**ME 50290 Indoor Environmental Analysis and Design, Sem. 2 (alternate years), Class 3, cr. 3. Prerequisite: ME 31500**

Review of current trend of building and indoor environment design. Theory of thermal comfort, indoor air quality, visual comfort, and acoustic comfort. Introduction of experimental techniques and advanced computer tools for indoor environment analysis and design. **Professor Chen.**

### Course Description

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<th>Schedule Type</th>
<th>Minutes Per Week</th>
<th>Meetings Per Week</th>
<th>Weeks Offered</th>
<th>% of Credit Allocated</th>
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### Course Attributes

- Registration Approval Type
- Department
- Instructor
- Satisfactory/Unsatisfactory Only
- Pass/Fail Only
- Honors
- Maximum Faculty Credit
- Credit by Examination
- Special Fee
- Full Time Enrollment
- Off Campus Experience

**Cross Listed Courses:**

**Graduate Council Doc. No. 12-34f**

**EFD 16-09**

**OFFICE OF THE REGISTRAR**

*(Grad Form 40G) [Excel format] - Does not include the Graduate Council's required supporting document. See pdf version of Form 40G)*
TO: The Engineering Faculty

FROM: The Faculty of the School of Mechanical Engineering

RE: New Course – ME 502 Indoor Environmental Analysis and Design

The Faculty of the School of Mechanical Engineering has approved the following new course. This action is now submitted to the Engineering Faculty with a recommendation for approval.

ME 502 Indoor Environmental Analysis and Design
Sem. 2 (alternate years), Class 3, cr. 3
Prerequisite: ME 315


Reason: This course has been taught three times on an experimental basis with the following enrollments: spring 04 - 9 students, spring 06 - 7 students, and spring 2008 - 9 students. This course provides students with the basic theory of thermal comfort, indoor air quality, visual comfort, acoustics comfort and HVAC systems as well as state-of-the-art on indoor environment design. This course will also attract students from architectural engineering.

James D. Jones, Associate Head/Professor
School of Mechanical Engineering

APPROVED FOR THE FACULTY OF THE SCHOOLS OF ENGINEERING BY THE ENGINEERING CURRICULUM COMMITTEE

ECC Minutes 9/24/12
Date 10/2/12
Chairman ECC 9/17/12
## Supporting Document for a New Graduate Course

**To:** Purdue University Graduate Council  
**From:** Faculty Member: Yan Chen  
Department: Mechanical Engineering  
Campus: West Lafayette  
**Date:** 7/20/2012  
**Subject:** Proposal for New Graduate Course - Documentation Required by the Graduate Council to Accompany Registrar’s Form 40G

**Contact for information if questions arise:**  
Name: James D. Jones  
Phone Number: 494-5691  
E-mail: jonesjd@purdue.edu  
Campus Address: 1288 ME/ ME room 2008B

**Course Subject Abbreviation and Number:** ME 50200  
**Course Title:** Indoor Environmental Analysis & Design

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### A. Justification for the Course:

- This course has been taught two times on an experimental basis with the following enrollments: spring 2010 – 13 students and then in spring 2012 – 19 students. This course teaches students to use computer tools to design a comfortable, healthy and safe building.
- The proposed ME 50200 course is a review of current trend of building and indoor environment design, theory of thermal comfort, indoor air quality and air distribution, introduction of experimental techniques and advanced computer tools for indoor environment analysis and design. The course will be offered in the spring with an anticipated enrollment of 15-20 students.

### B. Learning Outcomes and Methods of Evaluation or Assessment:

- Students in this course will: 1) Provide an introduction into and practical examples of indoor environment (1 week), 2) Present the basic theory of thermal comfort, indoor air quality, visual comfort, acoustics comfort and HVAC systems (4 weeks), 3) Introduce advanced tool to analyze and design indoor environment and energy use in buildings (6 weeks), & 4) Conduct indoor environment analysis and design for a challenging problem (4 weeks).
- There will be a term paper, design project report and presentations.
• 1. Engineering Topics: Engineering Science – 1.5 credits (50%) & Engineering Design – 1.5 credits (50%)
  - Criteria:
    | Exams and Quizzes | Papers and Projects |
    |--------------------|--------------------|
    | □                  | x                  |
    | □ Homework         | □ Laboratory Exercises |
    | □ Attendance and Class Participation | □ Extra Credit Policies |

