I. Locator Information:

Instructor:

Course # and Name: SWRK 631 ATOD: Bio-Medical Basis

Office Location:

Semester Credit Hours: 3 hours

Office hours:

Class Location:

Day and Time Class Meets:

Office Phone: Office Fax:

Email address:

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**FSU Policy on Electronic Mail:** Fayetteville State University provides to each student, free of charge, an electronic mail account ([username@uncfsu.edu](mailto:username@uncfsu.edu)) that is easily accessible via the Internet. The university has established FSU email as the primary mode of correspondence between university officials and enrolled students. Inquiries and requests from students pertaining to academic records, grades, bills, financial aid, and other matters of a confidential nature must be submitted via FSU email. Inquiries or requests from personal email accounts are not assured a response. The university maintains open-use computer laboratories throughout the campus that can be used to access electronic mail.

Rules and regulations governing the use of FSU email may be found at [http://www.uncfsu.edu/PDFs/EmailPolicyFinal.pdf](http://www.uncfsu.edu/PDFs/EmailPolicyFinal.pdf)

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Rules and regulations governing the use of FSU email may be found at [on Fayetteville State University](http://www.uncfsu.edu/PDFs/EmailPolicyFinal.pdf) provides to each student, free of charge, an electronic mail account (username@uncfsu.edu) that is easily accessible via the Internet. The university has established FS

I. COURSE DESCRIPTION

This course examines the biomedical bases of addictive disorders. Students will develop a broad scientific perspective on different classes of substance abuse and the biological basis of substance dependence. The biological bases of substance-related disorders include genetic factors, neuroanatomical and neurophysiological factors predisposing to substance dependence, medical consequences of alcohol and drug abuse, and pharmacological interventions.

II. COURSE OBJECTIVES

By the end of the semester, students will be able to:

1. Describe historical and sociocultural aspects of substance-related disorders.

2. Define addiction, dependence, abuse, misuse, tolerance, cross-tolerance, withdrawal, and other addiction-related terminology.

3. Understand the basic anatomy and physiology of the brain as it relates to addiction and dependency.

4. Describe the pharmacology and neuropharmacology of substances abuse, including metabolism, intoxication, tolerance, dependence, and neurobiology and mechanisms of actions of different classes of substances including alcohol, nicotine, stimulants, sedative-hypnotics, opioids, hallucinogens, etc.

5. Identify the abuse liability and withdrawal symptoms of different substances of abuse.

6. Describe the biomedical, psychological, and social consequence of substance abuse and addiction. Coverage will include different substances of abuse and their effects on the brain and other organ systems.

7. Understand the epidemiology of substance abuse, including the prevalence and consequences of substance abuse in special populations including women, the elderly, adolescents, Native Americans, African Americans, other ethnic minority groups, the aged, gay, lesbian, bisexual, and transgendered persons, and health professionals.

8. Describe existing models and conceptualizations of substance use, abuse, and dependence, including genetic, biological, biopsychosocial, and public health models of dependence and its consequences.
9. Discuss the attributes and effectiveness of current approaches to the primary, secondary, and tertiary prevention of substance use disorders.

III. SECONDARY COURSE OBJECTIVES

Secondary objectives of the course will be to:

1. Examine important genetic, psychological, neuropsychological, temperamental, psychiatric family, cultural, and socioeconomic factors in the etiology of substance abuse and dependence.

2. Provide students with a detailed account of the social, economic, and personal (i.e., biomedical and psychological) costs of alcohol and drug use.

3. Provide students with the skills they need to conduct comprehensive substance use assessments, assign diagnosis consistent with DSM-IV and other nosological systems, and the skills necessary to select and apply leading evidence-based interventions.

4. Introduce students to the full range of pharmacological treatments for substance abuse, including anticraving agents such as naltexone and acamprosate, rapid opioid detoxification, benzodiazepine and opioid overdose reversal, and opioid antagonist and substitution therapies such as burprenorphine and methadone.

5. Introduce students to the international epidemiology of substance use disorders and national and international policy and legislative measures attempting to reduce the supply of, and demand for, licit and illicit substances.

6. Introduce students to important issues or concerns (e.g., psychiatric comorbidity, polysubstance abuse, special populations considerations) relative to the success of substance abuse prevention and treatment approaches and policy issues pertinent to social justice considerations.

