

# DEPARTMENT OF PSYCHOLOGY

## Behavioral Neuroscience BS Major

### Questions & Answers for the KU Psychology BS in Behavioral Neuroscience

Behavioral Neuroscience (BN) is a new major in Psychology at the University of Kansas. The concentration in behavioral neuroscience is designed for students with a focused interest in the biological bases of behavior and thought. The concentration is well suited for students who are contemplating professional or mainly research careers in medicine, pharmacology, veterinarian medicine, animal science, neurology, neurobiology, and neuroscience. It is also suitable as a degree for those headed into other health-related fields or graduate school in other areas of psychology. As a behavioral neuroscience major, you will take courses in many different departments because, as you explore the neural basis of behavior and prepare to enter the neuroscience research field, you will need to acquire knowledge in the realms of chemistry, biology, psychology, statistics, and even computer science.

#### What is it?

Neuroscience is an extremely large discipline that encompasses the work of a wide variety of scientists with broad research interests. However, all neuroscientists are interested in the brain and how it works. Some neuroscientists (e.g., in biology) are only interested in learning about the basic physiology of the brain and of brain tissue. Biologically oriented neuroscientists might be interested in such questions as: What cellular processes enable neurons to communicate with each other via neurotransmitters? But **behavioral neuroscientists** are interested in the relationship between the physiological processes that occur in the brain and the behavior of an organism. The Behavioral Neuroscientist is likely to be interested in the biological basis of normal learning and memory as well as psychiatric illness (e.g., depression, drug abuse, schizophrenia). They might also be interested in how the nervous system influences thoughts, emotions, or abnormal behaviors. This focus on the behavior of the entire organism (typically humans) is what is distinctive about behavioral neuroscience within the KU Psychology Department.

#### Is it Hard?

Yes. Do not enter this major lightly as it will not be easy. What it will do is give you excellent opportunities for training in scientific research and a strong background in neuroscience, health, neuroscience research methods, statistics, and even some computer science. You will also have to take the general education courses for a BS, which are typically more difficult and time intensive than the BA requirements for psychology. That being said, if you are planning on going on into Medical School, you will find that these requirements overlap substantially with pre-med requirements. Furthermore, if you are planning on going on into a neuroscience or health-related field, this major will prepare you for the challenges to come. If you have any questions about this, you should discuss them with the BN Director, Dr. Chrysikou or one of the other faculty members in the Department with neuroscience-related interests.

#### Why should I do this?

This interdisciplinary program gives students exceptional experience with research and writing, as well as technological sophistication that will prepare you will for a variety of neuroscience-related graduate programs (neuroscience, psychology, pharmacology, mental health fields, neurobiology, medicine, dentistry, nursing). It also provides an excellent background for entry-level positions in research (e.g., biomedical, pharmaceutical, biotech).

#### How do I declare?

In order to apply to the major, **students will be invited (around mid-semester) via an Academic Notice in their KYOU PORTAL to a BN admission orientation** if they are in their application term. This is a semester in which you (the student) have enrolled in the minimum required courses to declare the major. This includes: PSYC 102, 104/105, 200/201 or 210/211, **and** one of the following core courses (PSYC 370/371 or PSYC375 or 380/381). You must have a **3.0 or greater GPA** for these courses. After you meet the above requirements and attend the admissions orientation, you will be asked to sign a DECLARATION INTENT FORM for the major. At this point, you will be admitted to the major.

#### What can I do for my research component?

An important part of the BN degree is the **research experience**. This is typically done through some combination of PSYC 480 (independent study) and an Honors thesis (PSYC460). To get involved in one of these, you need to meet with a suitable mentor in the Psychology department. Ideally, you will find a mentor with neuroscience interests; however, this is not a requirement. You should simply find a professor whose research interests overlap with yours and your future career goals.

Professors who conduct research in cognitive neuroscience, developmental neuroscience, clinical neuroscience, and social neuroscience include (but are not limited to) **Dr. David Johnson, Dr. John Colombo, Dr. Omri Gillath, Dr. Ruth Ann Atchley, Dr. Doug Denney, Dr. Evangelia Chryssikou, Dr. Christopher H. Ramey, and Dr. Cary Savage (KUMC)**. If your interests swing more towards medicine, clinical psychology and health, you might look into the research of **Dr. Nancy Hamilton, Dr. Amber Watts, Dr. Kelsie Forbush, Dr. Steve Ilardi, Dr. Ric Steele, Dr. Michael Roberts, Dr. Laura Martin (KUMC), Dr. Paula Fite, Dr. Christopher Cushing, Dr. Matthew Mosconi, and Dr. Michael Rapoff (KUMC)**.

