C080

APPLICATION FOR NEW COURSE

1. Submitted by College of Engineering Date August 5, 2004

   Department/Division offering course Civil Engineering

2. Proposed designation and Bulletin description of this course

   a. Prefix and Number CE 584 b. Title* Design of Timber and Masonry Structures

   *NOTE: If the title is longer than 24 characters (including spaces), write
   A sensible title (not exceeding 24 characters) for use on transcripts Timber and Masonry

   c. Lecture/Discussion hours per week 3 d. Laboratory hours per week none

   e. Studio hours per week none f. Credits 3

   g. Course description

   Current and historic design methods of buildings and their components using wood, wood products, bricks, and concrete blocks.

   h. Prerequisites (if any)

   Courses in steel and reinforced concrete design at the senior level, or consent of instructor.

   i. May be repeated to a maximum of not applicable (if applicable)

4. To be cross-listed as ARC 584 (Prefix and Number) David Briggs (Signature, Chairman, cross-listing department)

5. Effective Date Fall 2004 (semester and year)

6. Course to be offered ☒ Fall ☐ Spring ☐ Summer

7. Will the course be offered each year? ☒ Yes ☐ No
   (Explain if not annually)

8. Why is this course needed?

   Both architects and structural engineers are called on to design or renovate buildings made of these materials. The American Society of Civil Engineers strongly recommends that Civil Engineering departments provide such courses.

9. a. By whom will the course be taught? Prof. Hans Gesund

   b. Are facilities for teaching the course now available? ☒ Yes ☐ No
   If not, what plans have been made for providing them?

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10. What enrollment may be reasonably anticipated? Between 5 and 15 students

11. Will this course serve students in the Department primarily? Both CE and ARC ☒ Yes ☐ No

Will it be of service to a significant number of students outside the Department? ☒ Yes ☐ No
If so, explain.

Agricultural Engineering students may want to take this course and would be welcome.

Will the course serve as a University Studies Program course? ☐ Yes ☒ No

If yes, under what Area? _____

12. Check the category most applicable to this course

☒ traditional; offered in corresponding departments elsewhere;

☐ relatively new, now being widely established

☐ not yet to be found in many (or any) other universities

13. Is this course applicable to the requirements for at least one degree or certificate at the University of Kentucky? ☒ Yes ☐ No

14. Is this course part of a proposed new program: ☐ Yes ☒ No
If yes, which?

15. Will adding this course change the degree requirements in one or more programs?* ☐ Yes ☒ No
If yes, explain the change(s) below

16. Attach a list of the major teaching objectives of the proposed course and outline and/or reference list to be used. ✓

17. If the course is a 100-200 level course, please submit evidence (e.g., correspondence) that the Community College System has been consulted.

18. Within the Department, who should be contacted for further information about the proposed course?

Name Prof. Hans Gesund Phone Extension 7 - 4823

e-mail: hgesund@engr.uky.edu

*NOTE: Approval of this course will constitute approval of the program change unless other program modifications are proposed.

Print Form

Clear Form

ARC/CE 599 - DESIGN OF TIMBER AND MASONRY STRUCTURES

→ 584

Catalog Data: ARC/CE 599 - Design of Timber and Masonry Structures
Current and historical design methods of buildings and their components using wood, wood products, bricks, and concrete blocks. 3 Credits

Textbook: Design of Timber and Masonry Structures, lecture notes by Prof. H. Gesund

References: "National Design Specification for Wood Construction", American Forest and Paper Association, 2001
"Building Code Requirements for Masonry Structures" ACI 530-02, American Concrete Institute, 2002
"TEK Manual for Concrete Masonry Design and Construction", National Concrete Masonry Association
"Technical Notes on Brick Construction", Brick Institute of America
Internet Resources

Instructor: Hans Gesund, Professor of Structural Engineering
Office: 375 Oliver H. Raymond Building
Phone: (859) 257-4823
e-mail: hgesund@engr.uky.edu

Goals: To have students learn how to design modern structures in timber and masonry, how to analyze historic structures and adapt them to current uses, understand behavior of the materials and how this affects designs, and to gain an appreciation of the economics of construction using these materials. A subsidiary goal is to enable the students to answer questions on these materials on the professional licensing examinations.

Prerequisites: Courses in steel and reinforced concrete design at the senior level, or consent of instructor.

Topics: Materials - Wood and wood products, artificial wood products, fasteners, clay and concrete bricks and blocks, mortars, grouts.
Behavior of the materials - short and long term, elastic and inelastic.
Design philosophies - elastic and inelastic, empirical, historic..
Tension and compression members, beams, shear walls, floor systems, roofs, arches, trusses, joints and connections.
Codes of practice, design aids, construction methods.

