Syllabus NPSY 141a: Stress, Physiology, and Health
Department of Psychology
Brandeis University

Instructor: Jutta M. Wolf
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Room: Brown 103
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Office hours: tba

Class Meetings: tba
Course Website: http://latte.brandeis.edu/

About the Course
Due to increasing life expectancies and the elimination or reduction of many causes of early mortality, interests in the Health Sciences is shifting from the battle against acute infectious diseases to the understanding of factors that determine morbidity and mortality in mid- and later life. Currently, psychosocial factors are estimated to account for approximately 30% of overall costs of illness in Western societies. The study of psychosocial factors as determinants of health and disease is a relatively young but rapidly developing field, in which cutting edge biological technologies are combined with psychological research techniques. Because many diseases develop throughout the life span, the relevant concepts almost always contain an aging perspective.

The goal of this course is to gain an understanding of the bi-directional pathways between central nervous system processes and health. More specifically, we will analyze research investigating the associations of factors such as acute and chronic stress, depression, anxiety, and traumatic stress, with diseases of the cardiovascular system, the metabolic system, and the immune system. We will also work to an understanding of mechanisms in the central nervous system that underlie the relevant psychosocial states, of the pathways that are involved in communication between the central nervous system and the periphery of the human body, and finally, of the affected target tissues and organ systems in the body.

Learning Goals: The course will help gain scientific knowledge and research skills, through intensive reading and discussion of original research papers, which leads to the design of an experiment and the writing of a research proposal. This will also help developing critical thinking skills. The requirement of one oral presentation of an original research paper will further help develop oral communication skills. Students who might find this course valuable would be neuroscience and psychology students, students interested in clinical psychology and psychopathology, and students in HSSP.

Sources will be book chapters, original research articles, and overview articles explaining basic concepts from the areas of Behavioral Neuroscience, Neuroendocrinology and Neuroimmunology.

Prerequisites
One of the following: NPSY 11b, NBIO 146a, PSYC 38a, or NPSY 199a
**Course Requirements**

**Readings**

Required articles and book chapters will be available through LATTE. **Please complete the reading on or before the class date listed in the syllabus.**

- see *Course Schedule and Topics* and *List of Readings* at the end of this document for more details.
- Each student will be required to submit a reading response of 250 words for each class as a summary of each of the required readings (required readings are marked as such)
- Each reading response will have to contain one discussion question for each of the required readings to facilitate class discussion
- Reading responses with discussion questions will have to be uploaded through LATTE by 11am the day the topic is presented by students.

**Class presentation**

Every class, two or three students will individually present the findings of one of the required readings of the respective day as a 15-20min oral presentation similar to a conference presentation. You may use Power Point or any other mode of presentation, but you are strongly encouraged to visualize your presentation.

- Each presenter will meet with the instructor or TA a week before the presentation, during the instructor’s or TA’s office hours.
- Each presenting student will be required to take a leading role in the discussion of the paper he/she presented, which will be aimed at ensuring complete understanding of the respective reading and its implications.

Please note:

- You are required to present and presenting counts towards your participation grade.
- You will receive feedback on your presentation from both, the instructor and from other students taking this class as well.
- You will be offered a second opportunity to present to put said feedback to use (not required).

**Quizzes**

Two quizzes will be given; one earlier in the semester and a second one closer to the end of the semester (see *Course Schedule*). These quizzes will consist of multiple-choice questions and open answer / short-essay questions aimed at testing your understanding of the concepts that have been discussed or presented in class or have been part of the assigned readings (meaning that anything that is part of already completed required readings might be on each of the tests).

**Class participation**

Class participation will be graded and includes the following:

1. Attendance
2. Timely completion of reading assignments (by the date listed in the syllabus),
3. Thoughtful contribution to class discussions. **To facilitate discussion, each participant is required to prepare at least one discussion question for each of the required readings** (see also details above for reading responses).

**One-pagers**

Each student will write two one-page essays over the course of the term. Each essay aims to deepen the understanding of one of the course topics by formulating a research question and by trying to answer this question.
(1) The first essay will be a review of research articles. It must be based on original scientific articles (at least 2 articles, no “review” articles or other secondary or tertiary literature), which can be found through your own research (need to be related to one of the course topics and will need to be approved by the instructor) or can be chosen from the list of required readings. The goal is to pose a research question, argue why it is important to answer this question, and then use original research articles to answer this question (more details in assignment guide).