IV. EXPANDED DESCRIPTION:

This course is designed as a review of basics as well as an update on new methods and discoveries that bear on the causes and treatment of substance dependence. Although the course will focus on recent scientific findings pertaining to the biomedical bases of dependence and its treatment, it will be packaged for persons without a significant science background. This course will emphasize biomedical factors as they play a role in the etiology, epidemiology, natural history, expression, adverse consequences, treatment and prevention of diverse substance use disorders. We will study the distinction between drug abuse as a social problem and drug dependency as a brain disease. The course will focus on drugs such as alcohol, cocaine, nicotine, benzodiazepines, opioids, caffeine, marijuana, amphetamines, steroids, etc. Further, fetal and
other health consequences of substance abuse and dependence will be explored throughout the course.

Whether they work directly in chemical dependency treatment or in general social service settings, most social workers interact regularly with substance-using clients and colleagues. Substance use disorders are ubiquitous within the United States, in general and clinical populations, and are associated with significant personal, familial, social and economic costs. Disadvantaged groups are especially likely to experience the pernicious consequences of alcohol and drug use, which further complicate their efforts to cope with stressful and discouraging life circumstances.

Although substance use disorders are prevalent and disabling, numerous studies suggest that social workers and other health care professionals often fail to identify and intervene with the substance-using clients they serve. As a result, many opportunities to reduce the suffering of these persons and their families are lost. This course is designed to provide social work students with a comprehensive introduction to the epidemiology, etiology, prevention and treatment of alcohol and drug use disorders, with particular attention to neurobiological, medical, genetic, and dependency and its consequences. The first half of the course will focus primarily on alcohol, tobacco, and behavioral addictions, since these disorders are the most commonly encountered and clinically significant psychoactive substance use problems addressed in clinical settings. Cocaine, marijuana, opioid, hallucinogen, ecstasy, inhalant and other substance use disorders, will be addressed in the second half of the course, with special attention to the role of biomedical factors in these problems.

Introductory sessions will examine historical issues pertaining to alcohol and drug use, including significant social policies and legislation, and the prevalence of substance use internationally and within specific subpopulations of the United States. The scope, nature, treatment, and prevention of alcohol and drug use disorders within gay and lesbian, ethnic and racial minority, women, aged and other diverse groups including those of different cultures, classes, religions and with physical and mental disabilities, will be specifically addressed. Medical and social consequences of alcohol and drug use will then be examined in detail. Definitional and theoretical issues, particularly those associated with the diagnosis and presumed etiology of substance abuse problems will be the focus of several classroom sessions. Genetic, psychological, and social factors important to the development of substance dependence will be identified. Evidence-based approaches to the treatment of alcohol-and drug-use disorders will be a major focus of this course, particularly pharmacological and other biomedically-based treatment methods. Promising approaches to the prevention of substance abuse and policy maneuvers designed to reduce the social costs associated with such abuse are examined. Controversial issues in the addictions will be briefly addressed. At the conclusion of this course, students will be aware of current issues and treatment approaches in the addictions and may choose to apply this learning in practica or other service settings. Ethical and social justice issues affecting social work practice in the addictions will be examined throughout the course. Professional use of self in addictions treatment will be addressed. Although primarily covered in SOWO 700, we will briefly review use of: (1) numerous alcohol and drug abuse screening and assessment instruments, including the Michigan Alcoholism Screening Test, Drug Abuse Screening Test, ASI, CAGE, AUDIT, and TWEAK, (2) various assessment instruments evaluating mental health conditions commonly
occurring in conjunction with substance abuse (e.g., Beck Depression Inventory). (3) treatment plans incorporating evidence-based interventions that are evidence-based treatment planning resources.

V. EDUCATIONAL OUTCOMES

1. Students will be able to describe the epidemiology of substance use disorders within different U.S. subpopulations, including gay and lesbian, ethnic and racial minority, women, aged, and other diverse groups including those from different cultures and people with physical or mental disabilities or holding different religious views.

2. Students will be able to compare and contrast different conceptualizations (e.g., moral, disease, etc.) of substance use disorders vis-à-vis their implications for the prevention and treatment of substance use disorders.

3. Students will be able to describe important genetic, psychological, and socioeconomic factors in the etiology of substance use problems.

