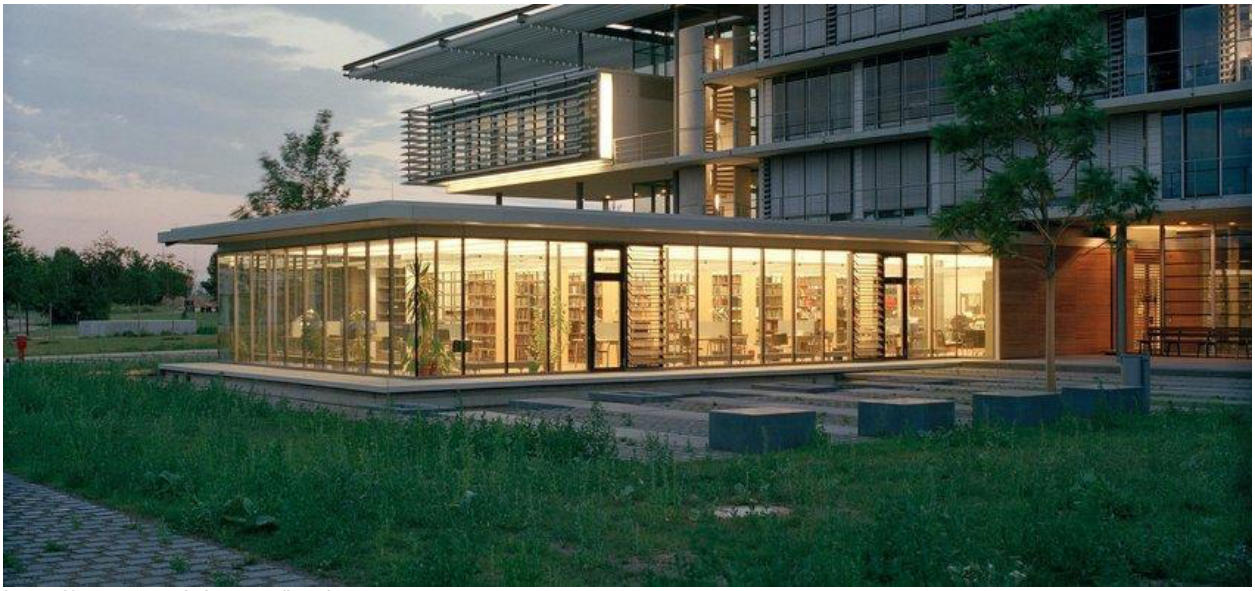
Neuroscience and Technology in Germany

May 23- June 17, 2022



https://www.mpg.de/153254/biophysics

Instructors:
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Credits: This program is worth **6 credits**. Possible course options include:

- **NEUR 473**: Current Neuroscience Research in Germany (3cr, **meets Mason Core Synthesis/Capstone**)
- **NEUR 461**: Cross-Cultural Studies in Scientific Inquiry (3cr)
- **INTS 399:** Study Abroad
- **Additional special topics courses possible (PSYC, BIOL and BENG)**

Program Overview:
This immersive, experiential course integrates biological, technological, and neuroscientific learnings in an international research setting with a focus on neuroscience and technology. In addition, it is an exploration of the cultural and historical aspects of scientific inquiry. We will visit active research settings, interact with professional scientists from many backgrounds, learn about innovative and current research, and be able to inquire about the current topics. We will observe the European scientific infrastructure and organization and compare to that of the North American setting. In addition, we will explore the historical background of innovation from the dawn of the printing press to current. Students will explore the cultural contexts for discovery by comparing the scientific culture between Europe and North America.

Eligibility: BIOL 213 and at least 9 credits of courses from NEUR, BIOL, CHEM, BENG or equivalent are eligible to participate. Students may be asked to participate in a selection interview. Exceptions can be granted by director approval.

Academic skills required: Foremost, you will need to be curious and engaged in our academic adventures. Additionally, because this course fulfills Core: Synthesis requirements, it requires a considerable amount of writing, discussion in small groups, and analysis. There will be reading and reviewing of basic and specialized science concepts. You will be expected to learn from lectures and educate yourself of upcoming research topics enough to interact with the scientists by asking informed questions. You will need to be able to write 1-2 page papers in a few hours of quiet time. This syllabus provides examples of rubrics used to assess learning objectives. Others will be provided via Blackboard before departure and expectations for assignments will be discussed during orientation.

