MARYLAND APPLIED GRADUATE ENGINEERING

Rehabilitation Robotics (ENPM640)
Sections 0101 and RO01

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Teaching Assistant: N/A
Pronouns: He/His
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Term: Season/Year: Fall 2024
Credits: 03
Semester Dates: From August 26, 2024 - December 9, 2024

Course Times: Fridays 1:00 – 3:40 pm
Classroom: JMP2222

Canvas/ELMS: https://umd.instructure.com/courses/1368661

Course Description

This course provides an introduction to a field of robotics dedicated to improving the lives of people with disabilities. The course is designed for graduate students wishing to learn more about the rehabilitation robotics, an emerging and one of the fastest growing fields of robotics. Rehabilitation robotics is the application of robots to improve the quality of life for individuals suffering from neurologic injuries and physical trauma. In contrast with other sub-specialties and/or courses in robotics, this course considers not only engineering design and development, but also the human factors that make some innovative technologies successful and others commercial failures. Engineering innovation by itself – without considering other factors such as evidence-based R&D and product acceptance – may mean that some technologies don't become or remain available or are inefficacious to aid their intended beneficiaries. This course differs from medical robotics in its focus on improving the quality of life through robot-mediated rehabilitation treatments, rather than improving or enhancing applications such as surgical interventions.

Course Objectives: The course provides the students with an introductory exposure and fundamental understanding of rehabilitation robotics. In particular, it provides the ***theoretical knowledge*** of automatic control systems deployed in rehabilitation robots (position control, force control, impedance/admittance control, series dynamics) and insight into selection of appropriate control system strategy(ies) based on the targeted disability condition and the impairments that result from it. In particular, the course will provide both qualitative and quasi-rigorous perspectives on impedance control, the gold standard for human-robot interaction control for many clinically efficacious rehabilitation robots. The course provides information about general considerations underlying different rehabilitation robots taking into account clinical and biomechanical needs of the targeted disabilities. It introduces students to fundamentals of human biomechanics and experimental techniques used in gait analysis to enable understanding of how such knowledge is necessary to evaluate human movement performance, a key aspect of characterizing the efficacy of rehabilitation robots in clinical settings. Through selected state-of-art literature, selected research and commercial grade rehabilitation robots are introduced to provide students with a basic ***knowledge of the field***. The course will take students through a "virtual" design and development process for at least one example rehabilitation robotic platform to illustrate the ***engineering principles*** and ***hardware selection*** for key robot subsystems (sensors, actuators, motors, and controller) and to facilitate an understanding of how design decisions are made to achieve the subsystem and overall robot performance toward alleviating specific disabilities. This will include conceiving possible changes to the hardware design and/or controller to either improve human performance or motivate the next-generation of the device/s. The course will also introduce students to the

methodology for clinical study design, while presenting some seminal clinical studies/trials utilizing rehabilitation robots, highlighting their study rationale, experimental design, and key findings, as well as ***ethical and regulatory*** guidelines in the field of rehabilitation robotics.

At appropriate times during the course, the instructor will bring one or more robots into the classroom for viewing and/or demonstration/s. Finally, one or more expert guest lectures on selected topics such as the biology and epidemiology of neurologic disease (such as stroke) and perspectives/experiences of physical therapists in utilizing rehabilitation robots will uniquely complement the subject matter covered.

Prerequisites

Basic understanding of linear time-invariant control systems (e.g., ENPM667 or equivalent) is highly preferred. No background or previous experience in robotics, biomechanics, and/or neuroscience is required. Students who have previously taken ENME444 "Assistive Robotics" should not enroll in this course.