To find out if these professors have research opportunities in their laboratories, simply drop them an email or stop by their office hours. You can find out more about their specific interests by visiting their unique websites. A good starting point is here: <http://psych.ku.edu/faculty>

Keep in mind that the relationships that you foster with these faculty members may turn into presentations at conferences, great mentoring, publications, and of course, helpful guidance and recommendation letters for graduate programs.

#### What are some examples of student research in Behavioral Neuroscience?

Look in the hallways on the 4<sup>th</sup> floor of Fraser and you will see lots of posters discussing neuroscience-related research. These might include studies using EEG, ERP, or MRI. Ask the neuroscience faculty (e.g., Dr. Chryssikou, Dr. Johnson, Dr. Gillath, or Dr. R. Atchley) for some examples of their students' work. For those students who are more pre-med or health oriented, Honors theses might have more of a clinical orientation such as work on fibromyalgia patients (Dr. Hamilton), Multiple Sclerosis patients (Dr. Denney), and Alzheimer patients (Dr. Johnson & Dr. Watts) or work on more general physiological processes.

#### Can I complete this degree in 4 years?

YES! While the concentration requires careful planning, you can do this in 4 years (see recommended curriculum). Some students take summer courses to accelerate their progress through the major or allow them greater flexibility during the school year (e.g., taking some of the lower level psychology courses or general education courses). To make sure that you are on track you should consult with your faculty advisor, with the psychology advisor, or with the BN advisor early in your 2<sup>nd</sup> year at KU.

Some of the electives in the BN program are only offered every few years so if there is one in particular you want to take you should PLAN AHEAD by contacting the professor who teaches it to find out when it will next be offered. You may take other upper level courses as alternatives to the listed electives (the more health/neuro/bio oriented psych courses); however, you should get approval from Dr. Chryssikou first.

With the exception of some introductory courses, most courses will have prerequisites. In mapping out your long-term course plan, list all prerequisites to ensure that you take your courses in the appropriate order.

#### What types of careers does the BN program prepare me for?

Clinical Psychology, Medicine, Pharmacology, Cognitive Neuroscience, Social & Affective Neuroscience, Clinical Neuroscience, Behavioral Neuroscience, Neuropsychology, Animal Science & Veterinary Science, Biological Psychology, Neurology, Neurosurgery, Nursing, Health Psychology, Psychophysics, Psychophysiology, Psychiatry, Scientific Writing/journalism, and many others. To learn more we recommend that you examine the resources in the Psychology Undergraduate Resource Center on the 2<sup>nd</sup> floor of Fraser. There are many books that discuss careers available to those with this type of degree.

Having this degree will also provide you with many skills that will be valued broadly by employers and will be transferable from job to job. This includes: research design, data collection and analysis, sophisticated statistical techniques, computer programming ability, analytical ability, writing skills, problem solving, critical thinking, and much more.

Careers in most of the fields listed above require a post-graduate (M.S., Ph.D., Psy.D., or M.D.) degree. However, many entry-level positions in medical, clinical, biotech, or pharmaceutical research are available to individuals with a B.S. degree. Useful Places to Learn More about Neuroscience: Society for Neuroscience: <http://www.sfn.org/> and <http://www.neuroguide.com/> as well as the Association for Psychological Science <http://www.psychologicalscience.org/> and the Cognitive Neuroscience Society <http://cogneurosociety.org/>

## How do I join the BS Major in Behavioral Neuroscience?

The requirements for ADMISSION to a major in Behavioral Neuroscience are distinct and different from the requirements for GRADUATION with a major in Behavioral Neuroscience.

In order to **apply to the major**, students will be invited (around mid-semester) via an Academic Notice in their KYOU Portal to a **Psychology Admission Orientation** if they are in their **application term** (semester in which student has enrolled in the minimum number of required courses to declare major, as noted below).

