**Course Change Proposal**  
**Form A**

<table>
<thead>
<tr>
<th>Academic Group (College):</th>
<th>Academic Organization (Department):</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health and Human Services</td>
<td>Physical Therapy</td>
<td>2/4/2011</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Type of Course Proposal:</th>
<th>Department Chair:</th>
<th>Submitted by:</th>
</tr>
</thead>
<tbody>
<tr>
<td>New x</td>
<td>Change ___ Deletion ___</td>
<td>Dr. McGinty</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Does this course fulfill a requirement for single-subject or multiple subject credential students?</th>
<th>For Catalog Copy:</th>
<th>CCE (Extension):</th>
<th>Semester Effective:</th>
</tr>
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<tbody>
<tr>
<td>Yes ___ No x</td>
<td>Yes ___ No ___</td>
<td>Yes ___ No x ___</td>
<td>Fall X Spring __, 2012</td>
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<table>
<thead>
<tr>
<th>Prefix &amp; No.</th>
<th>Title:</th>
<th>Units:</th>
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<tbody>
<tr>
<td>PT 632</td>
<td>Pharmacology for Physical Therapists</td>
<td>2</td>
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<table>
<thead>
<tr>
<th>This course replaces experimental course Subject Area (prefix) and Catalog Nbr (course number):</th>
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<tr>
<td>Yes ___</td>
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**JUSTIFICATION:**
This is a new course developed to meet the accreditation requirements for the Doctor of Physical Therapy degree.

**NEW COURSE DESCRIPTION:** (Not to exceed 80 words, and language should conform to catalog copy. See http://www.csus.edu/umanual/acad.htm - Guidelines for Catalog Course Description)

This course provides a study of pharmacological agents and their effects on the musculoskeletal, neuromuscular, cardiopulmonary and integumentary systems. Particular emphasis is placed on recognition of adverse reactions and side effects of various drugs as they affect patients receiving physical therapy. **Open to Physical Therapy Major Only.**

**Note:**
Prerequisite: BIO 633, PT 600, PT 602, PT 604, PT 606, PT 608, PT 630, PT 614, PT 618, PT 620, PT 622

Enforced at Registration: Yes x | No ___
Corequisite: PT 634, PT 636, PT 638
Enforced at Registration: Yes | No x
Graded: Letter x Credit/No Credit ___
Instructor Approval Required? Yes ___ No x ___
Course Classification (e.g., lecture, lab, seminar, discussion): Lecture C-O2
Title for CMS (not more than 30 characters) Pharmacology for PT

Cross Listed? | |
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<tr>
<td>Yes ___ No x ___</td>
<td>If yes, do they meet together and fulfill the same requirement, and what is the other course.</td>
</tr>
</tbody>
</table>

How Many Times Can This Course be Taken for Credit? 1

Can the course be taken for Credit more than once during the same term? Yes | No x ___
FOR NEW COURSE PROPOSALS OR SUBSTANTIVE CHANGES ONLY:

Description of the Expected Learning Outcomes: Describe outcomes using the following format: “Students will be able to: 1), 2), etc.” See the example at http://www.csus.edu/acaf/example.htm

At the completion of this course, the student will be able to:

Goal 1.0: Demonstrate Professional Physical Therapist Effectiveness

1.1 Compare and contrast normal biological, physiological, and psychological mechanisms of the human body with pathophysiological factors that lead to impaired body functions and structure.

1.1.4 Analyze the effects of pharmacological agents on human function.

1.1.4.1 Describe the primary pharmacokinetic factors involved in drug therapy (drug administration, absorption, distribution, interaction, and elimination).

1.1.4.2 Draw a dose response curve for drugs, and indicate the threshold dose and ceiling dose.

1.1.4.3 Describe the primary methods of internal drug administration (injection, inhalation, topical, transdermal, others).

1.1.4.4 Describe how drug absorption and distribution can be affected by specific physical therapy interventions such as thermal agents, massage, and exercise.

1.1.4.5 List the primary organs and tissues in the body that are responsible for drug metabolism.

1.1.4.6 List the factors that can alter normal pharmacokinetics (age, disease, drugs, genetics, nutrition, chemicals, body composition, and gender).

1.1.4.7 Explain how altered pharmacokinetics may lead to a decrease or an increase in drug effects, and how these effects may be recognized in patients/clients receiving physical therapy.

1.1.4.8 Recognize and appraise conditions reflecting critical (life-threatening) drug interactions in patients/clients receiving physical therapy.

1.1.4.9 Know and understand the mechanism of actions of various drugs commonly used by patients receiving physical therapy.

1.1.4.10 Identify and describe, in writing, general principals of pharmacology as they relate to clinical decision making in the physical therapy management of a patient.

1.1.4.11 Identify in writing the possible effects of various drug actions on physical therapy outcomes.

1.2 Determine the physical therapy needs of any individual seeking services.

1.2.2 Review pertinent medical records and conduct a comprehensive patient interview.

1.2.2.1 Know and understand the mechanism of actions of various drugs commonly used by patients receiving physical therapy.