Personal skills required: You need a keen sense of adventure, ability to stay alert to beauty and dangers, a tolerance of tight living quarters, willingness to live in unfamiliar places, flexibility for changing plans and conditions, openness to trying new foods, appreciation of outdoor activities and new flora and fauna, ability to dress appropriately for the weather and social circumstances, ability to participate in walking tours that may involve several miles of walking, and ability to stay engaged with host scientists and other representatives despite a lack of foreign language skills.

Community Participation Required:
We will be traveling together as a group for >3 weeks. Keep the following in mind:

- Attendance is mandatory at all scheduled classes and activities.
- Follow safety guidelines and leaders' instructions. These will include avoiding certain places and always traveling in small groups.
- Show **utmost** respect for lecturers, local guides, and hosts. Engage with them at every opportunity. Thank them for their contributions to your experience and learning.
- Often, you may not understand what is being said. Use non-verbal clues and remain engaged in conversations and interactions despite a lack of language skills.
- Your voice is important to us! Participation in group discussions is expected.
- Your attitude has a powerful effect on the group: Maintain a positive can-do attitude and cooperative behavior.
- Listen carefully and openly to one another, even when you disagree or take offense at what someone is saying. Remember that we are all human beings, worthy of respect, no matter our views, opinions, or perspectives.
- Please feel free to address any concerns with the leaders at all times.
- Get adequate rest at night -- cross-cultural engagement requires more than your typical energy requirements in your home culture.

Learning Objectives

- Explain how the scientific research system differs between Germany and the US
- Communicate and interact with international scientists about their work
- Describe the research and impact of research happening in the laboratories we visit, to include work related to **neurodevelopment, optogenetics, artificial intelligence, glial biology, and more**.
- Develop logical follow up studies based on our laboratory visits
- Explore the historical and cultural impact of scientific discoveries in Germany
- Discuss the cultural differences observed between the German culture and subcultures and those of your own predominant North American culture and the cultures of your families of origin.
- Analyze experiences in light of scientific, historical and cultural readings based on given prompts.

https://www.ancestry.com/history/distelfink-and-eagle-german-weaving-in-america/article_9ebdfee5-7bc6-11e8-8aa3-2f63c7efa9f4.html

Mason Core Synthesis Learning Objectives and Activities

1. **Communicate effectively in both oral and written forms, applying appropriate rhetorical standards (e.g., audience adaptation, language, argument, organization, evidence, etc.).** To accomplish this learning objective, students will practice conversational and formal oral and formal written communication. Students will be assessed on the following items to measure learning in this domain:
    a. Engagement in scientific dialogue with international scientists and students during visits.
    b. Preparation of a formal presentation that proposes a "Next Steps Study" from a research program they encountered during the visits to the laboratories.
    c. Short reports on site visits "Scientific Visit Reports" or Lectures "Lecture Summary" using appropriate scientific terminology and accurately recounting scientific premise and findings of each laboratory. Students will evaluate the scientific merits of the research program and imagine future directions.
2. **Using perspectives from two or more disciplines, connect issues in a given field to wider intellectual, community or societal concerns.** To accomplish this learning goal, students will consider scientific findings and technological advances in light of cultural and historical backgrounds. Students will be assessed on the following items to measure learning in this domain:

   a. Group discussions on site visits "Historical/Cultural (H/C) Context Discussion" expanding on the context of scientific discovery and technological advances.

3. **Apply critical thinking skills to: Evaluate the quality, credibility and limitations of an argument or a solution using appropriate evidence or resources.** To accomplish this learning goal, students will evaluate scientific findings and technological advances they encounter in will be assessed on the following items to measure learning in this domain:
   a. "Scientific Visit Reports" will be evaluated for analysis of the scientific merits of each research program including alternative hypotheses that were addressed, alternative hypotheses that were not addressed by the studies, and studies that will be necessary to eliminate the unaddressed alternative hypotheses.

https://www.packinmysuitcase.com/category/life-in-munich/german-culture/

Readings

Readings will be available to you through Blackboard before departure. A paper reader/packet will be made available to you during orientation.

