APPLICATION FOR NEW COURSE

1. Submitted by College of _______________________________ Engineering _______________________________ Date 3/30/05 _______________________________ Department/Division offering course Mechanical Engineering _______________________________

2. Proposed designation and Bulletin description of this course

   a.Prefix and Number ME 549 _______________________________ b. Title* Power Generation _______________________________

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

   c. Lecture/Discussion hours per week 3 _______________________________ d. Laboratory hours per week 0 _______________________________

   e. Studio hours per week 0 _______________________________ f. Credits 3 _______________________________

   g. Course description

   Modern powerplants for electric power generation and cogeneration. Thermodynamic analysis of different concepts of powerplants. Design studies of specific powerplants _______________________________

   h. Prerequisites (if any)

   ME 321 and ME 330 _______________________________

   i. May be repeated to a maximum of _______________________________ (if applicable) _______________________________

4. To be cross-listed as

Prefix and Number _______________________________ Signature, Chairman, cross-listing department _______________________________

   (semester and year) _______________________________

5. Effective Date _______________________________

6. Course to be offered □ Fall ☒ Spring □ Summer _______________________________

7. Will the course be offered each year? (Explain if not annually) _______________________________

   ☒ Yes □ No _______________________________

   Semi-annually for enrollment. _______________________________

8. Why is this course needed?

   The course will provide more in-depth coverage of electric power generation topics than can be covered in the regular undergraduate curriculum. _______________________________

9. a. By whom will the course be taught? Mechanical Engineering _______________________________

   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? 10-15

11. Will this course serve students in the Department primarily? ☑ Yes ☐ No
   Will it be of service to a significant number of students outside the Department?
   If so, explain.
   ☐ Yes ☑ No
   Can be. Course is of interest to chemical engineering students.

12. Will the course serve as a University Studies Program course? ☐ Yes ☑ No
    If yes, under what Area?

13. 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

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

15. Is this course part of a proposed new program?
    If yes, which?

16. Will adding this course change the degree requirements in one or more programs?*
    If yes, explain the change(s) below

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

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

19. Within the Department, who should be contacted for further information about the proposed course?
    Name: Vincent Capece
    Phone Extension: (270) 534 - 3123

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

Signatures of Approval:

Department Chair

Dean of the College

Approved at Department of Mechanical Engineering Faculty Meeting of April 20, 2005. Vote: unanimous.

*Undergraduate Council

*University Studies

*Graduate Council

*Academic Council for the Medical Center

*Senate Council (Chair)

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

Date of Notice to the Faculty

Date

Date

Date

Date

Date

Date

Date of Notice to University Senate

ACTION OTHER THAN APPROVAL
ME549 – Power Generation

Overall Course Outline

**COURSE:** ME 549, Power Generation
Lecture: 3 hrs; Credit: 3

**INSTRUCTOR:** V.R. Capece

**AUDIENCE:** Students in mechanical and chemical engineering

**GOALS:** Provide the student with a fundamental understanding of power generation.

**PREREQUISITES:** ME 330, ME 321, and engineering standing


**HOMEWORK:** In general, weekly homework assignments will be given. Homework assignments will in some cases have different problems and/or requirements for graduate students.*

**EXAMS/QUIZZES:** Exams/quizzes will in some cases have different problems and/or requirements for graduate students.*

**GRADING SCALE:**

<table>
<thead>
<tr>
<th>Score Range</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-100</td>
<td>A</td>
</tr>
<tr>
<td>80-89</td>
<td>at least a B</td>
</tr>
<tr>
<td>70-79</td>
<td>at least a C</td>
</tr>
<tr>
<td>60-69</td>
<td>at least a D (E for graduate students*)</td>
</tr>
<tr>
<td>0-59</td>
<td>E</td>
</tr>
</tbody>
</table>

*Our accreditation association and policy of the Graduate School require that there be different assignments and grading criteria for undergraduate students and graduate students in 400G and 500-level courses. For that reason, you will find differences in course requirements and/or grading criteria in this class, posted on the syllabus.
ME 549 POWER GENERATION

Course Goals: The goals of this class are to:
1) Familiarize the students with power plants for electric power generation.
2) Develop a basic understanding of steam power plants including supercritical power plants, with some applications of cogeneration.
3) Develop an understanding of simple gas turbine power plants as well as combined cycles.
4) Develop a basic understanding of preliminary turbine airfoil design.

Learning Outcomes: At the completion of this course the students should:
1) Understand the cycle analysis of power plants. This knowledge will be demonstrated by having successfully worked problems on the different power cycles covered.
2) Have a basic understanding of preliminary turbine blade design. This knowledge will be demonstrated by being able to compute and construct velocity diagrams and use Euler's turbomachine equation.

TOPICS TO BE COVERED

A. Introduction
B. Review of Thermodynamics
C. Rankine Power Cycles including reheat and regeneration
D. Cogeneration
E. Gas Turbine Cycles including reheat and regeneration
F. Combined Cycles
G. Energy Transfer in Turbomachines
H. Design of Turbines
I. Other Power Plant Concepts