Outcomes: Students are expected to be able to design and analyze timber and masonry structures for compliance with building codes.

Computer use: Structural analysis programs as needed, internet use for useful references and commercial products.

Laboratory: None

ABET Category: Design: 3 hours

Prepared by: Hans Gesund

Design content: Lectures, reading assignments, and problems/projects are oriented toward practical designs carried out by the students.

Relevance: Historically, wood and masonry were the primary building materials for all types of structures. Presently, the majority of single and small multiple family dwellings are made of wood, as are some commercial buildings. Many, if not most, basements, and many small commercial structures are made of masonry. In other countries most buildings are masonry, even tall, multistory apartment and commercial buildings. Renovation and re-adaptation of older buildings requires knowledge of these materials.

Additional information for students:

1. We will cover the material in the class notes, which will be handed out at the fi
   or second meeting.
2. There will be regular homework assignments, both reading and problems/projects. T
   written assignments will be corrected, but no grades will be given. I will keep
   informal track of quality and punctuality. In addition there will be references t
   internet sites which you will be expected to visit and from which you will be aske
   to download material. References will also be on reserve in the Architecture and/c
   Engineering libraries.
3. You are strongly urged to work together on all assignments. Since I hope to have a
   mixture of Architecture and Engineering students in the course, I encourage you to
   learn from each other and to cooperate as you will in your professional careers.
4. There will be a mid-term and a final exam, which will count equally. Both will be
   design oriented.
5. I will let you know office hours as soon as my schedule stabilizes. However, you a
   welcome to come to my office at any time that is convenient for you and when I am
   there. I do have a lot of committee meetings. You can always make an appointment.
   The best way to reach me outside of class is via e-mail.
6. Grading will be on a curve - only up, not down from the exam grades. Class partici
   pation and homework will count approximately 50% of your term grade, with the two
   exams counting for the other 50%.

EXPANDED COURSE DESCRIPTION: While timber and masonry are very dissimilar materials, historically they were the main construction materials for thousands of years, until less than 200 years ago. During that time they were each used alone for some structures, and together for others. Both are still widely used today.

Despite the dissimilarity of the physical and chemical properties of timber and masonry, there is some commonality in how they are used in structures. Both are employed as structural membranes in walls to resist in-plane as well as out-of-plane loads. Beyond that, design of structural components of both materials is commonly based on allowable stresses rather than load and resistance factors. LRFD methods exist, but refer back to elastic instead of plastic analyses of member stresses.

The timber part of the course will be largely concerned with properties of the material and how they affect Code provisions. In turn the Code provisions will determine the design of tension, compression, and flexural members, and then how these are connected to form trusses, floor, roof and wall systems, and buildings. Studies of the types of connections available and their selection will be an important part of this.

The masonry part of the course will deal with both brick and concrete block masonry as materials and also as primary load bearing constituents of structures. Unreinforced and reinforced masonry walls will be designed for in-plane and out-of-plane loadings. The use of masonry lintels to bridge openings, and the use of stone and brick arches and domes to cover open spaces in historic buildings will also be studied. Connection methods between walls, and between walls and timber floor systems will tie the two parts of the course together.

The course is new, and while individual courses in timber design and in masonry design are offered in some large programs, the combination is a new venture. There is much material to cover if the students are to gain an understanding of the materials and how to design structures employing them. Since this is an advanced course, students will have to spend considerable time to prepare themselves for each class, and will be expected to particpate fully in class discussions and projects.

The course is intended as an elective for architecture, construction engineering, and structural engineering majors. The hope is that the mingling of architecture and engineering students will provide a superior experience and learning climate for both. Since both groups of students may also consist of both undergraduate and graduate students, the work products expected, and the grading, will be adjusted to the background and interests of the individuals. Apples, oranges, grapes, pears, bananas, peaches, and strawberries can make a very tasty fruit salad even if the individual fruits cannot be compared to each other.

The primary objective of the course will be to have students learn how to design in the two materials. Additional objectives include having the students acquire an appreciation of how historic structures were designed and built, and providing an opportunity for students of varying backgrounds and education to work together, as many will in their professional lives.

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Signatures of Approval:

Department Chair	9/10/03 Date
Dean of the College	12/4/03 Date
	10/22/03 Date of Notice to the Faculty
*Undergraduate Council	Date
*University Studies	Date
J Blackwell *Graduate Council	3-19-04 Date
*Academic Council for the Medical Center	Date
*Senate Council (Chair)	Date of Notice to University Senate

*If applicable, as provided by the Rules of the University Senate

ACTION OTHER THAN APPROVAL

Rev 8/02