Materials

Buy 4 of the 8-page blue books. These are small notebooks that can be purchased at the campus bookstore. Written assignments will be completed in your notebooks. Write the first assignments in one of them. While your leader is reading it, write the second entries in the second one, and so on each assignment. You might want to have a third small notebook to jot down themes and ideas as they occur to you during the day, choosing from them for more extensive writing in your assignments. You might wish to use the extra notebook for your personal journaling and diary-keeping.

Grading and Assessments

Grading will be divided into 2 courses

First Course: NEUR 473: Current Neuroscience Research in Germany (3cr, Mason Core Synthesis/Capstone), or other special topics course

Grading Item	% of total grade
Engagement and Participation	40
5 x Scientific Visit Reports	30
5 x Historical/Cultural Context Discussion	15
Next Steps Study Presentation	15

Second Course: NEUR 461: Cross-Cultural Studies in Scientific Inquiry (3cr), or INTS 399: Study Abroad, or other special topics course

Grading Item	% of total grade
Engagement and Participation	40
6 x Analytical Notebook Entries	20
7 x Literature Cue Sheets	20
Final Integrative Essay	20

Grading Scale:

A	93-100%	B+	88-89.9%	C+	78-79.9%	D 60-69%	F 0-59%
A-	90-92.9%	B	82-87.9%	C	72-77.9%		
		B-	80-81.9	C-	70-71.9%		

Late Work: Assignments are due by our first meeting on the date set in the syllabus. Late work will incur a deduction of 50% of the earned grade, and will only be accepted for 2 days after the due date. If you are late for our meeting that day or miss our meeting, then your work is late. Work that is submitted more than 2 days late will not be graded and you will receive a 0 for the assignment.

Notebook for Written Assignments: All written assignments (with the exception of the Final Integrative Essay) will be handwritten in your blue notebooks (see **Materials**) and due throughout the trip. Notebooks must have your name clearly on the front. Each entry should be clearly labeled with the title of the assignment and the date it was written. You must write legibly! Work that cannot be read will not be graded. Notebooks will be turned in and checked by the instructors on regular intervals. **Digital**

option- If you prefer to write your assignments on an iPad or tablet, you will submit your assignments by the due date in the syllabus to Blackboard. Assignments are due by our first meeting on the syllabus due date. **Even if you plan to use the digital option, you are still expected to have the 4 paper blue books in case connectivity/technical issues require switching to a paper format.**

Engagement and Participation: You will be graded on your engagement and participation in the experience. You will be expected to be present, prepared, and actively participate in all aspects of the program and discussions. Attendance and engagement will be recorded each day, and your final score will be determined by the instructors based on the rubric below.

Rubric for Engagement and Participation

Grade	Criteria
0	Absent.
15-16	Present, not disruptive. Tries to respond when called on but does not offer much. Demonstrates very infrequent involvement in discussion.
16-17	Demonstrates adequate preparation: knows basic material or reading facts, but does not show evidence of trying to interpret or analyze the content Offers straightforward information (e.g., straight from the reading), without elaboration or very infrequently (perhaps once a class). Does not offer to contribute to discussion, but contributes to a moderate degree when called on. Demonstrates sporadic involvement.
18-19	Demonstrates good preparation: knows material facts well, has thought through implications of them. Offers interpretations and analysis of content (more than just facts) to class. Contributes well to discussion in an ongoing way: responds to other students' points, thinks through their own points, questions others in a constructive way, offers and supports suggestions that may be counter to the majority opinion. Demonstrates consistent ongoing involvement.
20	Demonstrates excellent preparation: has analyzed content exceptionally well, relating it to readings and other material (e.g., past course readings, material, discussions, experiences, etc.). Offers analysis, synthesis, and evaluation of concepts, e.g., puts together pieces of the discussion to develop new approaches that take the class further. Contributes in a very significant way to ongoing discussion: keeps analysis focused, responds very thoughtfully to other students' comments, contributes to the cooperative argument-building, suggests alternative ways of approaching material and helps class analyze which approaches are appropriate, etc. Demonstrates ongoing very active involvement.

