

# TRANSLATIONAL NEUROSCIENCE (PH.D.)

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The primary mission of the Translational Neuroscience Program (TNP) is to foster a new generation of neuroscientists trained in interdisciplinary science that focuses on improving the health and care of individuals affected by psychiatric or neurological disorders, or injuries to the nervous system through an understanding of disease mechanisms. The didactic curriculum encompasses an integrated syllabus of basic science, pre-clinical research, and clinical neurobiology, including cutting-edge neuroimaging technologies. The strength of the program is its interdisciplinary training faculty, which includes leading experts in brain disorders, diseases and injuries, pre-clinical animal research, transgenic and knockout models, substance abuse, neuropharmacological treatments, brain network and computational modeling, and brain development and aging.

The TNP is housed in the Department of Psychiatry & Behavioral Neurosciences (<http://bulletins.wayne.edu/graduate/school-medicine/clinical/psychiatry-behavioral-neurosciences/>), but is comprised of over 40 faculty members from 18 different departments spanning 4 colleges and schools within Wayne State University (WSU). The collaborative and interdisciplinary nature of the TNP program aligns well with the University's mission and strategic plan. Moreover, applications for graduate training in the neurosciences has quadrupled in the past 25 years making neuroscience research one of the most rapidly developing branches of medical research. The TNP program is fully committed in training basic and clinical neuroscientists who will be driving innovations that impact public health.

## Admission Requirements

**Admission** to this program is contingent upon admission to the Graduate School (<http://bulletins.wayne.edu/graduate/general-information/admission/>) and satisfaction of the admission requirements the School of Medicine (<http://bulletins.wayne.edu/graduate/school-medicine/programs/>). Applicants must have an undergraduate degree including several courses in basic sciences such as biology and chemistry. Three letters of recommendation are required from individuals able to judge the applicant's scientific potential. A one-page statement of purpose for applying in the translational neuroscience program, a Curriculum Vitae (CV) that summarizes academic and research experiences, minimum grade point average of 3.0 (on a 4.0 scale), the Graduate Record Examination (GRE), and an interview with a Graduate Officer or designated representative from the Steering Committee are required. Writing samples including conference abstracts and presentations, or publications, are optional. Foreign students must be proficient in English as determined by satisfactory performance on the standardized TOEFL English proficiency examination. An interview with potential graduate faculty mentor(s) is also desirable.

## Program Requirements

Students in the doctoral program are required to complete a minimum of ninety credits beyond the baccalaureate degree. Required courses include the following:

Code	Title	Credits
<b>Required Courses</b>		
ANA 7130	Neuroanatomy	4

GS 0900	Essential Research Practices: Responsible Conduct of Research	0
IBS 7015	Interdisciplinary Cell and Molecular Biology	6
<b>IBS Courses (Select one of the following):</b>		<b>2</b>
IBS 7030	Functional Genomics and Systems Biology	
IBS 7050	Molecular Neuropsychopharmacology	
IBS 7090	Biomedical Immunology	
IBS 7100	Biomedical Neuropharmacology	
IBS 7130	Systems Neuroscience: Structure and Function of the Nervous System	

<b>Statistics (select one of the following):</b>		<b>3-4</b>
FPH 7015	Biostatistics I	
PSY 7150	Quantitative Methods in Psychology I	
FPH 7020	Biostatistics II	
PSY 7160	Psychometrics and Factor Analysis	

<b>Additional Coursework</b>		
PYC 7010	Molecular Neuropsychopharmacology	3
PYC 7140	Fundamentals of Neuroimaging	3
PYC 7150	Fundamentals of Neuropsychiatric Disorders	3
PYC 7890	Research Seminar (6-8 credits required)	1
PYC 7990	Directed Study (Max. 10)	1-6
PYC 7996	Research Problems (9 credits required)	3
PYC 7998	Clinical Neuroscience Rotation (Max. 9)	3,6
PYC 9990	Pre-Doctoral Candidacy Research (Max. 10)	1-8
PYC 9991	Doctoral Candidate Status I: Dissertation Research and Direction	7.5
PYC 9992	Doctoral Candidate Status II: Dissertation Research and Direction	7.5
PYC 9993	Doctoral Candidate Status III: Dissertation Research and Direction	7.5
PYC 9994	Doctoral Candidate Status IV: Dissertation Research and Direction	7.5
PYC 9995	Candidate Maintenance Status: Doctoral Dissertation Research and Direction	0

<b>Advanced Topic Courses</b>		
12 credits minimum and 24 credits maximum encompassing neuroscience principles and methods, and the applications to nervous system disorders (starts in year 2)		12-24

Students are required to seek advice from a graduate advisor on his/her course selection. All course work must be completed in accordance with the regulations of the Graduate School (<http://bulletins.wayne.edu/graduate/general-information/academic-regulations/>) and the School of Medicine (<http://bulletins.wayne.edu/graduate/school-medicine/programs/>) governing graduate scholarship and degrees.

### PYC 6050 Biology of the Eye Cr. 3

Introduction to biology of eye structure/function, and to causes and clinical treatments of eye-related disorders and diseases. Offered Yearly.  
**Restriction(s):** Enrollment is limited to Undergraduate level students.  
**Fees:** \$25

**Equivalent:** ANA 6050, BIO 6055

### PYC 7010 Molecular Neuropsychopharmacology Cr. 3

First part of a two-semester in-depth study of nerve cells, their organization into functional circuits and their mediation of normal and aberrant behaviors. Offered Winter.