The Department of Psychology requires the following to be admitted as a Behavioral Neuroscience major:

1. Students must have satisfactorily completed **PSYC 102**
2. Students must have taken:
  - a. **PSYC 104/105**
  - b. **PSYC200/201 or PSYC210/211** (*previously known as PSYC 300 and PSYC 310*)
  - c. **and one of the following core courses (PSYC 370/371 or PSYC375 or PSYC 380/381)**
3. **Students must have a 3.0 or greater GPA for the group of courses listed under #2.**
4. Students must sign a Declaration Intent Form by attending a Psychology Admission Orientation during their application term.

**All applicants who meet the above requirements will be admitted.**

### Advising

Students should speak with **Dr. Chrysikou** or **Elizabeth Barton** *prior* to entering the BS program in behavioral neuroscience. Before you contact an advisor for an appointment, please read this handout very carefully, as it can answer several general questions about the B.S.

#### **Undergraduate Advising Specialist: Elizabeth Barton**

211A Fraser; phone: **(785) 864-3500**; email: [e.barton@ku.edu](mailto:e.barton@ku.edu)

*See Ms. Barton if you are a freshman or a sophomore student who has not yet been admitted to the major and has general questions regarding whether this major is appropriate for your career path, or would like to discuss admission to the major, changing majors, transfer credits, holds, financial concerns, and other general questions*

#### **Director of BS: Evangelia Chrysikou, Ph.D.**

457 Fraser Hall

[lilachrysikou@ku.edu](mailto:lilachrysikou@ku.edu)

Please email Dr. Chrysikou for an appointment.

*Dr. Chrysikou advises students who have already been admitted or are interested in transferring to the major and who are interested in cognitive, clinical, social or affective neuroscience, neuropsychology, neurology, pharmacology, behavioral neuroscience, cognitive science, and cognitive psychology related work or clinical psychology, health psychology & medical related work (nursing, medicine). Dr. Chrysikou can answer questions regarding: B.S. requirements, class substitutions, and appropriateness of elective courses for the B.S. Upon completion of the B.S. requirements, also see Dr. Chrysikou for the Major Certification Form before you apply for graduation during your senior year.*