Scientific Visit Reports: After each visit to a laboratory, you will write a "Scientific Visit Report". Reports will be evaluated for analysis of the scientific merits of each research program.

Historical/Cultural Context Discussion: You will regularly discuss in small groups the cultural differences observed between the German culture and subcultures, the North American culture, and the cultures of your families of origin, according to prompts that will be appropriate to each experience. You will record notes on each discussion, which will be turned into the instructors.

Next Steps Study Presentation: At the end of the program, you will prepare and give a formal presentation that proposes a "Next Steps Study" from a research program you encountered during one of the laboratory visits. Presentations will be delivered to other students and faculty in the program. Details will be provided.

Analytical Notebook: The analytical notebook is a written record of your responses to what you have experienced, heard, and observed during your travel and study. The analytical notebook is by its very nature subjective, but it includes concrete observations and experiences. **It goes beyond data collection to responding to the experiences.** It records and helps to process feelings, emotional responses, intellectual reactions and reasoning. While one should give effort to writing well, the analytical notebook is not a formal research paper with citation of sources and documenting them formally. Yet we encourage you to pick up brochures and flyers that give information about places and events that we visit and to listen attentively to tour guides; you may draw upon these sources, as well as on the reading resources for support of your reflections. Certainly, the analytical notebook is not a diary; entries which begin, "Today we went to/did such and such…" are <u>not</u> appropriate.

For each analytical notebook entry, you will do the following:

1. Complete reading(s) in advance of the activity
2. Participate in the activity/tour, discussion, etc.
3. Write an entry in your analytical notebook by responding to the prompt or activity.

Literature Reading Cue Sheets: Before each laboratory visit, you will need to familiarize yourself with the lab's research field by reading some of their research. These papers will be provided in your reader packet. Some visits may also require you to explore videos that will be posted in Blackboard. We will be discussing this material as a group in advance of each visit during our "Academic Lecture" time. Before each academic lecture, you will need to read the assigned research papers, explore the material in Blackboard, and complete a scientific reading worksheet.

Final Integrative Essay: During the final days in Germany, you will be challenged to reflect on your overall experience. This will happen in several ways. We will discuss

our experiences and reactions together as a group. You will fill out evaluation forms, and you will chat with your fellow group members informally. **Then, for your last assignment, we would like you to select one event/experience/happening that strikes you as particularly "cross-cultural" and deal with it in depth**. It should be an experience that challenged you in some way because you confronted a cultural difference that perhaps exposed you for who you are vis-à-vis your host culture. Your reaction may have been extreme delight or pleasure, or you may have been flustered by it, or even offended. The whole range of emotional reactions is fair game for this assignment. But choose just one!

Use this event to talk about what you have gained cross-culturally from your experience. What have you learned about yourself, your limitations, your ability to step outside your comfort zone, about human nature, about culture and people, about justice, or beauty, or faith, or whatever else is on your heart that is relevant to your cross-cultural experience.

Three to five pages will be necessary for you to say your piece adequately. We will collect your final notebooks, not including this essay, just before departure, so be sure to jot down any notes you will need to construct your final essay before submitting your notebook. Your essay will be submitted through Blackboard. Your notebook can be picked up on campus after we have read them and your final essay and determined your overall grade.

Policies and Resources

Academic Integrity: Mason is an Honor Code university; please see the Office for Academic Integrity for a full description of the code and the honor committee process. The principle of academic integrity is taken very seriously and violations are treated gravely. What does academic integrity mean in this course? Essentially this: when you are responsible for a task, you will perform that task. When you rely on someone else's work in an aspect of the performance of that task, you will give full credit in the proper, accepted form. Another aspect of academic integrity is the free play of ideas. Vigorous discussion and debate are encouraged in this course, with the firm expectation that all aspects of the class will be conducted with civility and respect for differing ideas, perspectives, and traditions. When in doubt (of any kind) please ask for guidance and clarification.