4. Students will be able to identify specific social, economic, and personal costs of alcohol and drug use.

5. Students will be able to identify appropriate instruments for, and important considerations in, screening, assessing and diagnosing substance-abusing clients and will be able to apply these approaches in practice.

6. Students will develop the capacities to identify new developments in, and apply evidence-based approaches to, treatment of substance-dependent clients.

7. Students will be able to identify and assess (e.g., psychiatric comorbidity, polysubstance abuse, membership in oppressed groups, etc.) that may affect the nature and outcome of prevention and treatment approaches.

8. Students will be able to describe ethical and social justice considerations as they affect policy measures instituted, and legislation enacted, to reduce the supply of, demand for, and adverse consequences of licit and illicit substance abuse.

9. Students will be able to discuss current evidence-based approaches to the primary, secondary, and tertiary prevention of substance use disorders.

10. Students will be able to address epidemiological, etiological, treatment and prevention considerations vis-à-vis tobacco, marijuana, cocaine, opioid, hallucinogen and other drug related problems.

11. Students will be able to identify and discuss social and economic justice issues that are important in substance abuse treatment and articulate the important role that social workers can and should play in addiction treatment.
12. Students will be able to describe important dimensions of professional use of self in addictions treatment.

13. Students will be able to conduct comprehensive substance use assessments, assign diagnoses, consistent with the DSM-IV and other diagnostic systems, and the skills necessary to select and apply leading evidence-based interventions.

In addition to the expected actualization of each of the foregoing student learning outcomes, “SWRK 631-ATOD: Biomedical Basis,” shall also specifically encompass through classroom learning exercises and supervised field practicum experiences all of the Twelve Core Functions promulgated by the North Carolina Substance Abuse Professional Practice Board. These Twelve Core Functions shall also constitute primary, integral, and pivotal student learning outcomes for this course. The Board, (Credentialing Procedures Manual, 2013) articulated these core functions as follows:

1. **Screening**: The process by which a client is determined appropriate and eligible for admission to a particular program.
2. **Intake**: The administrative and initial assessment procedures for admission to a program.
3. **Orientation**: Describing to the client:
   - general nature and goals of the program;
   - rules governing client conduct and infractions that can lead to disciplinary action or discharge from the program;
   - in a residential program, the hours during which services are available;
   - treatment costs borne by the client, if any, and;
   - client’s rights.
4. **Assessment**: Those procedures by which a counselor/program identifies and evaluates and individual’s strengths, weaknesses, problems and needs for the development of the treatment plan.
5. **Treatment Planning**: Process by which the counselor and the client:
   - identify and rank problems needing resolution;
   - establish agreed upon immediate and long term goals, and;
   - decide upon a treatment process and the resources to be utilized.
6. **Counseling**: (Individual, Group, & Significant Others) – The utilization of special skills to assist individuals, families or groups in achieving objectives through:
   - exploration of a problem and its ramifications;
   - examination of attitudes and feelings;
   - consideration of alternative solutions, and;
   - decision making.
7. **Case Management**: Activities which bring services, agencies, resources or people together within a planned framework of action toward the achievement of established goals. It may involve liaison activities, collateral contracts, and multi-disciplinary team coordination.
8. **Crisis Intervention**: Those services which respond to an alcohol and/or other drug abuser’s needs during acute emotional and/or physical distress.
9. **Client Education**: Provision of information to individuals and groups, concerning alcohol and other drug abuse and the available services and resources.

10. **Referral**: Identifying the needs of the client that cannot be met by the counselor or agency and assisting the client to utilize the support systems and community resources available.

11. **Reporting and Record Keeping**: Charting the results of the assessment and treatment plan, writing reports, progress notes, discharge summaries and other client-related data.

12. **Consultation with Other Professionals**:
   - Relating with our own and other professionals to assure comprehensive, quality care for the client.

**VI. REQUIRED TEXTS AND OTHER READINGS**

**A. Food Addiction**


OR


I really enjoyed both of these books. They are each well-written contemporary accounts by men living with food addiction or what is known more formally s binge eating disorder. Both offer significant insights into the phenomenology of food addiction. Saxen is a former male model and comedian with a good sense of humor but a checkered past, whereas Bruni was the restaurant editor of the *New York Times* and former Morehead scholar at UNC. Saxen’s book is a quick, interesting, and fun read; Bruni’s is more sophisticated, somewhat longer and offers more insight into the family dynamics of binge eating disorder. Please select only one of these books for this class. If you are interested in eating disorders, you will eventually want to read both of them.