1.3 Develop a plan of care based on the best available evidence and that considers the patient’s personal and environmental factors.

1.3.3 Progress the plan of care by making ongoing adjustments to interventions.

1.3.8.1 Monitor and adjust the patient’s plan of care in response to interpretation of pharmacological principles.

1.3.8.2 Explain how altered pharmacokinetics may lead to a decrease or an increase in drug effects, and how these effects may be recognized in patients/clients receiving physical therapy.

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Goal 2.0: Demonstrate Professional Behaviors

2.1 Recognize cultural, ethnic, age, economic, and psychosocial differences and apply a humanistic and holistic approach to the delivery of a clinical service.

2.1.1 Practice physical therapy demonstrating cultural competence with all individuals and groups.

2.1.2 Work effectively with challenging patients.

2.1.3 Respect personal space of patients/clients and others.

2.1.4 Demonstrate behaviors that are non-judgmental with regards to patients/clients’ lifestyles.

2.1.5 Respect roles of support staff and delegate appropriately.

2.2 Communicate effectively for varied audiences and purposes.

2.2.1 Demonstrate effective interpersonal (verbal, nonverbal, electronic) communication skills considering the diversity of populations and environments.

2.2.2 Facilitate therapeutic communication and interpersonal skills.

2.2.3 Discuss difficult issues with sensitivity and objectivity.

2.2.4 Appropriately utilize communication technology efficiently, professionally, and effectively.

2.2.5 Respect roles of support staff and communicate appropriately.

2.3 Participate in professional activities that serve the community and advance the profession of physical therapy.

2.3.1 Participate in community service activities.

2.3.2 Recognize the importance of participation in professional association activities.

2.3.3 Recognize one’s role as a member and leader of the health care team.

2.3.4 Promote participation in clinical education.

2.4 Recognize the need for personal and professional development.
2.4.1 Participate in self-assessment to improve clinical and professional performance.
2.4.2 Welcome and seek new learning opportunities.
2.4.3 Assume responsibility for professional lifelong learning.
2.4.4 Accept responsibility and demonstrate accountability for professional decisions.
2.4.5 Recognize own biases and suspend judgments based on biases.

2.5 Demonstrate entry level generic abilities, including:
2.5.1 Professional accountability and commitment to learning.
2.5.2 Recognition of one’s own limitations.
2.5.3 Effective use of constructive feedback.
2.5.4 Effective use of time and resources.
2.5.5 Demonstrate integrity, compassion, and courage in all interactions.

**Goal 3.0: Practice in an Ethical and Legal Manner**

3.1 Practice physical therapy in a manner consistent with established legal and professional standards.
3.1.1 Demonstrate awareness of and adherence to state licensure regulations.
3.1.2 Practice within all applicable regulatory and legal requirements.
3.1.3 Demonstrate the ability to search and find information about laws and regulations pertaining to physical therapy practice from state and federal electronic sources.
3.1.4 Demonstrate accountability by adhering to laws and regulations governing physical therapy fiscal management.

3.2 Practice in a manner consistent with the professional code of ethics
3.2.1 Demonstrate knowledge and application of ethical decision-making.
3.2.2 Treat patients/clients within scope of practice, expertise and experience.
3.2.3 Seek informed consent from patients/clients.

**Goal 4.0: Demonstrate Scholarship**

4.1 Apply basic principles of statistics and research methodologies within the practice of physical therapy.
4.1.1 Formulate and reevaluate positions based on the best available evidence.
4.1.2 Evaluate the efficacy and efficiency of physical therapy procedural interventions.
4.1.3 Critically evaluate and interpret professional literature as it pertains to practice, research, and education.
4.1.4 Utilize contemporary technology consistently to access evidence.

4.2 Contribute to the body of knowledge of physical therapy.
4.2.1 Participate in, plan, and/or conduct clinical, basic, or applied research.
4.2.2 Disseminate the results of scholarly activities.

**Attach a list of the required/recommended course readings and activities [Note: it is understood that these are updated and modified as needed by the instructor(s).] This attachment should be forwarded only to your Dean's office, not Academic Affairs.**

**Assessment Strategies:** A description of the assessment strategies (e.g., portfolios, examinations, performances, pre- and post-tests, conferences with students, student papers) which will be used by the instructor to determine the extent to which students have achieved the learning outcomes noted above:

<table>
<thead>
<tr>
<th>Assessment Type</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Exam @ 25% each</td>
<td>75%</td>
</tr>
<tr>
<td>3 Patient Case Studies @ 5% each</td>
<td>15%</td>
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<tr>
<td>Special Topics Presentation</td>
<td>10%</td>
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**Assignments** (For details see Assignments on the Homepage)

**Patient Case Studies**
These case studies will be based on the patient scenarios provided. Case studies must include the patient’s age, gender, medical diagnosis, past medical history, chief complaint, current medications and PT plan of care. Discussion of medications must include indications and possible interactions with PT. Each patient case must come from a separate PT diagnostic category: musculoskeletal, neuromuscular, cardiopulmonary, integumentary.