## Recommended Course Schedule for BS in Behavioral Neuroscience

| <b>1st Year Fall</b>  | <b>Requirement Fulfilled</b> | <b>Hours</b> | <b>1st Year Spring</b>  | <b>Requirement Fulfilled</b> | <b>Hours</b> |
|---|------------------------------|--------------|---|------------------------------|--------------|
| ENGL 101  | General education            | 3            | ENGL 102  | General education            | 3            |
| MATH103 (or other math if exempt)   | Math Requirement             | 3            | MATH 115/121  | Math Requirement             | 3            |
| CHEM 130  | Natural Science Req          | 5            | BIOL 150/151  | Natural Science Req          | 4            |
| <b>PSYC 102</b>   | Major requirement            | 1            | <b>PSYC 200 or 210</b>  | Major requirement            | 3            |
| <b>PSYC 104/105</b>   | Major requirement            | 3            | COMS 130 or PHIL 148  | General education            | 3            |
| <b>total</b>  |                              | <b>15</b>    | <b>total</b>  |                              | <b>16</b>    |
| Get involved with student organizations this semester! It furthers your classroom experience, looks great on a resume, and lets you meet people with common interests!  |                              |              | Registering at career services is free and gives you countless opportunities  |                              |              |
| <b>2nd Year Fall</b>  | <b>Requirement Fulfilled</b> | <b>Hours</b> | <b>2nd Year Spring</b>  | <b>Requirement Fulfilled</b> | <b>Hours</b> |
| ENGL 203-211  | General education            | 3            | <b>PSYC 370 or 375 or 380</b>   | Major Requirement            | 3            |
| <b>PSYC 200 or 210</b>  | Major requirement            | 3            | BIOL 152  | Natural Science Req          | 4            |
| <b>PSYC 370 or 375 or 380</b>   | Major requirement            | 3            | CHEM 135  | Natural Science Req          | 5            |
| EECS 138  | Computing Req                | 3            | MATH 116/122  | Math Requirement             | 3            |
| <b>BS PSYC elective</b>   | Major requirement            | 3            |   |                              |              |
| <b>total</b>  |                              | <b>15</b>    | <b>total</b>  |                              | <b>15</b>    |
| <b>Now eligible for entry to BS major after this semester's courses with 3.0 GPA in grey highlighted courses. Admission/Declaration of Major required this semester.</b>  |                              |              | Falling behind in anything or looking to expand into a minor? Look into summer school options and on line courses.  |                              |              |
| <b>3rd year fall</b>  | <b>Requirement Fulfilled</b> | <b>Hours</b> | <b>3rd year spring</b>  | <b>Requirement Fulfilled</b> | <b>Hours</b> |
| <b>PSYC 625</b>   | Major requirement            | 6            | EECS advanced course (e.g., computational neuro or other)   | Computing Req                | 3            |
| advanced BIOL (e.g., 435)   | Natural Science Req          | 3            | <b>PSYC 651, 679,687,692,693,694,695, 696</b>   | Major requirement            | 4            |
| <b>PSYC 500 (int stats)</b>   | Major requirement            | 3            | <b>BS PSYC elective</b>   | Major requirement            | 3            |
| WC 204  | General education            | 3            | WC 205  | General education            | 3            |
|   |                              |              | <b>PSYC 480</b>   | Major requirement            | 2            |
| <b>total</b>  |                              | <b>15</b>    | <b>total</b>  |                              | <b>15</b>    |
| Interested in an internship or a position in a research lab? This is an ideal time research possibilities   |                              |              | Have you considered departmental honors? Inquire with the Psychology Department. Applying to grad school? Start researching standardized testing required so you can study over the summer.             |                              |              |
| <b>4th year fall</b>  | <b>Requirement Fulfilled</b> | <b>Hours</b> | <b>4th year spring</b>  | <b>Requirement Fulfilled</b> | <b>Hours</b> |
| MATH upper level or <b>PSYC stats 6XX</b>   | Math Requirement             | 3            | <b>PSYC 460 (honors)</b>  | Major requirement            | 1            |
| <b>PSYC 460 (honors)</b>  | Major requirement            | 1            | <b>BS PSYC elective</b>   | Major requirement            | 3            |
| <b>PSYC 480</b>   | Major requirement            | 2            | humanities elective   | General education            | 3            |
| <b>BS PSYC elective</b>   | Major requirement            | 3            | elective/possible minor   |                              | 3            |
| humanities elective   | General education            | 3            | elective/possible minor   |                              | 3            |
| elective/possible minor   |                              | 3            | elective/possible minor   |                              | 3            |
| <b>total</b>  |                              | <b>15</b>    | <b>total</b>  |                              | <b>16</b>    |
| Apply for Spring graduation this semester & meet with your faculty mentor. Applying for grad school? Talk it over with your mentor as well. Most deadlines are in the late summer and fall. Don't forget to give your recommendation letter writers at least a month to work on your letters. |                              |              | Celebrate your accomplishment at May Graduation with your fellow Jayhawks!! Did you do a Quantitative Methods in Psychology minor or some other minor? This is a good time to polish off those courses. |                              |              |

**\* The general requirements are listed below but can be tailored to individual interests via consultation with a BS program chair**

**Non-psychology—General Education Courses.** A total of 84 hours with classes in these four areas and additional electives

**Humanities**—minimum of 24 hours

English: ENGL 101 & 102 (6 hrs.) & ENGL 203, 205, 209, 210, or 211 (3 hrs.)

Argument and Reason: COMS 130 or PHIL 148 or JOUR 150 or THR130 (3 hrs.)

Western Civilization: WC 204-205 (6 hrs.)

Humanities: Two electives in humanities (6 hrs.)

**Natural Sciences—5 courses** (minimum 14 hours); two of the following 2-class sequences, **AND an extension of one** or an approved alternative (*i.e., if you take the 2 BIOL & 2 CHEM classes, you must take ONE additional BIOL or CHEM class on top of those 4 courses*)

Biology: BIOL 150 & 152 (8 hrs.) **RECOMMENDED SEQUENCE**

Chemistry: CHEM 130 & 135 (10 hrs.)

Physics: PHSX 114 & 115 (8 hrs.)

Biological Anthropology: ANTH 104/304 & 340, 341, 350, 442, or 447 (6 hrs.)

**Mathematics—4 courses** (minimum of 12 hours, 6 of which must be calculus or calculus based)

MATH 101, 103, 105, 107 (3 hrs.)

