October 29, 2004

Memorandum

TO: Dr. David Watt
   Vice Provost for Academic Affairs

FROM: Robert A. Yokel, Ph.D.
   Associate Dean for Research and Graduate Education
   College of Pharmacy
   University of Kentucky Medical Center
   511C Pharmacy Building
   phone: 859-257-4855
   fax: 859-323-6886
   E-mail: ryokel@email.uky.edu

DATE: May 2, 2002

RE: Request for approval of a new three credit course: PHR 764: Drug Development Regulation and Clinical Research

The Director of Graduate Studies, the Graduate Program Committee and the faculty in Pharmaceutical Sciences and I have approved and submit for consideration and approval the attached new course application.

Thank you.

cc: Dr. Dan Wermeling
APPLICATION FOR NEW COURSE

1. Submitted by College of Pharmacy ___________________________ Date 9/10/2004

Department/Division offering course Pharmacy Practice & Science

2. Proposed designation and Bulletin description of this course

   a. Prefix and Number 764
   b. Title* Drug Development Regulation and Clinical Research
   *NOTE: If the title is longer than 24 characters (including spaces), write
   A sensible title (not exceeding 24 characters) for use on transcripts Pharmaceutical Development

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

   e. Studio hours per week 0
   f. Credits 3

   g. Course description

   A study of the pharmaceutical development process and its regulation, including a detailed examination of clinical research methodologies. Students will demonstrate their competence by developing a clinical trial protocol

   h. Prerequisites (if any)

   Enrollment in the Pharmaceutical Sciences Graduate Program or consent of instructor

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

4. To be cross-listed as

   N/A

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

5. Effective Date Spring semester 2005

6. Course to be offered [ ] Fall [X] Spring [ ] Summer

7. Will the course be offered each year? [ ] Yes [X] No

   Initially intend to offer on alternate years. Will convert to annual if there are sufficient graduate students or demand

8. Why is this course needed?

   Our graduates, who frequently are employed in the pharmaceutical industry, do not have formal education in the pharmaceutical development process and in a structured program to develop clinical research protocols. Enhancing clinical research scholarship is a priority in the College and Medical Center. Competency in the regulatory and clinical elements of drug development is required to engage in this type of research.

9. a. By whom will the course be taught? Daniel Wermeling, Pharm.D. with some guest lecturers

   b. Are facilities for teaching the course now available? [X] Yes [ ] No

   If not, what plans have been made for providing them?
APPLICATION FOR NEW COURSE

10. What enrollment may be reasonably anticipated? 8-12 Pharmacy graduate students per offering

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.
   The course could be useful to anyone who wishes to engage in pharmaceutical research. Graduates of other colleges who wish to work in the biomedical industry could benefit from this course.

   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?
   If yes, which?

15. Will adding this course change the degree requirements in one or more programs?*
    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. □ Check here if 100-200.

18. If the course is 400G or 500 level, include syllabi or course statement showing differentiation for undergraduate and graduate students in assignments, grading criteria, and grading scales. □ Check here if 400G-500.

19. Within the Department, who should be contacted for further information about the proposed course?
   Name   Daniel Wermeling, Pharm.D.  Phone Extension 3-7499

*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

Received 10/27/04

Dean of the College

Date

Sept 18, 2004

Date

October 17, 2004

Date of Notice to the Faculty

Date

Date

Date

11/17/04

Date

Date of Notice to University Senate

*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

DHR 964

ACTION OTHER THAN APPROVAL

Rev 3/04
Drug Development Regulation and Clinical Research
PHR 7XX

Course Outline

Primary Instructor: Daniel Wermeling, Pharm.D.
Associate Professor
231 A College of Pharmacy
Tel: 3-7499
Email: dwermel@uky.edu

Course Objectives:

This course offering provides education in drug development, regulation and clinical research that is not offered in College of Pharmacy professional or graduate course work. Upon completion of this course a student shall be able to:

1. Describe the history and regulation of the drug approval process for different types of pharmaceutical products
2. Describe the scientific considerations in designing human research studies that meet specific drug development goals
3. Apply the information obtained in class to contemporary drug development problems
4. Develop their own clinical protocol and patient consent form