**Special Topics**
Each student will choose from a list of drug classifications and deliver a 10 min oral presentation on the dynamics and kinetics of the drug, indications, side effects, drug interactions, contraindications, and effect on physical therapy (if any). A sign-up sheet will be used to prevent duplication.
For whom is this course being developed?
Majors in the Dept. ____ Majors of other Depts ____ Minors in the Dept. ____ General Education ____ Other ____

Is this course required in a degree program (major, minor, graduate degree, certificate)? Yes ___ No ___
If yes, identify program(s): PT

Does the proposed change or addition cause a significant increase in the use of College or University resources (lab room, computer facilities, faculty, etc.)? Yes ___ No ___
If yes, attach a description of resources needed and verify that resources are available.

Indicate which department or programs will be affected by the proposed course (if any). Physical Therapy

The Department Chair's signature below indicates that affected programs have been sent a copy of this proposal form.

Approvals: If proposed change, new course or deletion is approved, sign and date below. If not approved, forward without signing to the next reviewing authority, and attach an explanatory memorandum to the original copy.

<table>
<thead>
<tr>
<th>Signatures:</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department Chair:</td>
<td>2-10-11</td>
</tr>
<tr>
<td>College Dean or Associate Dean:</td>
<td>2-10-11</td>
</tr>
<tr>
<td>CPSP (for school personnel courses ONLY)</td>
<td></td>
</tr>
<tr>
<td>Associate Vice President</td>
<td></td>
</tr>
<tr>
<td>and Dean for Academic Programs</td>
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Distribution: Academic Affairs (original), Department Chair and College Dean. Dean’s office to send original after approval to Academic Affairs, at mail zip 6016. An electronic copy must also be sent.

9/10/2008
CALIFORNIA STATE UNIVERSITY SACRAMENTO
College of Health and Human Services
Department of Physical Therapy

PT 632 – Pharmacology for Physical Therapists

Summer Semester

COURSE CREDIT  2 units: 2 hours of lecture

LOCATION  TBA

TIME  TBA

INSTRUCTOR  TBA

E-mail
Office Hours
Phone

COURSE DESCRIPTION
This course provides a study of pharmacological agents and their effects on the musculoskeletal, neuromuscular, cardiopulmonary and integumentary systems. Particular emphasis is placed of recognition of adverse reactions and side effects of various drugs as they affect patients receiving physical therapy. Open to Physical Therapy majors only.

PREREQUISITES
BIO 233 Review of Human Gross Anatomy
PT 200 Pathokinesiology
PT 202 Evidence Informed Practice I
PT 204 Principles of Human Movement
PT 206 Therapeutic Measurements & Techniques
PT 208 PT/Patient/Professional Interactions
PT 220 PT Interventions I
PT 222 Evidence Informed Practice II
PT 630 Pathophysiology
PT 614 Neuroscience for PTs
PT 618 Foundations for Patient Management

CO-REQUISITES
PT 632 Diagnostic Imaging for PT
PT 636 Geriatrics/Gerontology for PT
PT 638 Health, Wellness, & Ergonomics

REQUIRED TEXT
Pharmacology In Rehabilitation, Ciccone, Third Ed, FA Davis, 2002

COURSE OBJECTIVES (All course objectives reference the overall educational goals and outcomes of the Department of Physical Therapy.)
At the conclusion of this course, the student is expected to:

**Goal 1.0: Demonstrate Professional Physical Therapist Effectiveness**

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**TEACHING STRATEGIES AND LEARNING ACTIVITIES**

This content will be delivered online. Case-method teaching, lecture by instructors and/or guests, demonstration, discussion groups, reading assignments, internet assignments, multiple writing assignments.

**ATTENDANCE**

Daily attendance and timeliness is expected. Courtesy and professional responsibility requires notification of the instructor for any absence in advance. Failure to notify the professor of an absence can result in lowering your participation grade and is considered unprofessional. Students are responsible for any missed work and may be required to complete make-up assignments.

**ACADEMIC HONESTY**

The university policy regarding academic honesty is in effect in this course and any alleged violations will be handled in accordance with the policies described in the University Catalogue. (www.csus.edu/admbus/uminumal/UMA00150.htm)
BEHAVIORAL EXPECTATIONS
Students are responsible for appropriate behaviors as defined by the generic abilities. Failure to comply with behavioral expectations during class may result in a student first being warned that behavior is inappropriate, then, if inappropriate behavior continues, a student may be asked to leave a class. Repeated failure to comply with behavioral expectations can lead to failure in the course. Cell phones and beepers should be off or silent (set to vibration mode) during the class. No text messaging is permitted in class.