Learning Outcomes

After successfully completing this course, you will be able to:

- Identify the parts of the human rehabilitation system (the "target").
- Develop understanding of common neurologic injuries such as stroke and their effects on physical function.
- Have a basic understanding of brain neuro-plasticity, motor learning concept, and how rehabilitation robots leverage brain plasticity to restore function (the "mechanism").
- Develop a basic understanding of human biomechanics with an emphasis on walking.
- Understand bio-instrumentation techniques to assess human movement performance, diagnose movement disorders, and evaluate rehabilitation outcomes (the "evaluation").
- Discuss types of rehabilitation robots, their designs, and their applications (the "technology").
- Understand different control systems (position, force, impedance), pros vs. cons, and their suitability for different rehabilitation robotic applications requiring physical human-machine interaction (the "control").
- Use engineering principles to identify and address a specific rehabilitation need (disability), design and develop a virtual rehabilitation robot including its hardware and control system and defend the solution (the "machine").
- Develop skills to interpret clinical findings resulting from application of rehabilitation robots in the lab and clinic and virtually design simple clinical trials (the "clinical study design").

Course Outline

The course content will be delivered sequentially in two parts: first, an understanding of feedback control systems, both position-regulated control (to foster understanding of trajectory-following rehabilitation robots) and interaction control (to foster understanding of impedance-controlled rehabilitation robots), followed by introductory concepts on human biomechanics and rehabilitation; and second, detailed exposure to rehabilitation robotics. As rehabilitation robotics is a very broad sub-specialty by itself, robotics for restoration of lower-limb function will be used as an example model throughout; however, both students will be exposed to upper-extremity (arm) robotics.

- **Control Systems**: frequency domain modeling/analysis, mechanical transfer functions, response of first and second-order systems and performance metrics, error regulation, stability analysis, improving transient response/error regulation through P, PI, and PID controllers, control law partioning, and trajectory-following control of position regulated control systems; fundamental concepts of impedance/admittance control, qualitative examples, compliance mirroring, isolated/contact stability, drawbacks of disturbance rejection/uncertainty modeling approach, interaction port, impedance/admittance, causal analysis, guidelines for appropriate choice for impedance/admittance, coupled system stability analysis, advanced interaction control (simple impedance control, force feedback, natural admittance control, series dynamics).

- **Rehabilitation:** Definition and different perspectives; parts of the human rehabilitation system; types of functional impairments due to neurologic injuries; concept of neuro-plasticity; principles and models underlying motor learning (massed-practice, feedback, goal setting); gait biomechanics; types of walking disorders: and types of bio- instrumentation and techniques (measurement-analysis) of gait and balance functions.

- **Robotics:** Terminology and taxonomy (operating principle, population targeted etc.), interesting and unique challenges of blending and interaction control of robotic (precise system) with frail populations (uncertain system); concept and benefits of under-actuation; different engineering subsystems in rehabilitation robotics (sensors, controllers, actuators); pros and cons of different designs and operating principles in various rehabilitation research and commercial grade robots; different controllers (position, impedance) and their pros and cons; considerations for choice of appropriate control system and robot hardware; solutions for stabilizing interaction during complex tasks such as robot-assisted walking; clinical trial design and findings regarding efficacy of robots commonly deployed in the clinic and research labs; and ethical guidelines for human subjects testing including clinical trials with rehabilitation robotics.

Course Materials

There is no required textbook for this course. Teaching materials include instructor's lecture slides and notes, and reading materials (selected journal and scientific conference proceeding articles). These will be posted on CANVAS at appropriate times (typically, lecture slides are posted on CANVAS after each lecture).

Course Structure

This course includes both on-campus and online sections. To attend synchronously online, log into ELMS-Canvas at the time of the Section 0101 class [Friday 1:00 pm] held in JMP2222 and select "Video Conference" from the left side menu. This will open a Zoom link to the live classroom.

For asynchronous online students, all lectures will be recorded and made available on ELMS-Canvas under "Panopto Recordings/Video Lectures" within 24 hours of the class time. Be sure to review the recorded lecture in a timely manner.

On-campus students come to class prepared to engage with the lecture and materials. Online students, be sure to log into Canvas regularly and participate in discussions and activities. Regardless of the section you are enrolled in, participation is expected.