OR


These two books differ significantly. I prefer the Kessler book and found it eye-opening in many respects. David Kessler is a physician and lawyer and former head of the Food and Drug Administration. In this book, Kessler examines the food industry in American, the way it uses science to appeal to our worst instincts (i.e., preference for sugar, fat, and salt), the manner in
which food stimulates reward pathways in the brain, the widespread development of conditioned overeating and obesity. Cynthia Bulik is a clinical psychologist at UNC, one of the leading eating disorders experts in the nation, and Director of the UNC Eating Disorders program. Her book is very readable and offers a more clinically-focused treatment of binge eating/food addiction. Please select only one of these books for this course. You will eventually want to read both of these books.

B. Exercise Addiction


AND


Exercise dependence is a very recently identified disorder and the reading selections for this area were scant. The autobiography by Peach Friedman has its virtues and limitations and I will avoid saying more here because I do not want to bias your response to the book. The book by Kerr et al. is the only intellectually acceptable text I could find on exercise dependence.

C. Gambling Addiction


AND


Bill Lee’s memoir is a fascinating account of the development and consequences of gambling addiction. It is an easy read, but I think captures many elements of the gambling dependence experience. Ladouccur and Lanchance’s book presents an evidence-based cognitive-behavioral treatment program for gambling addiction. The book can easily be read in one day and does a good job of capturing the elements of cognitive therapy for gambling addiction. We will read only the therapist manual, but there is also a companion book for clients that I will share with you.

D. Sexual Addiction


AND

Patrick Carnes book is the classic text in this area. The first edition of this book essentially created the field of sexual addiction treatment and he is considered the leading expert in this area. It is important to have read this book if you want to practice in the addictions. The book by Skinner is the first I have seen on the neglected topic of pornography addiction. More than half of all households in the U.S. now have a computer with internet access; this development has been associated with a dramatic increase in the number of persons viewing pornography in the confines of their own homes and anecdotal reports indicate that therapist are seeing dramatically larger numbers of clients with pornography addictions.

**Scientific and Clinical Bonus Point Articles**

Numerous bonus point articles, including and in addition to those listed below, will be distributed in class.


VII. Teaching Methods

The instructor will lecture on key concepts and substantive content. Students’ active participation in discussions is strongly encouraged. DVDs, videos, guest lectures, and group exercises will also be used to convey course material.

Grading and Evaluation

There will be 4 integrative book review assignments. Each of these assignments is worth a possible 25 points. In addition, there will be bonus point readings each typically worth 1 point, although additional points will be awarded for some bonus point readings and the instructor will point out these assignments and distribute all bonus point readings. Integrative book review assignments should be 3 to 4 pages in length, although you may write longer if you want to. The book reviews will involve a joint assessment of two books. The first 2 pages or so should review the first book and the second 2 pages should review the second book and discuss its implications for understanding the material presented in the first book. More details and due dates are offered for each assignment below.

1. Integrative Book Review Assignment #1 (25 points possible): Food Addiction. Read either 1a. Saxen or 1b. Bruni. This will provide you with exposure to an autobiographical account of living with food addiction/binge eating. Then read either 2a. Kessler or 2b. Bulik. This will provide you with a perspective on the causes, prevention, and treatment of food addiction. The integrative book review should spend about two pages discussing Saxen or Bruni (depending on which book you selected), with particular focus on the structure, style, and content of the book, intended audience, and pertinent elements of food addiction described in the book. The last two pages of the book review should focus on the structure, style, content, and intended of either Kessler or Bulik that has implications for understanding the causes, treatment or prevention of food addiction. Feel free to be creative with this review. You can devote more than 4 pages to the review if you chose to (although do not feel obliged to) and you can use references or not and format in APA style of your own selection. The point of this assignment is to enable me to ensure that you have read two books on food addiction and thought about them individually and how they might relate to each other.

2. Integrative Book Review Assignment #2 (25 points possible): Exercise Addiction. Read 3a. Diary of an Exercise Addict by Peach Friedman and the book by Kerr et al. entitled Exercise Dependence. Devote the first two or so pages of this assignment to describing the structure, style, and content of Friedman’s book and any potential insights you gained about the experience of exercise addiction from her writing. Devote the last two pages of the paper to discussing the structure, style, and content of the book by Kerr et al. and any insights you may have gained into possible causes of and potential treatments for persons with exercise addiction problems like Freidman.

