

## Psychopharmacology: Substances and the Brain Section A, Spring 2017

Mondays & Thursdays, 8:30-9:50, Vestergade 10-B24



### **Jesper T. Andreasen**

Ph.D. (Psychopharmacology, University of Copenhagen, 2009). M.Sc. (Psychopharmacology, University of Copenhagen, 2004). Associate professor at the Institute of Drug Design and Pharmacology, Faculty of Health and Medical Sciences, University of Copenhagen. With DIS since 2012.

### **Course Description**

This course will focus on psychiatric disorders and their pharmacological treatments. Besides covering basic brain anatomy and function, the link between dysfunctional brain regions/circuits and different psychiatric symptom will be discussed. A strong focus will be on neurotransmitters and their receptors, as well as how the neurotransmitters interact. This will be used to discuss the diverse pharmacological profiles of psychotropic/psychoactive agents, and how these profiles couple to their effects on perception, emotion and behavior, and to their adverse side-effects.

### **Pre-requisites**

One year of biology and one year of chemistry at the university level.  
A course in neurobiology is recommended but not required.

### **Learning Objectives**

By the end of this course, students will be able to:

- Describe the structure and function of the brain, with emphasis on neurotransmitters and synaptic transmission
- Review the different types of psychiatric disorders, their symptoms, the neurotransmitters involved, and the way they are treated
- Explain how psychoactive drugs affect the function of the brain, i.e. the mechanisms believed to underlie the therapeutic and adverse effects of psychopharmacological drugs.

### **Required Readings**

Stahl's "Essential Psychopharmacology", 4<sup>th</sup> ed., 2013

Canvas (<https://canvas.disabroad.org/login/canvas>): Any relevant reading material will be posted on the course page; please check it regularly.

### **Approach to teaching**

Class will be taught such that students will be engaged and therefore master course material. Course topics will be covered in a variety of ways including, but not limited to, the following: lectures, class discussions, case studies, critical analysis of research work (individual/groups), field studies and group presentations.

### **Canvas**

Canvas is a web-based system that allows you to access course resources and communicate with your classmates and faculty. To access Canvas, you can go to the DIS homepage and click the 'Canvas' link on the bottom of the website, or go to: <https://canvas.disabroad.org/login/canvas>. You can also download the Canvas App (By: Instructure) on iPhone and Android mobile smart phones.

**Evaluation**

The final grade for this course will be based on in-class tests, an assignment, and participation:

Component	Weight
Test 1	20%
Test 2	20%
Test 3	15%
Study Tour Assignment	15%
Participation	5%
Final Exam	25%
<b>Total</b>	<b>100%</b>

**Tests**

All the tests will be at the beginning of class unless otherwise stated.

Tests will be a combination of information recall, concept explanation and synthesis, and problem analysis.

	Topic	Date	Test Length
<b>Test 1</b>	<i>Schizophrenia</i>	Monday, February 20	40 minutes
<b>Test 2</b>	<i>Depression and antidepressants</i>	Thursday, March 30	40 minutes
<b>Test 3</b>	<i>Anxiety disorders and anxiolytics</i>	Monday, April 10	30 minutes
<b>Final</b>	<i>Cumulative, <u>but</u> highlighting ADHD, impulsivity, compulsivity, addiction</i>	TBA, May 8-11	2 hours

**Participation**

Participation is determined by attendance, tardiness and engagement in class. To prepare for each day, you are required to read all assigned material.

You are expected to attend all DIS classes when scheduled, and attendance and participation will be consistently monitored: in class, at field studies, and on study tours. If you miss multiple classes the Office of Academic Support will be notified and they will follow-up with you to make sure that all is well. Absences will jeopardize your grade and your standing at DIS. Allowances will be made in cases of illness; however, for multiple absences, you will need to provide a doctor’s note.

**Field Study Dates**

**Date:** Wednesday, March 15

**Time:** 8:30-12:30

**Description:**

**Date:** Wednesday, May 3

**Time:** 13:00-17:00

**Description:**

## Core Course Week and Study Tours

Core Course week and study tours are an integral part of the core course as we take the classroom on the road and see how theory presented in the classroom is translated to practice in the field. You will travel with your classmates and DIS faculty/staff on two study tours: a short study tour during Core Course Week and a long study tour to relevant European destinations.

Expectations for study tours

- Participate in all activities
- Engage in discussions, ask questions, and contribute to achieving the learning objectives
- Respect the destination, the speakers, DIS staff, and your fellow classmates
- Represent yourself, your home university and DIS in a positive light

One of the learning objectives of Psychopharmacology: Substances of the Brain is for you, the student, to be able to describe medical practice in a social, international, and scientific context. The study tours are a way to achieve this learning objective.