Please note that F1 students enrolled in the on-campus section are required to attend in person. If you have a conflict on a particular day, please reach out to me in advance to discuss.

Communication Guidelines

Communicating with the Instructor

My goal is to be readily available to you throughout the semester. I can be reached by email at anindo.roy@nextsteprobo.com. Please DO NOT email me with questions that are easily found in the syllabus or on ELMS-Canvas (e.g., When is this assignment due? How much is it worth? etc.), but please DO reach out about personal, academic, and intellectual concerns/questions.

While I will do my best to respond to emails within 24 hours, you will more likely receive email responses from me on Fridays and Mondays from 10am to 1pm EST.

When constructing an email to me please put "ENPM XXXX (Section XXXX): Your Topic" in the subject line. This will draw my attention to your email and enable me to respond to you more quickly.

Additionally, please review These tips for 'How to email a Professor'. By following these guidelines, you will be ensured to receive a timely and courteous response.

Finally, if you need to discuss issues not appropriate for the classroom and/or an email, we can arrange to talk by phone, over Zoom, or in person. Send me an email asking for a meeting and we can set something up.

Announcements

I will send IMPORTANT messages, announcements, and updates through ELMS-Canvas. To ensure you receive this information in a timely fashion, make sure your email and announcement notifications (including changes in assignments and/or due dates) are enabled in ELMS-Canvas (How to change notification settings in CANVAS).

Log into our ELMs-Canvas course site at least once every 24-hour period to check your inbox and the Announcements page.

Names/Pronouns and Self-Identifications

The University of Maryland recognizes the importance of a diverse student body, and we are committed to fostering inclusive and equitable classroom environments. I invite you, if you wish, to tell us how you want to be referred to in this class, both in terms of your name and your pronouns (he/him, she/her, they/them, etc.). Keep in mind that the pronouns someone uses are not necessarily indicative of their gender identity. Visit trans.umd.edu to learn more.

Additionally, it is your choice whether to disclose how you identify in terms of your gender, race, class, sexuality, religion, and dis/ability, among all aspects of your identity (e.g., should it come up in classroom conversation about our experiences and perspectives) and should be self-identified, not presumed or imposed. I will do my best to address and refer to all students accordingly, and I ask you to do the same for all of your fellow Terps.

Communicating with your Peers

With a diversity of perspectives and experience, we may find ourselves in disagreement and/or debate with one another. As such, it is important that we agree to conduct ourselves in a professional manner and that we work together to foster and preserve a virtual classroom environment in which we can respectfully discuss and deliberate controversial questions. I encourage you to confidently exercise your right to free speech—bearing in mind, of course, that you will be expected to craft and defend arguments that support your position. Keep in mind, that free speech has its limit and this course is NOT the space for hate speech, harassment, and derogatory language. I will make every reasonable attempt to create an atmosphere in which each student feels comfortable voicing their argument without fear of being personally attacked, mocked, demeaned, or devalued.

Any behavior (including harassment, sexual harassment, and racially and/or culturally derogatory language) that threatens this atmosphere will not be tolerated. Please alert me immediately if you feel threatened, dismissed, or silenced at any point during our semester together and/or if your engagement in discussion has been in some way hindered by the learning environment.

Netiquette Policy

Netiquette is the social code of online classes. Students share a responsibility for the course's learning environment. Creating a cohesive online learning community requires learners to support and assist each other. To craft an open and interactive online learning environment, communication has to be conducted in a professional and courteous manner at all times, guided by common sense, collegiality and basic rules of etiquette.

Grading

Grade Breakdown

Assignment	Percentage %
Homework 1	**15%**
Homework 2	**15%**
Midterm	**30%**
Final Exam	**40%**
Total	**100%**

Course Assignments

Homework Assignments

- Homework 1 will assess knowledge on the fundamentals of robots and position control systems. Homework 2 will assess knowledge on Impedance control and gait biomechanics. Questions will require analytical solutions to theoretical and design problems as well as basic simulations. The purpose is to reinforce underlying design principles and considerations for choice of controllers for rehabilitation robots. Grading shall be in accordance with standardized rubric.