SPECIAL ACCOMMODATIONS
During the course of the year, some students may utilize prearranged accommodations. If you are a student with a learning disability, physical disability, or other special needs, please let me know as soon as possible if you need special accommodation. These kinds of confidential discussions are best handled during my office hours or by special appointment. You can expect confidentiality and cooperation regarding any circumstances and needs that have been verified through the Office of Services to Students with Disabilities (SSWD) Lassen Hall 1008, (916) 278-6955.

ASSESSMENT & ASSIGNMENTS

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Special Topics
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GRADING SCALE

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percent</th>
<th>Points</th>
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<tbody>
<tr>
<td>A</td>
<td>93 – 100%</td>
<td>186-193</td>
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<tr>
<td>A-</td>
<td>90 – 92%</td>
<td>180-185</td>
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<tr>
<td>B+</td>
<td>87 - 89%</td>
<td>174-179</td>
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<td>Percentage</td>
<td>Score Range</td>
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<tr>
<td>B</td>
<td>83 – 86%</td>
<td>166-173</td>
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<tr>
<td>B-</td>
<td>80 – 82%</td>
<td>160-165</td>
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<tr>
<td>C+</td>
<td>76 – 79%</td>
<td>154-159</td>
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<tr>
<td>C</td>
<td>73 – 76%</td>
<td>146-153</td>
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<tr>
<td>C-</td>
<td>70 – 72%</td>
<td>140-145</td>
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<tr>
<td>D</td>
<td>60 - 69%</td>
<td>120-139</td>
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<tr>
<td>F</td>
<td>59% &amp; below</td>
<td>≤ 119</td>
</tr>
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Outline of Content: Pharmacology
I. General Principles of Pharmacology
   A. Therapeutic Agents
   B. Basic concepts of drug therapy
   C. Pharmacokinetics
      1. Absorption, distribution, metabolism & excretion
II. Pharmacology of the Central Nervous System
   A. General Principles
   B. Specific Drug Classes
III. Drugs Effecting Skeletal Muscle
   A. Skeletal Muscle Relaxants
   B. Analgesics & Anti-inflammatory Agents
   C. Management of selected disease processes
IV. Autonomic and Cardiovascular Pharmacology
   A. Autonomic Pharmacology: Cholinergic & Adrenergic Drugs
   B. Management of selected disease processes
      1. To include hypertension, angina pectoris, cardiac arrhythmias, &
         congestive heart failure.
V. Pharmacology of Other General Biological Systems

Please note that this syllabus may be changed at any time at the discretion of the instructor
with prior notification of the students.
SACRAMENTO STATE UNIVERSITY  
Department of Physical Therapy  

PT 632 Pharmacology for Physical Therapists  
Final Exam  

Name ____________________________  

Read all choices, choose the one best answer and record it on both your test and Scantron sheet.  

You are helping to manage drug therapy in the Rheumatology Clinic. (Any Brand Names listed are correct and intended to help [they are not part of the question]).  

1. Which of the following are potential side effects of long-term therapy with glucocorticosteroids?  
   A. Decreased risk of infection, and cataracts  
   B. Decreased sodium and potassium blood levels  
   C. Increased muscle strength, and euphoria  
   D. Increased blood glucose, muscle weakness and weight gain  
   E. Dry, non-productive cough, unrelated to an infection  

2. Which of the following is not characteristic of the cushingoid side effects associated with long term glucocorticosteroid therapy?  
   A. "Moon face"  
   B. Enlargement of supraclavicular fat pads  
   C. Mood swings  
   D. Thin distal extremities  

3. Jane has been receiving prednisone 10 mg. p.o. q.d. for many months and the plan is to discontinue the medication. The plan should include the following:  
   A. Monitoring for myalgia, arthralgia, fever, and malaise  
   B. Decreasing the dose of the medication slowly, specifically to avoid a relapse of the underlying condition  
   C. Providing additional doses of the steroid if stressful situations (e.g., surgery) should develop  
   D. Avoiding acute adrenal insufficiency  
   E. All of the above  

The following two questions are related to Mrs. Steroid, a seventy-year old female patient who has been receiving prednisone 7.5 mg. p.o. q.d. for approximately five years for the treatment of her rheumatoid arthritis (RA). You are monitoring her for potential side effects of prednisone therapy.  

4. Mrs. Steroid is becoming progressively weaker. Which of the following statements is not true regarding the potential prednisone-induced myopathy?  
   A. The myopathy may be severe, and can prevent ambulation  
   B. The myopathy is a result of prednisone's catabolic effect on protein peripherally  
   C. The weakness is usually of the distal musculature of the arms and legs  
   D. The myopathy is usually a result of chronic, long-term therapy
5. It is apparent to you that her vision has been declining. Which of the following is most likely a side effect of the prednisone therapy?
   A. Retinopathy
   B. Cataracts
   C. Increased intraocular pressure
   D. None of the above; prednisone rarely, if ever, causes ocular side effects
   E. b. and c.