**Restriction(s):** Enrollment is limited to Graduate level students.

**PYC 7140 Fundamentals of Neuroimaging Cr. 3**

Overview of methods: PET, EEG/ERP/TMS, fundamentals of MR, structural MRI, functional MR, MR spectroscopy and DTI. Review of the application of these methods in studying disorders of the nervous system. Offered Winter.

**Restriction(s):** Enrollment is limited to Graduate level students.

**PYC 7150 Fundamentals of Neuropsychiatric Disorders Cr. 3**

Overview of pathophysiology, clinical manifestations, and treatment of major neuropsychiatric disorders. Offered Fall.

**Restriction(s):** Enrollment is limited to Graduate level students; enrollment limited to students in the School of Medicine.

**PYC 7320 MR Imaging of Neurovascular Disease Cr. 3**

Recent advances in MRI technology applied to human brain vascular diseases. Methods include: 3D anatomical imaging, diffusion tensor imaging, functional brain imaging, perfusion imaging, and susceptibility weighted imaging. Offered Every Other Fall.

**Restriction(s):** Enrollment is limited to Graduate level students.

**Equivalent:** BME 7720

**PYC 7500 Advanced Topics in Neuroscience Cr. 1-6**

Topics offered each semester in one-credit modules, relevant to ongoing research in the degree program. Offered Every Term.

**Restriction(s):** Enrollment is limited to Graduate level students.

**Repeatable for 9 Credits**

**PYC 7515 Advanced Topics: Imaging, Neurodevelopment and Psychiatric Disorders Cr. 3**

Advanced introduction to imaging neurodevelopment based on anatomical, biochemical and functional studies; focus on abnormal development of psychiatric disorders. Offered Every Other Winter.

**Restriction(s):** Enrollment is limited to Graduate level students; enrollment limited to students in a Doctor of Philosophy degree.

**PYC 7595 The Gut Microbiome and Translational Neuroscience Cr. 3**

This combined lecture and discussion course will introduce graduate students with interests in translational neurosciences to the emerging field of the gut microbiome. Lectures will cover basics of the gut microbiome to include bacterial taxonomy, samples used to study the gut microbiome, DNA isolation, library construction and quality control and 16S rRNA sequencing on a MiSeq next generation sequencer. Additional lectures will include descriptions of sequence data download and analysis, bioinformatics, multivariate statistics, and graphical display of data. The latest published literature on the gut-brain axis will also be used for purposes of discussion and to give students an appreciation for how the gut microbial community can influence the brain and its function. Particular emphasis will be placed on how a dysbiosis in the gut microbiome can influence psychiatric diseases, substance abuse disorders and other physiological functions attributed entirely to the brain heretofore. Offered Every Other Fall.

**Restriction(s):** Enrollment is limited to Graduate level students.

**PYC 7890 Research Seminar Cr. 1**

Presentations by clinical and basic research staff and by the program's graduate students. Offered Every Term.

**Restriction(s):** Enrollment is limited to Graduate level students.

**Repeatable for 8 Credits**

**PYC 7990 Directed Study Cr. 1-6**

Independent study under the guidance of an advisor, including complete review of a problem area immediately relevant to basic or clinical neuroscience. Offered Every Term.

**Restriction(s):** Enrollment is limited to Graduate level students.

**Repeatable for 10 Credits**

**PYC 7996 Research Problems Cr. 3**

Directed laboratory rotation for graduate students in the translational neuroscience program. Offered Every Term.

**Restriction(s):** Enrollment is limited to Graduate level students.

**Repeatable for 9 Credits**

**PYC 7998 Clinical Neuroscience Rotation Cr. 3,6**

Neuroscience trainees become familiar with clinical issues in their chosen area of study; transfer of basic science knowledge to clinical application. Offered Every Term.

**Prerequisites:** PYC 7150 with a minimum grade of C

**Restriction(s):** Enrollment is limited to Graduate level students.

**Repeatable for 6 Credits**

**PYC 9990 Pre-Doctoral Candidacy Research Cr. 1-8**

Research in preparation for doctoral dissertation. Offered Every Term.

**Restriction(s):** Enrollment is limited to Graduate level students.

**Repeatable for 12 Credits**

**PYC 9991 Doctoral Candidate Status I: Dissertation Research and Direction Cr. 7.5**

Offered Every Term.

**Restriction(s):** Enrollment is limited to Graduate level students.

**PYC 9992 Doctoral Candidate Status II: Dissertation Research and Direction Cr. 7.5**

Offered Every Term.

**Prerequisite:** PYC 9991 with a minimum grade of S

**Restriction(s):** Enrollment is limited to Graduate level students.

**PYC 9993 Doctoral Candidate Status III: Dissertation Research and Direction Cr. 7.5**

Offered Every Term.

**Prerequisite:** PYC 9992 with a minimum grade of S

**Restriction(s):** Enrollment is limited to Graduate level students.

**PYC 9994 Doctoral Candidate Status IV: Dissertation Research and Direction Cr. 7.5**

Offered Every Term.

**Prerequisite:** PYC 9993 with a minimum grade of S

**Restriction(s):** Enrollment is limited to Graduate level students.

**PYC 9995 Candidate Maintenance Status: Doctoral Dissertation Research and Direction Cr. 0**

Offered Every Term.

**Restriction(s):** Enrollment is limited to Graduate level students.

**Fees:** \$434.8

**Repeatable for 0 Credits**