Midterm Exam

- Midterm exam will assess knowledge on robot fundamentals, position and impedance control, gait biomechanics, passivity, and design of rehabilitation robots. The purpose is to reinforce and unify design principles and considerations for rehabilitation robots. The midterm exam will cover all topics except clinical trial design. Questions will require analytical as well as multiple choice solutions to theoretical and design problems as well as basic simulations. The exam will be take home (1 week submission turnaround). Grading shall be in accordance with standardized rubric.

Final Exam

- The final exam will cover all topics and is take home (1 week submission turnaround). Questions will require analytical solutions to a comprehensive, multi-faceted design problem. Grading shall be in accordance with standardized rubric.

Grading of Assignments

All assignments will be graded according to a predetermined set of criteria (i.e., rubric) which will be communicated to students before the assignment is submitted.

To progress satisfactorily in this class, students need to receive timely feedback. To that end, it is my intention to grade all assignments within **2 weeks** of their due date. If an assignment is taking longer than expected to grade, students will be informed of when they can expect to see their grade.

Grade Computation

All assessment scores will be posted on ELMS/Canvas page. If you would like to review any of your grades (including the exams), or have questions about how something was scored, please email me to schedule a time for us to meet and discuss.

It is expected that you will submit work by the deadline listed in the syllabus and/or on ELMS-Canvas. Late work will be penalized according to the late work policy described in the **Course Policies and Procedures** section below.

Grade Disputes: I am happy to discuss any of your grades with you, and if I have made a mistake, I will immediately correct it. Any formal grade disputes must be submitted in writing and within one week of receiving the grade.

Final letter grades are assigned based on the percentage of total assessment points earned. To be fair to everyone I have to establish clear standards and apply them consistently, so please understand that being close to a cutoff is not the same as making the cut (89.99 ≠ 90.00). It would be unethical to make exceptions for some and not others.

Final Grade Cutoffs									
+	97.00%	+	87.00%	+	77.00%	+	67.00%	+	
A	94.00%	B	84.00%	C	74.00%	D	64.00%	F	<60.0%
-	90.00%	-	80.00%	-	70.00%	-	60.00%	-	

Course Schedule

Week #	Topic
1 **Aug 30**	**Robot fundamentals:** Characteristics, terminology, mechanical taxonomy, forward/inverse kinematics, multiple or no solution scenarios, eliminating pose/actuator/trajectory redundancies, minimum jerk criterion, Jacobian.
2 **Sep 6**	**Position-regulated control systems:** Issues with position control (prelude), the need/benefits of feedback, feedback vs. programmable controller, control law, concept of contact constraints, transient response with/without programmable feedback controller, critical damping.
3 **Sep 13**	**Position-regulated control systems:** (Part I) Frequency domain modeling, performance metrics, steady-state error (SSE), error regulation, effect of constant gain on SSE, stability types & poles, SSE vs. stability tradeoff, improving transient response/SSE through position-regulated control. (Part II) Control law partioning, trajectory-following/direct error control, prelude to interaction control.
4 **Sep 20**	**Fundamentals of Interaction Control:** (Part I) Mechanical impedance/admittance, qualitative underlying principles of impedance control (IC), interactive relationships to deficit severity, key questions in IC, biological inspirations. (Part II) Isolated vs. contact stability with position & force feedback, practical problems associated with contact instability, drawbacks of disturbance rejection & uncertainty modeling approaches, interaction port, formal definitions of impedance/admittance for linear & non-linear systems, IC as a solution to contact instability, port impedance/admittance vs. transfer functions.
5 **Sep 27**	**Analysis of Coupled Systems:** (Part I) Bond graphs, causality, impedance/admittance reduction, choice for impedance/admittance (preference vs. requirement), Nyquist stability. (Part II) Passive systems, stability vs. passivity, coupled system stability analysis, practical tests for passivity, static impedance control.