The End of Mrs. Steroid

6. Regarding aspirin:
   A. There is a greater risk of an allergic reaction to aspirin in patients with asthma
   B. Aspirin should be stopped one or two days before surgery, due to aspirin’s antiplatelet effects
   C. Gastrointestinal ulcers caused by aspirin are always painful
   D. During chronic therapy with aspirin, taking it with food will decrease the risk of gastrointestinal ulcer
   E. The GI side effects of aspirin may be minimized by taking the aspirin with a full glass of alcohol.

7. Hydroxychloroquine:
   A. Has many significant drug interactions
   B. Takes approximately four to six months for therapeutic effects to begin
   C. Does not cause mental status changes
   D. May cause some skin and mucosal pigmentation changes
   E. c. and d

8. Sulfasalazine:
   A. Is not a prodrug
   B. Should provide beneficial effects within one to two weeks
   C. Can change the color of the patient’s urine and skin to a yellow-orange color
   D. Rarely causes gastrointestinal disturbances
   E. Does not require routine monitoring of CBC’s

9. Which of the following is recommended when taking both an NSAID for inflammation and low-dose aspirin for cardiac protection?
   A. The NSAID should be given 2 hours before the aspirin
   B. The aspirin should be given 2 hours before the NSAID
   C. The aspirin should be given on one day and the NSAID on the next day
   D. Dosing with aspirin and NSAIDS is contraindicated because of increased GI bleeding
10. Recent research on anti-inflammatory drugs suggests that the main disadvantage of COX-2 inhibitors compared to the non-selective agents is increased:
   A. Gastric bleeding
   B. Cardiac events
   C. Sedation
   D. Dehydration

11. In general, a medication's blood level will reach steady state (and stay at that plateau level or range) on repeated administration of the medication, if all of the following occur except:
   A. The dose remains constant
   B. The dosing interval stays the same
   C. The metabolism of the drug increases or decreases
   D. The excretion of the drug is consistent
   E. A and D

12. A patient has a drug blood level of 500 units/ml. The drug's half-life is three hours. If concentrations above 100 units/ml are therapeutic, and no more of the drug is given; what is the minimum time that it will take for blood levels to reach the sub-therapeutic range?
   A. One to three hours
   B. Two to four hours
   C. Three to six hours
   D. Six hours
   E. Six to nine hours

13. An agonist must have:
   A. Receptor subtypes to interact with
   B. Affinity
   C. Efficacy
   D. Receptor blockade capability
   E. B and C

14. A patient has been receiving two medications, Drug A and Drug B, together for many months and the doses are appropriate for each medication. The patient is doing well. Drug A is known to inhibit the metabolism of Drug B. Drug B is metabolized to inactive metabolites. Drug A is no longer needed and will be discontinued. You would expect that:
   A. The dose of Drug B should be increased
   B. The dose of Drug B should be decreased
   C. The dose of Drug B does not need to be changed

15. Which of the following is not a pharmacodynamic variable?
   A. Diseases
   B. Decreased absorption of a medication
   C. Gender
   D. Age
   E. Genetic factors
16. It takes approximately ________ half-lives for a drug to reach steady state.
   A. One and one-half
   B. Three
   C. Five
   D. Seven
   E. Nine

17. Drug X has the potential to cause severe toxicity. Drug Y has the ability to displace Drug X from protein binding sites. The danger of administering a new drug, Drug Y, to a patient being maintained on Drug X is greatest if Drug X is normally:
   A. 99 percent protein bound
   B. 25 percent protein bound
   C. 1 percent free
   D. 99 percent free
   E. A or C

18. A medication is most likely to cross a membrane, such as the blood brain barrier, if the drug molecule is:
   A. Small, lipid soluble, and unbound
   B. Large, lipid soluble, and unbound
   C. Small, lipid insoluble, and unbound
   D. Small, lipid soluble, and protein bound
   E. Large, water soluble, and unbound

19. A prodrug is a medication that is:
   A. Metabolized from an inactive compound to an active drug
   B. Metabolized to active metabolites which are as active as the original drug
   C. Metabolized in the kidney and/or liver
   D. Metabolized to inactive metabolites initially
   E. Excreted unchanged in the urine

20. Noncompliance, as it relates to a patient taking a medication, includes which of the following?
   A. The patient taking too much of the medication involuntarily (e.g., because the patient is forgetful)
   B. The patient taking too much of the medication voluntarily
   C. The patient taking the correct dose of the medication, but at the wrong times
   D. The patient taking the medication for a shorter period of time than prescribed
   E. All of the above
21. Which one of the following statements regarding hepatic metabolism is true?
   A. The liver converts all drugs to less active or inactive metabolites
   B. Increased age (>60 years old) may significantly affect the ability of the liver to metabolize some drugs
   C. Some drugs are eliminated essentially unchanged, without being metabolized by the liver first
   D. Slight impairment of liver function should appreciably affect drug metabolism
   E. The liver metabolizes drugs when they are protein bound

22. The half-life of a drug is primarily related to:
   A. Absorption
   B. Hepatic metabolism
   C. Renal excretion
   D. B and C
   E. A and B

23. Which of the following statements regarding drugs (agonists and antagonists) is true?
   A. Agonists have both efficacy and affinity, but antagonists have only affinity for a receptor
   B. Agonists can produce adverse or toxic effects, whereas antagonists do not.
   C. Antagonists bind to a receptor and produce an effect, and agonists cause no response.
   D. Most pharmacological antagonists bind to and then inactivate agonist molecules.