## Learning Objectives

The objectives of both core course week and the long study tour are:

- To showcase examples of psychopharmacological research, treatment, and education
- To broaden the students' view of the challenges face by psychopharmacology regarding research, treatment options, and sociological attitudes.
- To show examples of novel research methods and findings with both laboratory and clinical relevance
- To explore and learn more about Scandinavia and other societies in Europe

While on a program study tour, DIS will provide hostel/hotel accommodation, transportation to/from the destination(s), approx. 2 meals per day and entrances, guides, and visits relevant to your area of study or the destination. You will receive a more detailed itinerary prior to departure.

The dates for core course week, including short study tour, and your long study tour are below for your reference.

**Core Course Week:** Monday February 6 – Friday, February 10

**Short Study Tour:** Malmö, Sweden: Monday, February 6 – Wednesday, February 8

**Copenhagen Portion:** Thursday February 9 and Friday February 10

**Long Study Tour:** Munich: Sunday, February 26 – Friday, March 3

## Academic Study Tour Leaders

**Core Course Week:**



**Ciaran Fitzpatrick**

PhD fellow in behavioural neuropsychopharmacology investigating how visual attention and impulsivity are regulated by the monoaminergic neurotransmitters. M.Sc. (Pharmaceutical Sciences, University of Copenhagen, 2015), B.Sc. (Neuroscience & Pharmacology, University College Dublin, 2009). With DIS since 2012.

## Long Study Tour:



### **Maitane Caballero Puntiverio**

MSc Pharmaceutical Sciences (University of Copenhagen) and MSc in Pharmacy (University of the Basque Country). PhD-fellow in pharmacology, with the following project: "*The continuous performance test to study attentional performance: in vivo pharmacological and optogenetic studies in mice, and human studies in healthy volunteers.*" With DIS since 2016.

## Study Tour Coordinator:



### **Bettina Hornbøll**

Founder of CogniCation; cognitive communication. PhD-fellow in neurobiology doing imaging of the effect of serotonin during emotion processing in the brain, while challenging participant's natural serotonergic levels. The project has been conducted at Danish Research Center for Magnetic Resonance (DRCMR) and Center for Integrated Molecular Brain Imaging (CIMBI). M.Sc. Neurobiology (University of Copenhagen, 2006). B.A. Biology (University of Copenhagen, 2004). With DIS since 2012.

*Bettina arranges academic tour visits and grades the study tour assignment. You may see her around DIS as she teaches Neuroscience of Fear and Neuroscience Methodology. She is also the study tour leader for Section B.*

## Travel policies

You are required to travel with your group to the destination. If you have to deviate from the group travel plans, you need approval from the program director and the study tours office.

## Study Tour Assignment

Before going on long study tour, you will be divided into groups of 3-4 people. A more in-depth description will be provided closer to the short study tour.

## Practical Information

### **Academic Honesty: Plagiarism and Violating the Rules of an Assignment**

DIS expects that students abide by the highest standards of intellectual honesty in all academic work. DIS assumes that all students do their own work and credit all work or thought taken from others. Academic dishonesty will result in a final course grade of "F" and can result in dismissal. The student's home universities will be notified. DIS reserves the right to request that written student assignments be turned in electronic form for submission to plagiarism detection software. See the Academic Handbook for more information, or ask your instructor if you have questions.

### **Disability resources**

Any student who has a need for disability accommodations should contact Sean Green to coordinate this. Upon DIS approval, students should inform the instructor of accommodations within the first 2 weeks of class.

### **Office Hours**

The instructors have no set office hours, but you may contact them or Program Assistant Victoria Stepanova with any inquiries.

**DIS contacts**

Lisbeth Borbye, Program Director  
Susana Dietrich, Assistant Program Director  
Victoria Stepanova, Program Assistant  
Science & Health Program Office, Vestergade 10-B12

**Policy on late papers and/or assignments**

Late papers will be accepted, but your grade for the paper will be reduced by half a letter grade for each day that it is late.

**Use of Laptops or Phones in Class**

Use of phones in class is not allowed. Laptop use is only allowed for group and project work.

Date		Topic	Reading	Lecturer
Wednesday, January 18 <b>Neuroscience Program Orientation</b> 10:15-11:45 V23-301				
Thursday, January 19	1	<ul style="list-style-type: none"> <li>• General introduction to course content and expectations</li> <li>• Chemical signal transduction and receptors as psychopharmacological drug targets</li> <li>• Basic pharmacology (transporters and GPCRs)</li> </ul>	Stahl, Chapter 1: 1-9 Stahl, Chapter 2: 28-51	Jesper
Thursday, January 19	<p><i>Please join us for:</i></p> <p><b>Neuroscience Welcome Social</b></p> <p>18.00-19.30</p> <p style="color: red;">TBA</p> <p><i>TBAAn informal setting to get to know your study tour leaders, your peers, and your instructor!</i></p>			
Monday, January 23	2	<ul style="list-style-type: none"> <li>• Basic pharmacology (ion channels)</li> <li>• Functional brain anatomy: brain structures, transmitters and circuits</li> </ul>	Stahl, chapter 3: 52-67 Stahl 3rd edition, chapter 7: 195-222 (On Canvas)	Jesper
Thursday, January 26	<b>Core Course Week Orientation</b>			
Monday, January 30	3	<ul style="list-style-type: none"> <li>• Schizophrenia: symptoms and the dopamine hypothesis</li> </ul>	Stahl, chapter 4: 79-96	Jesper
Thursday, February 2	4	<ul style="list-style-type: none"> <li>• Schizophrenia: glutamate, GABA and serotonin</li> </ul> <p><b>*Election of Class Representatives</b></p>	Stahl, chapter 4: 96-128 Stahl 3rd edition: Fig. 9-41A-D (On Canvas)	Jesper
<p><b>Core Course Week</b></p> <p><b>February 6 -10</b></p> <p><b>Short Study Tour (Malmø): February 6-8</b></p> <p><b>Copenhagen Portion: February 9-10</b></p> <p><i>More information will be given during Core Course Week Orientation</i></p>				