6 **Oct 4**	**Impedance/Admittance Controllers:** (Part I): Hierarchy of stability types (nominal/coupled/command following), generalized interactive dynamics transfer function, simple impedance control (SIC), pros vs. cons of SIC. (Part II) Force feedback, pros vs. cons of pure force feedback, physical equivalent systems, natural admittance control (NAC), series dynamics.
7 **Oct 11**	**Rehabilitation and Biomechanics:** Perspectives/definitions, assistive vs. therapeutic robots, measurement of human walking, gait analysis, gait cycle/phases/events, spatial/temporal gait, walking disorders in stroke.
8 **Oct 18**	**Lower Extremity Rehabilitation Robotics:** Need for neuro-rehabilitation, end-effector vs. exoskeletal robots, paradigm shifts (brain science/rehabilitation/technology), modularity, back drivability, limitations of conventional gait therapy, "though experiment(s)".
9 **Oct 25**	**Design of Lower Extremity Robot:** Product lifecycle (concept—prototyping—bench trials—preclinical trials—clinical trials), detailed example to illustrate hardware selection & controller design.
10 **Nov 1**	**Ankle Robotics for Lower Limb Rehabilitation:** Clinical needs, concept of under-actuation, the Anklebot as an example motor learning robotic platform (design/component selection/bench validation/estimating position using models/estimating stiction/impedance characterization).
10 **N0v 8**	**Clinical Impact of Ankle Robotics:** (Part I) Videogame-based Anklebot training in chronic and sub-acute stroke. (Part II) Anklebot gait therapy including challenges and solutions for stabilizing interaction during robot- assisted walking; key clinical findings to determine rehabilitation efficacy.
11 **Nov 15**	**Future Directions for Lower Limb Robotics:** Different disease conditions/mobility activities, untethering devices, pediatric applications, TRIZ design principle, MIT-Sky Walker.
12 – 14 **Nov 22** **Dec 6**	**Clinical Study Design & Guidelines** Types of studies in rehabilitation robotics (interventional/observational, parallel group/dose-ranging/cross-over), role of health economics: VA-COOP Trial, study design process (randomization, stratification, blinding), ethical and regulatory guidelines.

Note: This is a tentative schedule, and subject to change as necessary – monitor ELMS-Canvas for current deadlines. In the unlikely event of a prolonged university closing, or an extended absence from the university, adjustments to the course schedule, deadlines, and assignments will be made based on the duration of the closing and the specific dates missed.

Due Dates

Grading Event	Topics(s)	Assigned	Due
Homework 1	Fundamentals of robots, position control systems.	End of Week 3	End of week 4
Homework 2	Impedance control, gait biomechanics.	End of Week 5	End of Week 6
Midterm Exam	Robot fundamentals, position & impedance control, gait biomechanics, LE (ankle) robots.	End of Week 8	End of Week 9
Final Exam	All materials	Finals Week	TBD

Course Policies and Procedures

The University of Maryland's conduct policy indicates that course syllabi should refer to a webpage of course-related policies and procedures. For a complete list of graduate course related policies, visit the Graduate School website. Below are course-specific policies and procedures which explain how these Graduate School policies will be implemented in this class.

Satisfactory Performance

The Graduate School expects students to take full responsibility for their academic work and academic progress. The student, to progress satisfactorily, must meet all the academic requirements of this course. Additionally, each student is expected to attend all lectures (unless excused by the instructor in writing), turn in their homework on time (see Grading Procedures), complete all readings and any preparatory work before each class session, come to class prepared to make substantive contributions to the learning experience, and to proactively communicate with the instructor when challenges or issues arise.

Questions about Assignments

Please ask all questions you may have about an assignment by 2PM the day before the assignment is due. Any questions asked after that time may not be answered in time for you to make changes to your work.

Late Work Policy

Assignments should be completed by the due date and time listed with the assignment, on the syllabus, and/or in the course calendar. If you are unable to complete an assignment by the stated due date, it is your responsibility to contact your instructor to discuss an extension, at least 24 hours BEFORE the assignment is due. Extensions are not guaranteed but may be granted at the instructor's discretion.