- Although not an “official form” of writing, one-pagers are frequently asked for by funding agencies or other institutions to get an overview of your planned research, and to give you a recommendation on how to further proceed (e.g. submit a full proposal or not).
- With only one page of space, the message must be communicated in a very clear and precise language, which for many people is more difficult than writing a 10-page essay. The ability to communicate a message a clear and concise way is an important skill.
- One-pagers should not contain quotations / citations, graphical representations, and cannot just be a slight variation of the abstract of a research paper.
- Format (a): Your essay must fit onto one page, using a regular legible font and font size (i.e. not smaller than 11 point), and legible and attractive overall layout. You should use your specific research question as a title and use the remainder of the page to answer this question by summarizing one or more research articles in your own words.
- Format (b): You should structure this one page using section headings. Examples will be given in the assignment guide.

(2) The second one-pager will be written in the form of a research proposal. This serves as a practice run for your final paper. This will be very similar to the first one-pager, i.e. you will pose a research question, and argue why it is important to answer this question, but instead of using research articles to answer your question, you will suggest a research study designed to answer the question. You will need to use at least two original research articles to support your research question. These articles must be different from the ones used for one-pager #1 (more details in assignment guide).

Each one-pager has to be submitted the *Sunday after* the day it is listed at in the course schedule for deadlines.

**Final Paper**

For the final paper, you will identify a research question for which you think that the available literature is insufficient, design a scientific study to fill the specified gaps in the literature, and write a grant proposal that you could theoretically submit to a federal funding agency. You might use one of the one-pagers as a starting point. This grant proposal will consist of a summary of background research findings, the identification of a gap in our knowledge, formulation of one or more hypotheses to test, and a description of the study you would suggest to close the gap in our knowledge.

- I encourage you to identify potential study ideas early in the semester. I suggest that you identify at least one unanswered research question during or after each week’s class.
- Specific instructions and guidelines will be given during the semester.

The final paper will have to be written in the format of a R21 grant proposal to the National Institutes of Health (NIH) – see assignment guide for details (this is not APA format).

**Guidelines for all writing assignments**

All writing assignments will have to be submitted through LATTE before/by the respective deadline.
The various course requirements are worth the following proportions of your final grade:

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<thead>
<tr>
<th>Requirement</th>
<th>% of final grade</th>
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<tbody>
<tr>
<td>One-pagers</td>
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<tr>
<td>1st one pager:</td>
<td>12.5%</td>
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<td>2nd one pager:</td>
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<td>Quizzes</td>
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<td>2nd quiz:</td>
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<td>Class contributions</td>
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<td>Participation</td>
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<td>Presentation</td>
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<td>Final Paper</td>
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**LATTE**

A copy of this syllabus will be available on LATTE. Readings will be uploaded to LATTE before class. Presentations will be made available on LATTE after each class. The instructor will use LATTE’s grading capabilities so that you will be able to check your grades online.

**Late Work and Extensions**

Papers submitted after the deadline will be penalized by lowering the grade by 10 percent points for each day late. If you have some extenuating circumstances that would make it impossible for you to hand in an assignment on time, please talk to me before the deadline to see if I can arrange a reasonable extension plan.

**Special Needs**

Brandeis seeks to welcome and include all students. If you are a student who needs accommodations as outlined in an accommodations letter, please talk with me and present your letter of accommodation as soon as you can. I want to support you.

In order to provide test accommodations, I need the letter more than 48 hours in advance. I want to provide accommodations but cannot do so retroactively. If you have questions about documenting a disability or requesting accommodations, please contact Student Accessibility Support (SAS) at 781.736.3470 or access@brandeis.edu.

**Academic Integrity**

You are expected to be honest in all of your academic work (see http://www.brandeis.edu/studentaffairs/srcs/ai/index.html). Academic dishonesty in any form, e.g., cheating or plagiarism, will not be tolerated and instances of alleged dishonesty will be forwarded to the Office of Campus Life for possible referral to the Student Judicial System as required by University policy (see section 5 of the Rights and Responsibilities handbook for the university policies in this area). Potential sanctions include failure in the course and suspension from the University. If you have any questions about my expectations, please ask.