MATH 115/125 & 116/126 (6 hrs.)

plus one additional MATH course

**Computing**—a minimum of 6 hours

EECS 138 **Intro to Computing** (3 hrs.)

The second 3 hours could be a second semester of EECS 138 (focused on a second programming language) or be from an additional approved course that provides an opportunity to gain computing experience (e.g., Computational Neuroscience- special topics EECS). This second course could also be PSYC 480 or PSYC 481 if this Independent Study requires independent, original application of the student's computing skills such as computer simulation of cognitive processes, or experience with computationally complex neuroscience techniques, such as brain imaging and mapping, or physiological data collection and analysis (must be approved).

**Behavioral Neuroscience—Required Psychology Courses-** A total of at least 40 hours with classes in these four areas (28 hrs.), and additional JR/SR-level psychology electives or approved neuroscience related courses (12 hrs.).

**Behavioral Neuroscience Psychology Courses**—6 hours total (\*The remaining 3<sup>rd</sup> course can function as an elective)

PSYC 370/371 **Behavioral Neuroscience** (3 hrs.)

PSYC 375 **Cognitive Neuroscience** (3 hrs.)

PSYC 380/381 **Clinical Neuroscience** (3 hrs.)

**Laboratory Courses**—9 hours total

PSYC 200 **Research Methods in Psychology** (3 hrs.)

PSYC 625 **Methods in Neuroscience and Psychophysiology** (6 hrs.)

**Quantitative Courses**—a minimum of 9 hours

PSYC 210 **Statistics in Psychological Research** (3 hrs.)

PSYC 500 **Intermediate Statistics in Psychological Research** (3 hrs.) PSYC 650 **Statistical Methods in**

**Behavioral and Social Science Research I** (4 hrs.)

PSYC 651 **Statistical Methods in Behavioral and Social Science Research II** (4 hrs.)

PSYC 679 **Applied Nonparametric Statistical Methods** (4 hrs.)

PSYC 687 **Factor Analysis** (4 hrs.)

PSYC 692 **Test Theory** (4 hrs.)

PSYC 693 **Multivariate Analysis** (4 hrs.)

PSYC 694 **Multilevel Modeling** (4 hrs.)

PSYC 695 **Categorical Data Analysis** (4 hrs.)

PSYC 696 **Structural Equation Modeling** (4 hrs.)

**Applied Research Experience**—4 hour minimum

PSYC 449 **Laboratory/Field Work in Human Biology**

PSYC 460 **Psychology Honors**

PSYC 480 **Independent Study**

PSYC 481 **Research Practicum**

**Optional Elective Courses in Psychology or other disciplines**— 12 hour minimum

PSYC 412 **Introduction to Motivation and Emotion** (3 hrs) *or* PSYC 690 **Motivation & Emotion** (3 hrs)

PSYC 318 **Cognitive Psychology** (3 hrs.) *or* PSYC 418 **Introduction to Cognitive Science** (3 hrs.)

PSYC 482 **Sensation and Perception** (3 hrs.)

PSYC 432 **Human Behavioral Genetics** (3 hrs.)

PSYC 656/690 **Social Neuroscience** (3 hrs.)

PSYC 646 **Mental Health & Aging** (3 hrs.)

PSYC 691 **Psychology of Aging** (3 hrs.)

PSYC 535 **Developmental Psychopathology** (3 hrs)

PSYC 555 **Evolutionary Psychology** (3 hrs)

PSYC 605 **Health Psychology** (3 hrs.)

PSYC 630 **Clinical Psychology** (3 hrs.)

PSYC 690 **Pediatric Health & Health Promotion** (3 hrs.) PSYC 678 **Drugs and Behavior** (3 hrs.)

LING 438 **Neurolinguistics** (3 hrs)

PSYC 690 **Creative Cognition** (3 hrs)

SPLH 320 **Introduction to the Neuroscience of Human Communication** (3 hrs.)

BIOL 454 **Brain Diseases & Neurological Disorders** (3 hrs)

PSYC 800 **Foundations of Neuroimaging (with permission from instructor)** (3 hrs.)

PSYC 840 **Women's Health (with permission from instructor)** (3 hrs.)

\* other advanced (400 and above) courses in Psychology or Biology (with a biological or cognitive/neuroscience approach) may be permissible **with permission from the Behavioral Neuroscience Director**