Assignments that are submitted between 1 minute and 24 hours late will receive 75% of the credit. Assignments that are more than 24 hours late will receive 0% of the credit. Exceptions will be made in accordance with University policy regarding excused absences.

Religious Observance

It is the student's responsibility to inform the instructor of any intended absences for religious observances in advance. Notice should be provided as soon as possible but no later than the end of the schedule adjustment period.

Academic Integrity

For this course, some of your assignments will be collected via Turnitin on ELMS/Canvas. I have chosen to use this tool because it can help you improve your scholarly writing and help me verify the integrity of student work. For information about Turnitin, how it works, and the feedback reports you may have access to, visit Turnitin Originality Checker for Students

The University's Code of Academic Integrity is designed to ensure that the principles of academic honesty and integrity are upheld. In accordance with this code, the University of Maryland does not tolerate academic dishonesty. Please ensure that you fully understand this code and its implications because all acts of academic dishonesty will be dealt with in accordance with the provisions of this code. All students are expected to adhere to this Code. It is your responsibility to read it and know what it says, so you can start your professional life on the right path. **As future professionals, your commitment to high ethical standards and honesty begins with your time at the University of Maryland.**

It is important to note that course assistance websites, such as CourseHero, or AI generated content are not permitted sources, unless the instructor explicitly gives permission. Material taken or copied from these sites can be deemed unauthorized material and a violation of academic integrity. These sites offer information that might be

inaccurate or biased and most importantly, relying on restricted sources will hamper your learning process, particularly the critical thinking steps necessary for college-level assignments.

Additionally, students may naturally choose to use online forums for course-wide discussions (e.g., Group lists or chats) to discuss concepts in the course. However**, collaboration on graded assignments is strictly prohibited unless otherwise stated**. Examples of prohibited collaboration include asking classmates for answers on quizzes or exams, asking for access codes to clicker polls, etc. Please visit the **Office of Graduate Studies' full list of campus-wide policies** and reach out if you have questions.

Finally, on each exam or assignment you must write out and sign the following pledge: ***"I pledge on my honor that I have not given or received any unauthorized assistance on this exam/assignment."***

If you ever feel pressured to comply with someone else's academic integrity violation, please reach out to me straight away. Also, ***if you are ever unclear*** about acceptable levels of collaboration, ***please ask***!

To help you avoid unintentional violations, ***the following table*** lists levels of collaboration that are acceptable for each graded exercise. Each assignment will contain more specific information regarding acceptable levels of collaboration.

						
Homework Assignments	✔	---	---	---	---	---
Midterm	✔	---	---	---	---	---
Final Exam	✔	---	---	---	---	---

Course Evaluation

Please submit a course evaluation through Student Feedback on Course Experiences in order to help faculty and administrators improve teaching and learning at Maryland. All information submitted to Course Experiences is confidential. Campus will notify you when Student Feedback on Course Experiences is open for you to complete your evaluations at the end of the semester. Please go directly to the **Student Feedback on Course Experiences** to complete your evaluations. By completing all of your evaluations each semester, you will have the privilege of accessing through Testudo the evaluation reports for the thousands of courses for which 70% or more students submitted their evaluations.