24. Drug A is metabolized to inactive metabolites in the liver. Drug B causes significant hepatic enzyme inhibition. If a patient has been maintained on Drug B and Drug A is added, you would anticipate that the dose of Drug A would be:
   A. Greater than usual
   B. Less than usual
   C. Not affected
   D. Greater than Drug B
   E. None of the above

25. Which statement best describes pharmacokinetics?
   A. The effects of absorption, distribution, metabolism, and excretion of drugs
   B. The study of accelerated drug metabolism and elimination
   C. The process of converting a solid dosage form of a medication into a solution for enhanced absorption
   D. The effects of drugs on the body
   E. None of the above statements has anything to do with pharmacokinetics
26. Which of the following statements about plasma protein binding and the actions of drug molecules is true?
   A. Unbound molecules may produce pharmacological effects
   B. Bound molecules can be metabolized
   C. Unbound molecules can be excreted
   D. Bound molecules usually cannot be displaced by other drugs
   E. A and c

27. A medication is eliminated renally. The excretion of the drug is usually accomplished through:
   A. Reabsorption
   B. Glomerular filtration
   C. Secretion
   D. A and C
   E. B and C

28. Drug X is administered intravenously and has a peak blood level of 300 units/ml. Drug X (the same medication) is administered orally and reaches a peak blood level of 150 units/ml. All things being equal (other than I.V. vs. oral), which of the following statements is true?
   A. The half-life of Drug X following I.V. administration will be the same as the half-life following oral administration.
   B. The half-life of Drug X following I.V. administration will be half as long as the half-life following oral administration.
   C. The half-life of Drug X following I.V. administration will be twice as long as the half-life following oral administration.
   D. None of the above -- not enough information to comment on half-life.

29. You are exercising a teenage girl who has a history of asthma. During the course of her therapy session she begins to complain of cough, dyspnea, and wheezing. Unfortunately she has left her inhaler at home. Vital signs include RR= 42 breaths/min, HR = 120bpm, blood pressure 150/70. What is the first thing you do?
   A. send her home
   B. have her breathe into a bag
   C. call her home to see if someone can bring in her inhaler
   D. call 911

30. Which one of the following is the most appropriate drug to reverse her acute bronchoconstriction?
   A. inhaled beta agonists
   B. inhaled anticholinergics
   C. inhaled mast cell stabilizers
   D. oral steroids
31. Which of the following drugs are used to lessen the symptoms of cystic fibrosis?
   A. mucolytic agents
   B. beta blockers
   C. calcium channel blockers
   D. alpha-agonists

32. A transdermal nitroglycerin patch should be left on for approximately:
   A. 7 days
   B. 3 days
   C. 6 hours
   D. 8 hours
   E. 12 hours

33. The usual onset of action (and range of onset of action) for sublingual nitroglycerin tablets is:
   A. Instantly (may take up to 30 seconds to begin to act)
   B. 30 (15 to 45) seconds
   C. 1 minute (45 seconds to 75 seconds)
   D. 5 (3 to 7) minutes
   E. 2 (1 to 3) minutes

34. Which of the following are usually considered the drugs of choice in the scheduled treatment of vasospastic (or variant / Prinzmetal's) angina?
   A. Sublingual nitroglycerin tablets
   B. Transdermal nitroglycerin patches
   C. Calcium channel blockers
   D. Beta-adrenergic blockers
   E. Nitroglycerin explosives

35. Which of the following is true regarding the use of morphine or other narcotic analgesics in the treatment of pain?
   A. The risk of addiction is a concern in treating a patient with terminal cancer
   B. In treating acute pain, narcotic analgesics make evaluating the underlying disease or condition more difficult
   C. The difference between medications, such as effectiveness based on route of administration, does not influence the selection of individual agents
   D. It is usually difficult to get equianalgesic doses among the narcotic analgesics
   E. All of the above
36. Which of the following statements about warfarin (Coumadin) is not true?
   A. Warfarin affects active clotting factors that are already in the circulation.
   B. Warfarin affects the vitamin K-dependent clotting factors; factors II, VII, IX, and X.
   C. A possible side effect of warfarin therapy is microembolization, the "purple toe syndrome."
   D. Cholestyramine and colestipol can bind warfarin in the gastrointestinal tract and decrease the systemic absorption of warfarin.
   E. Warfarin is classified as a Category X medication, and it can cause birth defects and abortions.