3. Integrative Book Review Assignment #3 (25 points possible): Gambling Addiction. First, read Bill Lee’s memoir about his gambling addiction, Born to Lose, and then read Ladoucœur and LaChange’s treatment manual Overcoming Pathological Gambling. Devote the first two
pages or so of this review to a discussion of the structure, style, and content of Lee’s book and discuss anything you learned about potential causes, symptom, and other aspects of gambling addiction as manifest in Lee’s autobiographic account. Devote the last two or so pages of this review to a discussion of the treatment model and activities presented by Ladouceur and Lachance and discuss how they might or might not be applicable to treatment of a pathological gambler like Bill Lee.


5. It is perfectly appropriate in any of these integrative review assignments to raise concerns you might have about the validity of conceptualizations of these problems as addictions and to discuss any other relevant concerns or issues you might have with anything you read. You may also want to discuss how evidence-based or culturally appropriate or broadly applicable any of the books we read are and the extent to which autobiographical accounts may provide findings that can be generalized to other persons.

You may also earn points by reading bonus point articles. The drug abuse vocabulary assignment I distribute the first day of class is worth 5 bonus points and you can read and turn in any of the scientific or clinical articles listed above for one bonus point each. You should read and take notes on the bonus point article in question and put your name at the top of the article and turn in to me for review and grading. I will also be distributing a large number of articles during class that you can read for bonus points. You can use bonus point assignments to raise your point total. For example, if you received a perfect total score of 75 on the first three integrative book reviews, you could then add 5 bonus points and receive a P or add 19 bonus points and receive an H without having to do the last integrative book review. Students who end the course with 115 or more points, will receive an H and a letter from me to UNC letterhead or documenting outstanding performance in this class. I will also be pleased to provide any phone or written recommendations attesting to outstanding performance in this class for those students who end the course with 115 or more points.

**Grading System:**

- 115+ points = H+ (i.e., Letter Documenting Exceptional Performance)
- 94-100 = H
- 80-93 = P
- 70-79 = L
- 69 and below = F

**Policy on Late and Incomplete Assignments:** Students are expected to turn in all assignments on time. Incomplete or tardy assignments will be discussed with the particular student in question.

**Policy on Academic Dishonesty:** All written assignments should include a signed pledge from you stating that, “I have not given or received unauthorized aid in preparing this written work.” In keeping with the UNC Honor Code, if reason exists to believe that academic dishonesty has occurred, a referral will be made to the Office of the Student Attorney General for investigation.
and further action as required. Please refer to the APA Publication Manual and School of Social Work Student Manual and Writing Guide for information regarding attribution of quotes, plagiarism, and appropriate use of assistance in preparing classroom assignments.

VIII. COURSE OUTLINE

Session One:

COURSE OVERVIEW AND HISTORICAL AND EPIDEMIOLOGICAL ISSUES IN ALCOHOL AND DRUG USE, ABUSE, AND DEPENDENCE

This session will address basic epidemiological issues and will place alcohol use in its historical and cultural context.

Topics:
1. Overview of Course
2. History of Alcohol and Drug Use
3. Epidemiology of Alcohol and Other Drug Use and Social Work Significance of Substance Use Disorders

Session Two:

DEFINITIONAL, CONCEPTUAL, AND ETIOLOGICAL ISSUES IN THE ADDICTIONS

This session will overview various definitional and theoretical issues in the addictions and major etiological models, with particular attention to biomedical models and etiological factors.

Topics: Definitions, Conceptions and Theories of Alcohol and Drug Abuse.

1. Etiological factors in the Development of Substance Use Disorders
   a. Genetic/Biological
   b. Psychological
   c. Social/Cultural

Session Three:

THE NEUROBIOLOGY OF ADDICTION

1. Basic Brain Science
2. Brain Structure and Function in Chemical Dependency
3. Genetic Inheritance of Vulnerability to Addiction

Session Four:

FIRST ASSIGNMENT DUE
MEDICAL AND SOCIAL CONSEQUENCES OF ALCOHOL ABUSE AND ALCOHOL DEPENDENCE

This session comprehensively addresses the social and physical effects of alcohol abuse and alcohol dependence from an individual and societal perspective.