• This course is taught by lecture and covers the program outcomes described in the program map.
  - Method of Instruction:
    | Lecture | Recitation |
    |---------|------------|
    | x       |            |
    | □ Presentation | □ Laboratory |
    | □ Lab Prep   | □ Studio |
    | □ Distance   | □ Clinic |
    | □ Experimental | □ Research |
    | □ Ind. Study | □ Pract/Obs |
    | □ Seminar    |            |

C. Prerequisite(s):
• Must have taken ME 31500 – Heat and Mass Transfer
• ME 31500 is the only prerequisite needed for this course.

D. Course Instructor(s):
• Qingyan (Yan) Chen, Reilly Professor of Mechanical Engineering

• Is the instructor currently a member of the Graduate Faculty?  □ Yes  □ No
  Click here to enter text.
  (If the answer is no, indicate when it is expected that a request will be submitted.)

E. Course Outline:
• 1. Provide an introduction into indoor environment (1 week), 2. Present the basic theory of psychrometrics, thermal comfort, indoor air quality, visual comfort, acoustics comfort, and HVAC systems (4 weeks), 3. Introduce advanced tools to analyze and design indoor environment and energy use in buildings (6 weeks), and 4. Conduct indoor environment analysis and design for the challenging problem (4 weeks).
F. Reading List (Include course text):
   
   - No textbook required, lecture notes handed out in class.
   - No textbook required.

G. Library Resources:
   
   - No resources needed.

H. Example of a Course Syllabus:

   Week 1: Overview of Indoor Environment
   
   Weeks 2-5: Theory
   
   Weeks 5-10: Tools for Indoor Environment Analysis
   
   Weeks 11-14: Analysis and Design of Indoor Environment
   
   Week 15: Final project presentations
ME 502
INDOOR ENVIRONMENT ANALYSIS AND DESIGN

Course Outcomes
1. Provide an introduction into and practical examples of indoor environment.
2. Present the basic theory of thermal comfort, indoor air quality, visual comfort, acoustics comfort and HVAC systems.
3. Introduce advanced tools to analyze and design indoor environment.

Overview of Indoor Environment (1 wk)
1. Introduction of indoor environment
2. Examples of indoor environment

Theory (4 wks)
1. Psychrometrics
2. Thermal comfort
3. Indoor air quality
4. Visual and acoustics comfort
5. HVAC systems

Tools for Indoor Environment Analysis (6 wks)
1. Introduction to flow computer programs
2. Governing indoor flow equations
3. Numerical techniques
4. Heat transmission

Analysis and Design of Indoor Environment (4 wks)
1. Analysis
2. Design
3. Project presentation
COURSE NUMBER: ME 502

REQUIRED COURSE OR ELECTIVE COURSE: Elective

TEXTBOOK/REQUIRED MATERIAL: None – Lecture notes handed out in class.

COORDINATING FACULTY: Q. Yan Chen


ASSESSMENTS TOOLS:
1. Term paper.
2. Design project report.
3. Presentations.

PROFESSIONAL COMPONENT:
1. Engineering Topics: Engineering Science – 1.5 credits (50%)
   Engineering Design – 1.5 credits (50%)

NATURE OF DESIGN CONTENT: Use computer tools to design a comfortable, healthy, and safe building.

COMPUTER USAGE: Several building simulation programs.

COURSE STRUCTURE/SCHEDULE:
1. Lecture – 2 days per week at 75 minutes.

COURSE TITLE: Indoor Environment Analysis and Design

TERMS OFFERED: Spring

PRE-REQUISITES: ME 315 Heat and Mass Transfer

COURSE OUTCOMES:
1. Provide an introduction into indoor environment.
2. Present the basic theory of psychrometrics, thermal comfort, indoor air quality, visual comfort, acoustic comfort, and HVAC systems.
3. Introduce advanced tools to analyze and design indoor environment.

RELATED ME PROGRAM OUTCOMES: N/A

PREPARED BY: Q. Yan Chen

REVISION DATE: January 17, 2008