basic requirements of instrumentation & control systems
4. Sources of energy
  - a. Know the types of available fuels
  - b. Know the energy values of fuels
  - c. Understand broad environmental concerns
5. Power systems
  - a. Know the major components of various power systems
  - b. Be able to interpret process & instrumentation diagrams
6. Conventional power plants
  - a. Know the basic operation, construction & installation of boilers
  - b. Know the basic operation, construction & installation of turbines
  - c. Know the basic operation, construction & installation of generators/motors
  - d. Know the basic operation, construction & installation of heat transfer devices
7. Auxiliary equipment
  - a. Know the basic types of piping and appropriate uses
  - b. Know the methods of pipe joining systems
  - c. Know the uses and applications of piping fittings and appurtenances
  - d. Know the various types of valves and specific uses
  - e. Know the different types of pumps and fans
  - f. Be able to read pump and fan curves
  - g. Be able to select pipe materials from specification data

## Power and Process Plant Construction

8. Process plants
  - a. Know the major components of pharmaceutical plants
  - b. Know the major components of food production plants
  - c. Know the major components of water treatment plants
  - d. Know the major components of wastewater treatment plants
  - e. Know the major components of (to be determined) plants
  
9. Process and site piping
  - a. Know the construction trades of piping work
  - b. Know QA/QC methods of piping work
  - c. Know how to read and interpret pipe testing reports
  - d. Know the requirements of pipe testing methods
  - e. Be able to layout basic pipe support systems
  - f. Be able to review valve shop drawings from specifications
  - g. Schedule a plant piping system
  
10. Foundations and structural systems
  - a. Know concreting methods and requirements of mass foundations
  - b. Know concreting methods and requirements of caisson foundations
  - c. Know concreting methods and requirements of nuclear enclosures
  - d. Know concreting methods and requirements of machinery support
  - e. Know concreting methods and requirements for dampening vibrations
  - f. Know the erection procedures for multi-level steel framing systems
  
11. Construction erection
  - a. Be able to understand system shop drawings
  - b. Know basic equipment installation methods
  - c. Know rigging and equipment transfer methods
  - d. Understand site logistics and planning for equipment
  
12. Construction on-site management
  - a. Understand the appropriate delivery systems for plant projects
  - b. Know the broad requirements for plant commissioning
  - c. Know the broad requirements for plant de-commissioning
  - d. Understand site security requirements and issues
  - e. Be introduced to appropriate regulatory authority issues and requirements
  
13. Field trips and guest speakers
  - a. View actual completed plant projects (or under construction)
  - b. Better visualize the scope and magnitude of plant projects
  - c. Learn from industry experts

Prepared by: David Hanna  
Last Updated on 02/15/2008