Topics:
1. Medical Complications of Alcohol and Drug Abuse.
2. Social Consequences of Alcohol and Abuse
   a. Effects on Families, Employment, Crime, etc.

Session Five:

MEDICAL AND SOCIAL CONSEQUENCES OF ALCOHOL ABUSE AND DEPENDENCE CONTINUED/BRIEF REVIEW OF ECONOMIC CONSEQUENCES OF ALCOHOL USE PROBLEMS AND SCREENING

This session will focus on the terotogenic effects of alcohol and drug abuse, economic costs of alcohol use disorders, and will expose students to a number of useful screening instruments and will conclude the discussion of the biomedical, social, and economic consequences of alcohol abuse and alcoholism.

Topics:
1. Fetal alcohol effects of alcohol and drug use and abuse
2. Economic Costs of Alcohol Abuse and other Economic Issues.
   b. Economic Costs of Alcohol Abuse and Treatment of Alcohol Use Disorders.
   c. Social and Economic Justice Concerns Related to Alcoholism.
3. Screening and Assessment of Alcohol Problems

Session Six:

TREATMENT CONSIDERATIONS AND SPECIAL POPULATIONS


a. Overview
   i. Setting (inpatient/outpatient, etc.)
   ii. Format (individual/group/family)
   iii. Modalities (Antidipsotropic and Anti-craving Therapies)

b. Special Populations Considerations
SECOND ASSIGNMENT DUE

Session Seven:

DEVELOPMENT PSYCHOPATHOLOGY OF ADDICTION AND COMORBID SUBSTANCE USE AND PSYCHIATRIC DISORDERS: BIOMEDICAL FACTORS AND THEIR INTERPLAY WITH SOCIAL FACTORS

Session Eight:

MARIJUANA ABUSE AND DEPENDENCE

Topics:
Marijuana Abuse and Dependence
  a. Epidemiology
  b. Etiology
  c. Consequences
  d. Assessment/Treatment.

THIRD ASSIGNMENT DUE

Session Nine:

STIMULANTS
Topics:
1. Stimulants: Cocaine, Amphetamines, Caffeine, Nicotine, and Other Drugs
   a. Cocaine
   b. Amphetamines
   c. Caffeine
   d. Nicotine
   e. Other
      i. Khat
      ii. Betel Nuts
      iii. Yohimbe
      iv. Ephedra

Session Ten:

OPIOIDS, SEDATIVES, AXIOLYTICS, AND INHALANTS

Topics:
1. Opioids
2. Sedative – Hypnotics
3. Anxiolytics
4. Inhalants

Session Eleven:
OTHER DRUGS OF ABUSE

Topics:
1. Hallucinogens
2. Over-the-Counter Medications
3. Steroids
4. Controversial Issues: Legislation, Drug Testing, etc.
5. Methods of Treating Drug Dependence

FINAL ASSIGNMENT DUE

Session Twelve:

CONTROVERSIAL ISSUES AND ETHICAL AND SOCIAL JUSTICE CONCERNS IN THE ADDICTIONS/INTRODUCTION TO PHARMACOLOGY

Topics:
1. Controversial Issues in the Alcohol Studies and Treatment Areas
   a. Controlled Drinking by Alcoholics vs. Abstinence-Only Treatment Goals
   b. Consequences of the War on Drugs
   c. The Effectiveness of Alcoholics Anonymous
   d. Denial and Motivation in Alcoholism Treatment
   e. Co-Dependency and Adult Children of Alcoholics
   f. The Validity of Alcoholics’ Self-Reports

2. Review of General Considerations in Alcohol and Drug Abuse
   a. Routes of Administration
   b. Dosage Forms
   c. Pharmacokinetics
   d. Metabolism
   e. Factors that influence drug metabolism:
      i. Age
      ii. Circadian Rhythms
      iii. Drug Interactions
      iv. Purity and Potency
      v. Set and Setting
      vi. Tolerance
   f. The neurochemistry of addiction
      i. Neurotransmitter systems
      ii. Neuroanatomical considerations

Session Thirteen:

Comprehensive Review of Course Topics/Future Directions
Session Fourteen:

Turn in all bonus point articles and any remaining work.