37. A patient is being maintained on warfarin (with therapeutic prothrombin times [PT/INRs]) for prevention of deep vein thrombosis. If aspirin is begun in anti-inflammatory doses for rheumatoid arthritis, what effect would you expect the aspirin to have on the warfarin therapy?
   A. No effect on the PT/INRs or the effect of the warfarin
   B. A decrease in the effectiveness of the warfarin (decreased PT/INRs) due to ASA inducing the enzymes that metabolize the warfarin
   C. An increased risk of gastrointestinal bleeding, due to the potential gastrointestinal irritation and ulceration from the aspirin
   D. An increase in the effectiveness of the warfarin (increased PT/INRs) due to ASA inhibiting the enzymes that metabolize the warfarin

38. The physical therapist would monitor which of the following laboratory values to determine the effectiveness of oral anti-coagulants (warfarin)?
   A. blood urea nitrogen
   B. activated partial thromboplastin time (APTT)
   C. INR
   D. complete blood count (CBC)

39. If a patient needs to have sublingual nitroglycerin tablets for an acute anginal attack, the patient should:
   A. Use one tablet, wait a minute; if the first one does not work, repeat the dose
   B. Use one tablet, wait three to five minutes; if the first one does not work, repeat the dose; wait five more minutes, if the second dose does not work, use a third tablet; if that does not work, get to the Emergency Room.
   C. As in B except get a new supply of nitroglycerin tablets (they are expired), rather than going to the Emergency Room.
   D. Use one or two tablets and wait two minutes; if the first dose does not work, repeat the dose and wait two more minutes; if the second does not work, go to the Emergency Room.
   E. Always use the medication while lying down
40. The maximum therapeutic effect of nitroglycerin administered sublingually is most likely to occur at approximately:
   A. 1 to 3 minutes
   B. 4 minutes
   C. 10 minutes
   D. 30 minutes
   E. 60 minutes

41. Regarding digoxin, which of the following statements is true?
   A. Digoxin has many troubling, but not dangerous, side effects
   B. Hyperkalemia is the most common cause of digoxin toxicity
   C. Digoxin toxicity can result in virtually any cardiac arrhythmia
   D. The mechanism of action in the treatment of heart failure is related to digoxin having a negative inotropic effect
   E. Digoxin is eliminated primarily by hepatic metabolism to an inactive compound

42. Which of the following statements is not true about digoxin (Lanoxin) toxicity?
   A. The likelihood and severity of cardiac toxicity is related to the severity of the heart disease
   B. The patient may experience blurred vision, including seeing halos or yellow-green tinted vision
   C. Mental status changes, such as disorientation, confusion, or hallucinations are fairly common symptoms, except in the elderly
   D. Anorexia, nausea, vomiting, and diarrhea are frequently symptoms of toxicity
   E. Cardiac toxicity may precede other symptoms of toxicity in approximately 50 percent of the cases of digoxin toxicity

43. Regarding furosemide (Lasix) and spironolactone (Aldactone), which of the following statements is true?
   A. Furosemide is a “high ceiling” diuretic, and spironolactone can cause potassium retention
   B. Furosemide may decrease blood glucose, and spironolactone blocks aldosterone receptors
   C. Furosemide can cause potassium loss, and spironolactone can cause potassium loss
   D. Furosemide can increase calcium blood levels, and spironolactone can cause potassium retention
   E. A and b are true

44. Anticholinergic effects, side effects, or toxicity include all of the following, except:
   A. Blurred vision
   B. Urinary retention
   C. Palpitations
   D. Diarrhea
   E. Psychosis
45. Regarding hydrochlorothiazide (HCTZ), which of the following statements is true?
   A. The long-term antihypertensive mechanism of action of HCTZ is related to decreased vascular resistance, not diuresis
   B. HCTZ can decrease blood glucose as a side effect
   C. HCTZ can cause hearing loss as a side effect
   D. HCTZ can decrease lipid blood levels as a side effect
   E. A and B

46. Lack of functional gain when baclofen or another antispasticity agent is administered may be caused by which of the following?
   A. Muscle weakness
   B. Seizures
   C. Rebound spasticity
   D. Enhanced muscle spindle sensitivity

47. Which of the following insulin regimens offers the greatest flexibility in terms of food intake and timing of meals?
   A. multiple dosing with bedtime intermediate
   B. split and mixed
   C. multiple dosing with morning peakless insulin
   D. split and mixed with bedtime intermediate

48. Which of the following is contraindicated in type 1 diabetes shortly after an insulin injection?
   A. ankle pumps
   B. fine motor activities
   C. grip strengthening
   D. abdominal curl ups

49. Mr. Malaise has been maintained on propranolol (Inderal) for two months. Recently he has developed symptoms that are consistent with depression. What is the most appropriate course of action?
   A. Recognize the depression as drug-induced and stop the propranolol
   B. Suspect endogenous depression, because propranolol rarely, if ever, causes depression
   C. Increase the dose of the propranolol
   D. Begin to taper the propranolol with the goal of discontinuing it (while adding an alternative cardiovascular medication)
   E. Wait six months in the hope the depression will just go away, as tolerance to side effects is common

50. Serotonin Syndrome may include symptoms of:
   A. Sexual dysfunction
   B. Myoclonus
   C. Weight gain
   D. Nausea
51. Which of the following is false?
   A. anti-depressants take several days minimum to take effect
   B. anti-depressants must be tapered slowly
   C. Tricyclic Anti-depressants can increase glaucoma risk
   D. SSRI’s may initially increase the risk of suicide in adolescents.