Course Outline Topics/Hours

1. History of Pharmaceutical & Biologic Regulation, FDA authority
2. Governmental, Economic and Marketplace Influences on Pharmaceutical Research and Development
3. Pharmaceutical Inventions, patents and intellectual property and relation to market exclusivity, UK IP disclosure and royalty policy
4. Contemporary Overview of Drug and Development and approval
   a. New Drug Applications – New Chemical Entity or biologic discovery & development process – Elements and submission of an IND (505) b i
      i. Preclinical toxicology/pharmacology and Good Laboratory Practices (GLP)
      ii. Chemistry/manufacturing and controls, Good Manufacturing Practices (GMP), & Process Analytical Technology (PAT)
      iii. Clinical Investigation Plan and Good Clinical Practices (GCP)
   b. Generic, 505 j, (Abbreviated New Drug Applications – ANDA),
   c. Over-the-Counter pharmaceutical and dietary supplement (nutraceuticals) approval process
   d. Medical device (IDE, PMA and 510 k)
e. Drug delivery system approval process (505) b 2
f. Orphan Drug Development Process
g. Humanitarian Use Devices

5. Drug Development Clinical Research Methodology
   a. Clinical Pharmacology (Phase 1) Objectives and Requirements for a new drug
      i. First in man trial/Bioavailability, etc.
      ii. Drug metabolism
      iii. Formulation assessments and Bioequivalence
      iv. PK/PD modeling and analysis
      v. Pharmacogenomics
      vi. Special population studies - gender, race, age, weight
      vii. Studies with radiolabeled agents, procedures, requirements
   b. Writing a clinical protocol
   c. Phase 2 and 3 Clinical Research
      i. Objectives of each phase
      ii. Classic study designs for efficacy and safety studies
         1. Statistical plan, choosing variables, sample size, test methods and analysis plan
         2. Surrogate markers in clinical research
         3. Examples
            a. Antibiotic
            b. AIDS Vaccine
            c. Anti-cancer drug
            d. Anti-seizure medicine
      iii. Monitoring Safety Data & role of Data Monitoring Boards
   d. Clinical Study Logistics and Direction Responsibilities
   e. Principles of data management (21 CFR 11), source books, charts, case report forms, computer entry, data integrity and storage.
   f. Clinical Study Reports, manuscript writing and Authorship
   g. Research with approved pharmaceuticals and IND status
   h. Elements on an NDA submission
   i. Post-approval requirements, pharmacovigilance, Phase 4 studies, and Outcomes Research
   j. Drug Marketing and Advertising
   k. FDA inspections, 483 process, response strategies, Market withdrawals (unsafe drug) and enforcement actions (non compliance examples)

6. Obligations of University Research Investigator
   a. IACUC
   b. IRB
   c. Radiation Drug Review Committee and Biosafety Committee
   d. Legal agreements and authority
      i. Contracts
      ii. Material transfer
      iii. Confidentiality
      iv. Risk management
v. Conflict of interest

e. Financial considerations of clinical research

f. UK infrastructure supporting research.

Practicum

Given a study title for a drug each student shall write a clinical protocol in FDA IND format and an IRB subject consent form. Each student shall make a verbal presentation in class regarding their study. Problems for clinical pharmacology and clinical trial design will be assigned. The student shall submit their protocol in writing for a grade.

<table>
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<tr>
<th>Course elements</th>
<th>Hours</th>
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<tbody>
<tr>
<td>Lecture Hours</td>
<td>35</td>
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<tr>
<td>Examinations (2)</td>
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<tr>
<td>Practicum Q &amp; A</td>
<td>3</td>
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<tr>
<td>Verbal Presentations</td>
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<tr>
<td>Written Assignment</td>
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<td>Total</td>
<td>58 hours</td>
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Recommend 4 credit hour course taught every other year unless demand requests more frequent offering

Grading

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<table>
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<tbody>
<tr>
<td>Exam # 1</td>
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<tr>
<td>Exam # 2</td>
<td>30%</td>
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<tr>
<td>Written Protocol</td>
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<tr>
<td>Total</td>
<td>100%</td>
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Exam format will be multiple choice, short answer and essay responses. Verbal presentation will be graded for content, completeness and professional presentation similar to seminar evaluations. Written protocols will be evaluated in a similar manner.
Course Meeting Schedule

The course will meet 3 hours per week for one semester (MWF) beginning in the Spring semester of 2005.

Prerequisites- Enrollment in the Pharmaceutical Sciences Graduate Program or Consent of Instructor

Clinical Pharmaceutical Science students recommended course for 1st year and Traditional Track Recommended for 2nd or later year.

Useful References

Spilker       Guide to Clinical Trials
Bolton       Statistics in Pharmaceutical Sciences
Mathieu       Drug Development
Mathieu       Biologics Development
Beers        Generic and Innovator Drugs
Dunn          Protecting Study Volunteers in Research