BIOL6756: DERMAL PHARMACOLOGY & TOXICOLOGY SYLLABUS

COURSE INSTRUCTOR: KAREN ANNE COSTA-STRACHAN, Ph.D.

PLEASE NOTE: ATTENDANCE FOR THIS COURSE IS MANDATORY.

### COURSE OUTLINE

This course is designed to provide students with an in-depth overview of dermal pharmacology and toxicology. Emphasis will be placed on basic skin structure and function, key skin conditions (acne, rosacea, wrinkling) skin metabolism of drugs and xenobiotics, transdermal transport, percutaneous absorption, allergic contact dermatitis, irritant dermatitis, intrinsic and extrinsic aging of the skin and the impact of retinoids, etc: phototoxicity, photoallergy, photocarcinogenicity, topical cosmetic safety testing and the use of noninvasive bioengineering techniques in the assessment of dermal toxicity.

### Instructional Units

| A. | Overview of skin structure/function/cell types, skin physiology, the role of the stratum corneum in skin barrier function, compromise of skin barrier function and wound repair, how topicals impact the epidermis. |
| B. | Skin metabolism/pharmacology, percutaneous absorption of materials from topical cosmetics, topical drugs, etc.; transdermal transport mechanisms |
| C. | Irritant vs. allergic contact dermatitis and the need for clinical safety testing of cosmetics, the Kligman human and guinea pig maximization test, HRIPT (human repeat insult patch testing) common irritants and allergens, skin reactions to perfumes and preservatives |
| D. | Phototoxicity, photoallergy, photoallergy, photocarcinogenicity (skin cancer), the role of sun exposure, use of sunscreens |
| E. | Dermal photodamage as compared to intrinsic, chronological aging of the skin |
| F. | Current in vivo and in vitro models of predicting dermal toxicity, dermal irritancy/allergenicity using computer modeling: QSAR, DEREK |
| G. | Noninvasive bioengineering techniques in the assessment of skin response/reactions to cosmetics: laser Doppler imaging (LDI), reflectance spectrophotometry, colorimetry, skin conductance/capacitance (Novameter, SkiCon, Corneometer) for moisturization assessment, transepidermal water loss (TEWL) via Evaporimetry, skin pH assessment, replica analysis for changes in skin’s microtopography, D’Squame analysis, Canfield digital photography of the skin for P. acnes/pigmentation changes/aging, etc. |

### Objectives: Upon completion of this course, the student will

| A. | Have a thorough comprehension of skin pharmacology and toxicology |
| B. | Be familiar with an able to discuss skin structure and function, skin physiology, skin metabolism as related to percutaneous absorption and transdermal transport |
| C. | Understand and be able to distinguish intrinsic versus extrinsic aging of the skin |
| D. | Understand and be able to discuss the difference between allergic contact dermatitis vs. irritant dermatitis, citing examples of agents responsible for causing both conditions |
E. Have a clear understanding of photocarcinogenicity (skin cancer) and phototoxicity/photoallergy and the relationship of these conditions to sun exposure
F. Be able to describe and cite examples of noninvasive bioengineering techniques in the clinical assessment of skin condition

Scheduled Lecture Topics (order may change slightly):
1. Skin Structure and Function
2. Cutaneous Metabolism
3. Inflammation and Irritation: Mechanism, Causative Agents and Testing
4. Allergic Contact Dermatitis I: Mechanism and Patch Testing
5. Allergic Contact Dermatitis II: Causative Agents
6. Phototoxicity
7. Photoallergenicity
8. Photocarcinogenicity
9. Risk Assessment of Potential for Cosmetic Skin Reactions
10. Child versus Adult Skin
11. Intrinsic (Chronological) vs. Extrinsic (Photodamage) Aging of the Skin; Ways to Prevent and Alleviate
12. Free Radicals and Antioxidants; the natural anti-oxidant capacity of the skin and the need to supplement
13. Percutaneous Absorption
14. Non-invasive clinical testing of the skin

**Grading**
45% Midterm
45% Final
10% Term Paper

**About The Instructor**
Karen A. Costa-Strachan, Ph.D. is currently Director of Regulatory Affairs at Prestige Brands Holdings, Inc. in New York. Prior to that she has held positions at Doctor’s Dermal Formula, Playtex Products and Avon Products. Her varied experience encompasses cosmetic skin care products as well as OTC drug products, cosmeceuticals, medical devices and household products. Dr. Costa-Strachan has managed both U.S. and International Product Safety, Regulatory Affairs and Quality support for all product categories. She earned her Ph.D. in Pharmaceutical Sciences (Toxicology) and M.S. degree in Pharmaceutical Sciences (Pharmacology) from St. John’s University School of Pharmacy & Allied Health, New York. She completed two postdoctoral fellowships at the University of Pennsylvania School of Medicine, where she held an N.I.H. Fellowship at the Institute for Environmental Medicine under Aaron Fisher, M.D. as well as training in dermatological science under Albert Kligman, M.D. Dr. Costa-Strachan is an adjunct Assistant Professor in the Cosmetic Science Program at Fairleigh Dickinson University in Teaneck, NJ as well as a adjunct Assistant Professor of Toxicology at St. John’s University in New York.