Disability Services: Disability Services at George Mason University is committed to upholding the letter and spirit of the laws that ensure equal treatment of people with disabilities. Under the administration of University Life, Disability Services implements and coordinates reasonable accommodations and disability-related services that afford equal access to university programs and activities. Students can begin the registration process with Disability Services at any time during their enrollment at George Mason University. If you are seeking accommodations, please visit http://ds.gmu.edu/ for detailed information about the Disability Services registration process. Disability Services is located in Student Union Building I (SUB I), Suite 2500. Email:ods@gmu.edu | Phone: (703) 993-2474

Diversity and Inclusion: George Mason University is committed to providing equal opportunity and an educational and work environment free from any discrimination on the basis of race, color, religion, national origin, sex, disability, veteran status, sexual orientation, gender identity, gender expression, age, marital status, pregnancy status or genetic information. George Mason University shall adhere to all applicable state and federal equal opportunity/affirmative action statutes and regulations.
The University is dedicated to ensuring access, fairness and equity for minorities, women, individuals with disabilities, and veterans (as covered by law) in its educational programs, related activities and employment. George Mason University shall thus maintain a continuing affirmative action program to identify and eliminate discriminatory practices in every phase of university operations.
Any employee who becomes aware of sexual harassment or other potentially discriminatory behavior must contact Compliance, Diversity, and Ethics.
Retaliation against an individual who has raised claims of illegal discrimination or has cooperated with an investigation of such claims is prohibited

Title IX: Notice of mandatory reporting of sexual or interpersonal misconduct: As a faculty member, I am designated as a "Non-Confidential Employee," and must report all disclosures of sexual assault, sexual harassment, interpersonal violence, stalking, sexual exploitation, complicity, and retaliation to Mason's Title IX Coordinator per University Policy 1202. If you wish to speak with someone confidentially, please contact one of Mason's confidential resources, such as Student Support and Advocacy Center (SSAC) at 703-380-1434 or Counseling and Psychological Services (CAPS) at 703-993-2380. You may also seek assistance or support measures from Mason's Title IX Coordinator by calling 703-993-8730, or emailing titleix@gmu.edu.

Neuroscience and Technology in Germany Assignment Calendar

Day	**Base Location**	**Activities**	**What should I be working on?** Ongoing readings and assignments	**What is due?** Must be completed by our first meeting time that day
-2 Mon 5/23	Fairfax	Orientation on Fairfax Campus		
-1 Tues 5/24	Fairfax	Orientation on Fairfax Campus	-Analytical notebook: Expectations	
1 Wed 5/25	Travel	Fly to Germany	-Analytical notebook: Expectations	
2 Thr 5/26	Arrival FRA/ Frankfurt	Arrive, check in, get settled, Welcome Dinner together	-Analytical notebook: First Impressions	**Assignments Due**: -Analytical notebook: Expectations
3 Fri 5/27	Frankfurt	Academic Overview	-Analytical notebook: First Impressions -Read How Language Shapes Thought by Lera Boroditsky -Read Weigelt visit material and do Lit Cue sheet	
4 Sat 5/28	Frankfurt	German lessons, cultural orientation, guided tour	-Read How Language Shapes Thought by Lera Boroditsky -Read Weigelt visit material and do Lit Cue sheet -Analytical notebook: Language shapes thought	**Assignments Due**: -Analytical notebook: First Impressions
5 Sun 5/29	Frankfurt	Academic lecture on Developmental Neuroscience,	-Read Nikolic and Nagel visit material and do Lit Cue Sheets	**Assignments Due**:

		check-ins, Optional trip to Schwannheim	-H/C Context discussion	-Analytical notebook: Language Shapes Thought -Lit Cue Sheet on Weigelt readings
6 Mon 5/30	Frankfurt	Day trip to Dortmund Lab visit- Sarah Weigelt- cognitive neuroscientist (developmental)	-Read Nikolic and Nagel visit material and do Lit Cue Sheets -Scientific Visit Report (Weigelt)	**Assignments Due**: -H/C Context discussion notes
7 Tues 5/31	Frankfurt	Academic Lecture on AI and Optogenetics, Scientist visit- Danko Nikolic- AI Startup in Frankfurt	-Read Heidelberg Visit readings -Scientific Visit Report (Weigelt) -Scientific Visit Report (Nikolic)	**Assignments Due**: -Lit Cue Sheets for Nikolic and Nagel
8 Wed 6/1	Frankfurt	Day trip to Heidelberg Choose 2 technical museums (Pharmacy, Prinshorn, Bosch) Tour Heidelberg	-Read Heidelberg Visit material -Analytical notebook: Heidelberg -Read Hildegard von Bingen material	**Assignments Due**: -Scientific Visit Report (Weigelt) -Scientific Visit Report (Nikolic) -Heidelberg reading
9 Thr 6/2	Frankfurt	Day trip to Mainz Gutenberg Museum with workshop and tour of Bingen am Rhein, Museum am Strom	**-**Analytical notebook: Hildegard von Bingen -H/C Context discussion (Mainz)	**Assignments Due**: -Analytical notebook: Heidelberg -Hildegard von Bingen reading
10 Fri 6/3	Frankfurt	Day trip to Wurzburg Tour Wurzburg Lab visit- Georg Nagel- channelrhodopsins and optogenetics Tour Rontgen Memorial (on x-ray discovery)	-Scientific Visit Report (Nagel)	**Assignments Due**: **-**Analytical notebook: Hildegard von Bingen -H/C Context discussion notes (Mainz)

11 Sat 6/4	Frankfurt	Free time	**-**Read Nicke visit material and do Lit Cue sheet -Scientific Visit Report (Nagel)	
12 Sun 6/5	Frankfurt	Free time	**-**Read Nicke visit material and do Lit Cue sheet -Scientific Visit Report (Nagel)	
13 Mon 6/6	Frankfurt/ Munich	Travel to Munich Orientation in Munich	**-**Read Nicke visit material and do Lit Cue sheet	**Assignments Due**: -Scientific Visit Report (Nagel)
14 Tues 6/7	Munich	Walking tour of Munich Academic Lecture, Nicke prep	-H/C Context discussion (Munich)	**Assignments Due:** -Lit Cue Sheet (Nicke)
15 Wed 6/8	Munich	Guided tour of Deutsches Museum	-Analytical notebook: Deutsches Museum	**Assignments Due**: -H/C Context discussion (Munich) notes
16 Thr 6/9	Munich	Day trip to Zugspitze		**Assignments Due**: -Analytical notebook: Deutsches Museum
17 Fri 6/10	Munich	Lab Visit- Annette Nicke	**-**Scientific Visit Report (Nicke) **-**Read Ravensbruck material	
18 Sat 6/11	Munich/ Berlin	Travel to Berlin Orientation in Berlin	**-**Read Ravensbruck material **-**Read Madry, Geiger, Uhlhaas visit material and do Lit Cue Sheets	**Assignments Due**: **-**Scientific Visit Report (Nicke)
19 Sun 6/12	Berlin	Tour of Ravensbruck concentration camp	**-**Read Madry, Geiger, Uhlhaas visit material and do Lit Cue Sheets	**Assignments Due**: -Ravensbruck reading

		Debrief at hotel	-H/C Context discussion (Ravensbruck)	
20 Mon 6/13	Berlin	Tour Berlin Adlershof technology and media park Academic Lecture, Madry, Geiger, Uhlhaas prep		**Assignments Due**: -Madry, Geiger, Uhlhaas Lit Cue sheets -H/C Context discussion (Ravensbruck) notes
21 Tues 6/14	Berlin	Academic Lecture Lab visits at Charite/ Humboldt University: Christian Madry & Joerg Geiger (neurophysiology), Peter Uhlhaas	-Scientific Visit Reports (Madry, Geiger, Uhlhaas)	
22 Wed 6/15	Berlin	Discussion Prepare for final presentations	-H/C Context discussion -Next Steps Presentation	**Assignments Due**: -Scientific Visit Reports (Madry, Geiger, Uhlhaas)
23 Thr 6/16	Berlin	Departure COVID testing Final presentations Final Wrap up and Conclusions		**Assignments Due**: -H/C Context discussion notes -Next Steps Presentation
24 Fri 6/17	Berlin	Depart		
Final Integrative Essay due Friday, June 24				

This calendar may be modified at any time