52. Which of the following is incorrect regarding lithium?
   A. is used to treat manic depression
   B. levels should be monitored every 1-2 days
   C. accumulates in body and can reach toxic levels
   D. can cause a resting hand tremor

53. Regarding pulmonary meds: Which of the following is not a side effect of B2:
   A. dry mouth
   B. headaches
   C. nervousness
   D. dizziness

54. Regarding methylxanthines: which is not true?
   A. increases strength of diaphragmatic contractions
   B. produces bronchodilation
   C. are used primarily to treat asthma
   D. can temporarily effect the sense of smell

55. The mechanism of calcium channel blockers is to:
   A. force the calcium out of the myocardial cells
   B. block the entry of calcium into the myocardial cells
   C. constrict the blood vessels
   D. act as an autonomic drug

56. Thrombolytic agents are useful after a myocardial infarction to:
   A. act as an anticoagulant
   B. lyse the blood clot
   C. dilate the coronary arteries
   D. constrict the coronary arteries

57. You are working with a patient who is on beta blockers. The resting heart rate is 80bpm, and the resting BP is 135/90mm Hg. Which of the following is an acceptable response to exercise?
   A. exercise heart rate= 140 bpm, BP=140/60
   B. exercise heart rate= 100bpm, BP= 145/85
   C. exercise heart rate= 80bpm, BP= 140/120
   D. exercise heart rate=70bpm, BP= 100/60
The following are thirteen true/false (T/F) questions. [The generic names (trade names) are correct and meant only as help, not as part of the question.]

58. T F If a patient has been receiving a monoamine oxidase inhibitor (MAOI) antidepressant, such as phenelzine (Nardil), s/he should not receive baclofen (Lioresal) within 14 days of the MAOI because of a potential hypertensive crisis from a drug interaction.

59. T F Acetaminophen is metabolized in the liver primarily to inactive compounds, but acetaminophen toxicity can cause severe renal damage.

60. T F Calcium carbonate is 50 percent elemental, or absorbable, calcium; therefore, to provide 1 g. of elemental calcium, you would need 2 g. of calcium carbonate.

61. T F For osteoporosis prevention in postmenopausal women, the usual dose of alendronate (Fosamax) is 5 mg. once a day or 35 mg. once a week.

62. T F Raloxifene (Evista), a selective estrogen receptor modulator (SERM), used for the prevention and treatment of osteoporosis, increases the risk of breast cancer.

63. T F Calcitonin (Miacalcin), a hormone that acts as an antiresorptive compound, has analgesic effects on bone pain.

64. T F If used, it’s important to start estrogen replacement therapy (ERT) soon after the onset of menopause, as the most rapid loss of bone occurs within the first ten years.

65. T F A centrally acting α2-adrenergic agonist muscle relaxant, tizanidine (Zanaflex) is structurally related to clonidine, with hypotension, sedation, dry mouth, and asthenia as tizanidine’s most common side effects.

66. T F The drawback of using inhalers as a delivery form for pulmonary medicines is that it can increase the many adverse effects of these meds.

67. T F Asthmatics often experience a wide-spread hyper-reactivity of alveolar smooth muscles in response to an allergin.

68. T F SSRI’s are effective anti-anxiety agents.

69. T F Nardil is seldom used to treat depression due to multiple drug interactions

70. T F Use of St. John’s Wort with tricyclic anti-depressants increases the risk of serotonin syndrome.
Finally, we have 3 short answer questions.

71. A patient has been well maintained on a certain dose of theophylline for many years as part of his treatment of asthma. He is just about to complete an eight week course of ciproflaxin for the treatment of osteomyelitis. The theophylline level was checked and the theophylline dose was properly adjusted when the ciproflaxin was begun about eight weeks ago. What changes if any would you expect for the theophylline therapy once the ciproflaxacin course is complete and why?

72. A pt new to you has been well maintained on a certain dose of theophylline for many years as part of her treatment of asthma. In addition she has been well maintained on a certain dose of phenytoin for several years for a seizure disorder. On reviewing her drug regimen for the first time, what concern if any would you have about the theophylline and phenytoin and why?

73. Below are 2 graphs depicting serum concentrations of two medications: Drug A and B. Serum concentration is on the y-axis and time on the x-axis. Which drug has the longer ½ life and why?