Plagiarism means presenting the opinion or the work of others as your own work. This can occur in a number of ways, some more obvious than others. For example, if you simply take someone else’s researched and written report and present it as your own, that is a clear-cut case of
plagiarism. Also, if you use the exact language of someone else without placing the words in quotation marks and naming the original author, you are clearly committing plagiarism. You are also committing plagiarism, however, if you take someone else’s arrangement of material or pattern of thought and present it as your own without referencing it, even if you express it in your own words. In summary, do not submit work that presents the ideas of others as your own ideas, fails to properly cite sources, and/or lifts sentences or ideas from the works of others. If you are uncertain as to whether something you are doing would count as cheating, ask me before you turn it in.

**Re-grading Policy**

If you believe that a mistake has been made in the grading of a paper, you may ask for a re-grade. This request must be made in writing and must include a justification in writing of why you believe that a re-grade is warranted. Written requests must be submitted to the professor within 1 week of when you receive your grade for that paper. Once you turn in a written request, a re-grading of your entire paper/exam will be done. Any mistakes in grading (either in your favor or against you) will be corrected. This means that any time you ask for a re-grade, it is possible for your grade to go up, go down, or stay the same.
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<thead>
<tr>
<th>#</th>
<th>date</th>
<th>Topic / Schedule</th>
<th>deadlines / events</th>
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<tbody>
<tr>
<td>1</td>
<td>Jan 17</td>
<td>Intro to NPSY141: Organizational Meeting</td>
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<td>2</td>
<td>Jan 24</td>
<td>Topic #1: Basic concepts (JMW)</td>
<td>11am: RR #1</td>
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<td>Topic #2: Stress circuits in the CNS (JMW)</td>
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<td>3</td>
<td>Jan 31</td>
<td>Topic #2: <strong>presentations 1 &amp; 2</strong></td>
<td>11am: RR #2</td>
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<td>Topic #3: Stress responsive systems in the periphery (JMW)</td>
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<td>4</td>
<td>Feb 7</td>
<td>Topic #3: <strong>presentations 3 &amp; 4 &amp; 5</strong></td>
<td>11am: RR #3</td>
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<td>Topic #4: Acute stress effects on the CNS (JMW)</td>
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<td>5</td>
<td>Feb 14</td>
<td>Topic #4: <strong>presentations 6 &amp; 7</strong></td>
<td>11am: RR #4</td>
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<td>Topic #5: Stress to disease (long-term effects / over the life span) – biological effects (JMW)</td>
<td>*1st one-pager due</td>
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<td>Feb 21</td>
<td>Break – No Class</td>
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<td>6</td>
<td>Feb 28</td>
<td><strong>Quiz #1</strong></td>
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<td>7</td>
<td>Mar 6</td>
<td>Topic #5: <strong>presentations 8 &amp; 9 &amp; 10</strong></td>
<td>11am: RR #5</td>
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<td>Topic #6: Stress to disease (long-term effects / over the life span) – cognitive effects (JMW)</td>
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<td>8</td>
<td>Mar 13</td>
<td>Topic #6: <strong>presentations 11 &amp; 12 &amp; 13</strong></td>
<td>11am: RR #6</td>
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<td>Topic #7: Inflammation as bi-directional pathway – CNS to periphery (JMW)</td>
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<td>9</td>
<td>Mar 20</td>
<td>Topic #7: <strong>presentations 14 &amp; 15 &amp;16</strong></td>
<td>11am: RR #7</td>
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<td>Topic #8: Inflammation as bi-directional pathway – Periphery to CNS (JMW)</td>
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<td>10</td>
<td>Mar 27</td>
<td>Topic #8: <strong>presentations 17 &amp; 18 &amp; 19</strong></td>
<td>11am: RR #8</td>
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<td>Topic #9: Affective Disorders and Health (JMW)</td>
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<td>11</td>
<td>April 3</td>
<td>Topic #9: <strong>presentations 20 &amp; 21 &amp; 22</strong></td>
<td>11am: RR #9</td>
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<td>Topic #10: Prevention or amelioration of the health consequences of stress (JMW)</td>
<td>*2nd one-pager due</td>
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<td>April 10</td>
<td>Break - No Class</td>
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<td>12</td>
<td>April 17</td>
<td><strong>Quiz #2</strong></td>
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<td>13</td>
<td>April 24</td>
<td>Topic #10: <strong>presentations 23 &amp; 24 &amp; 25</strong></td>
<td>11am: RR #10</td>
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<td>How to write a research grant proposal (JMW)</td>
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<td>May 1</td>
<td>Final Paper</td>
<td>Final paper due</td>
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**List of Readings**

Usually, up to four original research papers, book chapters, or review papers will be assigned for each class. ALL readings will be made available through LATTE.