Copyright Notice

Tips for Succeeding in this Course

1. **Participate.** I invite you to engage deeply, ask questions, and talk about the course content with your classmates. You can learn a great deal from discussing ideas and perspectives with your peers and professor. Participation can also help you articulate your thoughts and develop critical thinking skills.
2. **Manage your time.** Students are often very busy, and I understand that you have obligations outside of this class. However, students do best when they plan adequate time that is devoted to course work. Block your schedule and set aside plenty of time to complete assignments including extra time to handle any technology related problems.
3. **Login regularly.** I recommend that you log in to ELMS-Canvas several times a week to view announcements, discussion posts and replies to your posts. You may need to log in multiple times a day when group submissions are due.
4. **Do not fall behind.** This class moves at a quick pace and each week builds on the previous content. If you feel you are starting to fall behind, check in with the instructor as soon as possible so we can troubleshoot together. It will be hard to keep up with the course content if you fall behind in the pre-work or post-work.
5. **Use ELMS-Canvas notification settings.** Pro tip! Canvas ELMS-Canvas can ensure you receive timely notifications in your email or via text. Be sure to enable announcements to be sent instantly or daily.
6. **Ask for help if needed.** If you need help with ELMS-Canvas or other technology, IT Support. If you are struggling with a course concept, reach out to me and your classmates for support.

Student Resources and Services

Taking personal responsibility for your learning means acknowledging when your performance does not match your goals and doing something about it. I hope you will come talk to me so that I can help you find the right approach to success in this course, and I encourage you to visit the Counseling Center's Academic Resources to learn more about the wide range of resources available to you. Below are some additional resources and services commonly used by graduate students. For a more comprehensive list, please visit the Graduate School's Campus Resources Page.

Accessibility and Disability Services

The University of Maryland is committed to creating and maintaining a welcoming and inclusive educational, working, and living environment for people of all abilities. The University of Maryland is also committed to the principle that no qualified individual with a disability shall, on the basis of disability, be excluded from participation in or be denied the benefits of the services, programs, or activities of the University, or be subjected to discrimination. The Accessibility & Disability Service (ADS) provides reasonable accommodations to qualified individuals to provide equal access to services, programs and activities. ADS cannot assist retroactively, so it is generally best to request accommodations several weeks before the semester begins or as soon as a disability becomes known. Any student who needs accommodations should contact me as soon as possible so that I have sufficient time to make arrangements.

For assistance in obtaining an accommodation, contact Accessibility and Disability Service at 301-314-7682, or email them at adsfrontdesk@umd.edu. Information about sharing your accommodations with instructors, note taking assistance and more is available from the Counseling Center.

Writing Center

Everyone can use some help sharpening their communication skills (and improving their grade) by visiting The Graduate School's Writing Center and schedule an appointment with them. Additionally, international graduate students may want to take advantage of the Graduate School's free English Editing for International Graduate Students (EEIGS) program.

Health Services
The University offers a variety of physical and mental health services to students. If you are feeling ill or need non-emergency medical attention, please visit the University Health Center.

If you feel it would be helpful to have someone to talk to, visit UMD's Counseling Center or one of the many other mental health resources on campus.

Notice of Mandatory Reporting
Notice of mandatory reporting of sexual assault, sexual harassment, interpersonal violence, and stalking: As a faculty member, I am designated as a "Responsible University Employee," and I must report all disclosures of sexual assault, sexual harassment, interpersonal violence, and stalking to UMD's Title IX Coordinator per University Policy on Sexual Harassment and Other Sexual Misconduct.

If you wish to speak with someone confidentially, please contact one of UMD's confidential resources, such as CARE to Stop Violence (located on the Ground Floor of the Health Center) at 301-741-3442 or the Counseling Center (located at the Shoemaker Building) at 301-314-7651.

You may also seek assistance or supportive measures from UMD's Title IX Coordinator, Angela Nastase, by calling 301-405-1142, or emailing titleIXcoordinator@umd.edu.
To view further information on the above, please visit the Office of Civil Rights and Sexual Misconduct's website at ocrsm.umd.edu.

Basic Needs Security
If you have difficulty affording groceries or accessing sufficient food to eat every day, or lack a safe and stable place to live, please visit UMD's Division of Student Affairs website for information about resources the campus offers you and let me know if I can help in any way.

Veteran Resources
UMD provides some additional supports to our student veterans. You can access those resources at the office of Veteran Student life and the Counseling Center. Veterans and active duty military personnel with special circumstances (e.g., upcoming deployments, drill requirements, disabilities) are welcome and encouraged to communicate these, in advance if possible, to the instructor.