Thursday, February 9 2-3 hr	5	•Schizophrenia antipsychotic drugs	Stahl, chapter 5: 129-169	Jesper
Monday, February 13	6	• Antipsychotic drugs  <b>*Reflection for Short Study Tour due (upload to canvas)</b>	Stahl, chapter 5: 169-177 (until "...insulin regulation." + 180-190 (clozapine, olanzapine, quetiapine, asenapine) + 190-210 (risperidone, paliperidone, ziprasidone, iloperidone, aripiprazole, brexpiprazole) + 211-212 (sulpiride, amisulpride).	Jesper
Thursday, February 16	7	• Antipsychotic drugs: new avenues  <b>Long Study Tour Orientation</b>	Stahl, chapter 5: 227-236	Jesper
Monday, February 20	8	<b>Test 1: Schizophrenia [40 minutes]</b>  • Depression	Stahl, chapter 6: 273-283 + fig. 6-1 Stahl 3rd edition: Fig. 11-46 to 11-54 (On Canvas)	Jesper
Thursday, February 23	9	• Depression  <b>*Upload fact sheet to Canvas</b>	Stahl, chapter 6: 250-273	Jesper
<p><b>Long Study Tour</b> Sunday, February 26- Friday, March 3 Munich <i>More information will be given during Long Study Tour Orientation</i></p>				
Monday, March 6	10	• Antidepressants	Stahl, chapter 7: 284-322	Jesper
Thursday, March 9	11	• Antidepressants  <b>*Reflection for Long Study Tour due (upload to canvas)</b>	Stahl, chapter 7: 326-346 (until "...use for depression")	Jesper
Monday, March 13	12	• Antidepressants	Stahl, chapter 7: 350-357 (from "Brain Stimulation: ..." to "...sustained remission.") + 361-369	Jesper
Wednesday, March 15	<p><b>Field Study II</b> <b>08:30 – 12:30</b> <b>Neurobiology Research Unit, Copenhagen University Hospital</b> <i>Preclinical-Psychiatry &amp; Neuroimaging</i></p>			

Thursday, March 16	13	• Antidepressants	Stahl, chapter 9: 388-419	Jesper
<b>Break</b> March 18 –26				
Monday, March 27	14	• Anxiety disorders	Stahl, chapter 9: 388-419	Jesper
Thursday, March 30	15	<b>Test 2: Depression and antidepressants</b> [40 minutes]  • Anxiety disorders	Stahl, chapter 9: 388-419	Jesper
Monday, April 3	16	• Anxiolytics  <b>Group Research Paper due by 16:00 (upload to canvas)</b>	Stahl, chapter 9: 388-419	Jesper
Thursday, April 6	17	• ADHD	Stahl, chapter 12: 471-502	Jesper
Monday, April 10	18	<b>Test 3: Anxiety disorders and anxiolytics</b> [30 minutes]  • ADHD	Stahl, chapter 12: 471-502	Jesper
<b>Break</b> April 12 – 17				
Thursday, April 20	19	• Impulsivity, compulsivity, and addiction	Stahl, chapter 14: 537-551	Jesper
Monday, April 24	20	• Impulsivity, compulsivity, and addiction	Stahl, chapter 14: 551-575	Jesper
Thursday, April 27	21	• Impulsivity, compulsivity, and addiction	Stahl, chapter 14: 537-575	Jesper
Monday, May 1		<i>Reserved for make-up class</i>		
Wednesday, May 3	<b>Field Study II</b> <b>13:00-17:00</b> <b>Neurobiology Research Unit, Copenhagen University Hospital</b> <i>Preclinical-Psychiatry &amp; Neuroimaging</i>			
Thursday, May 4		Optional: Review Session	Bring your questions!	Jesper
Tuesday, May 9  15:00 – 17:00 Location: DIS, TBA	22	<b>Final Exam</b> <b>Cumulative, with a focus on ADHD, and Impulsivity, compulsivity, and addiction</b>		Jesper