Please note that the required readings might be updated up to two weeks before each class meeting to allow for inclusion of cutting edge research.

1. **Basic Concepts**

In this first section we will focus on the most important concept mediating between psychosocial factors and disease: stress. We will study the development of stress concepts, from physiology-focused explanations to truly psychological concepts, which include hypotheses about specific cognitive and emotional processes.

**Required readings:**

**Additional reading – not required, just recommended as an add-on throughout the semester:**

2. **Stress circuits in the central nervous system**

In this section, we will analyze how emotions, particularly those relevant to stress-related disorders, are processed within the central nervous system to elicit a stress response.

**Required readings:**

**Suggested readings (not required):**
3. Stress-responsive systems in the periphery of the body

To understand the association between states of the central nervous system and diseases of the periphery of the body, we need to learn about the pathways connecting the CNS with the periphery. The CNS reaches out to the periphery of the body through neural pathways, and through the secretion and reception of endocrine signals. The two major stress systems of the body are part of the neural system (i.e. the sympathetic nervous system) and of the endocrine system (i.e. the hypothalamus-pituitary-adrenal axis). Both systems communicate states of threat or danger to the periphery of the body. In addition, the CNS is able to receive signals from most peripheral organ systems through similar pathways. Of particular relevance is the immune system, which is connected to the CNS through endocrine and neural pathways, and is an excellent example of bidirectional communication of periphery and CNS.

Required readings:

4. Acute stress effects on the CNS

In addition to being started in the CNS, stress responses also induce profound changes in the CNS, either directly, by intra-CNS pathways, or indirectly, by secondary mediators of peripheral stress responses feeding back into the CNS. One example of the latter effects is modulation of human memory by the stress hormone cortisol.

Required readings:

Suggested readings (not required):

5. How can stress lead to disease? Life span perspective: Biological Effects

One of the most important conclusions from the previous section is that acute stress, threat or challenge induce major changes in the states of the CNS and the periphery, but also that these changes are highly adaptive in the short term, and necessary for survival. In section 5 and 6 of
the course we will analyze research that tries to understand which conditions need to be fulfilled for psychosocial factors being associated with central and peripheral pathophysiological processes and disease. We will find that one of the requirements is long-term exposure to adverse psychosocial factors, which necessarily includes a life-span or aging perspective. Many of the diseases that are connected to stress-related factors are also classified as age-related diseases, because they require long-term exposure to psychosocial or behavioral risk factors.

**Required readings:**

**Background Readings (recommended, but not required):**

6. *How can stress lead to disease? Life span perspective: Cognitive and CNS Effects*

This section asks similar questions as the above, only that here the focus is on effects on the function of the central nervous system, mainly cognition.

**Required readings:**

7. *Inflammation as a bidirectional pathway between CNS and periphery: CNS to periphery*

In this section of the class, we will develop a deeper understanding of one of the most promising pathophysiological communication pathway currently studied. Inflammation can be a healthy response to infection with a pathogen, but the same mechanism is frequently activated without a specific pathogenic stimulus, in which case its adaptive mechanisms are turned into maladaptive threats to our health.
Required readings:

8. Inflammation as a bidirectional pathway between CNS and periphery: periphery to CNS

Required readings:
- P#19: tbd

9. Affective Disorders and Health

Affective disorders such as Major Depression, anxiety disorders, and posttraumatic stress disorders are among the most prevalent diseases of the 21st century. They are not only a significant burden for the patient, but also for society. Affective disorders are associated with increased risk for severe somatic diseases such as cardiovascular diseases, type 2 diabetes, the metabolic syndrome and osteoporosis. Current research is beginning to uncover the pathways connecting affective disorders with pathophysiological changes.

Required readings:
- P#22: tbd
10. How can we use the current findings to prevent or ameliorate the health consequences of stress?

While most of the earlier work focused on how negative CNS states could lead to negative health outcomes, recent research has pointed in the opposite direction. Currently, an increasing number of researchers are asking the question how the current findings can be turned around and used in prevention and treatment. In fact, mounting evidence shows that treatments such as stress management training or meditation are effective in reducing acute stress responses, but also in helping people with fatal diseases such as AIDS or cancer live longer.

**Required readings:**
- P#25: tbd

**Optional readings (reviews and further original studies):**