

University of Florida
College of Public Health & Health Professions Syllabus
RSD 6701: Matlab Foundations for Rehabilitation Science
(3 credit hours)

Spring, 2021

Delivery Format: Flipped-classroom model

Video lecture: 1 hour (Online)

Lab session: Thursday 5:10- 7:05 pm (HPNP 1102)

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Office Hours: TBD

Teaching Assistants: N/A

Preferred Course Communications: email

Prerequisites: This course is open to all Ph.D. students in Rehabilitation Science, Biomedical Sciences, and Applied Physiology and Kinesiology. Students shall have a fundamental understanding of linear algebra and matrix operations before taking this course. Two types of students will benefit the most from taking this course: 1) those who have already established their own research project and collected data for analysis, or 2) those who have completed courses of Biomechanics or Biomechanical Data Analysis (e.g., signal processing related). If the student cannot evaluate if this course is appropriate for him/her, please contact the course instructor.

PURPOSE AND OUTCOME

Course Overview

This course introduces Matlab foundations to allow graduate students to code, compute, analyze, and plot research data collected in rehabilitation and human movement sciences. The course is fairly intensive and requires dedicated efforts to accomplish. Each week, students watch a one-hour recorded lecture and practice Matlab codes in the textbook afterward. The lab sessions are dedicated to Q & As. During the sessions, students bring their questions to the class for discussions and answers. Questions shall be relevant to the video lectures, practice codes in the book, lab problems, assignments, and the final project.

Relation to Program Outcomes

This course relates to the following student learning objectives in the RSD program:

1. Learn fundamental programming knowledge to inspect, postprocess, analyze, plot, and save data of rehabilitation and human movement sciences.
2. Develop basic programming and coding skills to inspect, postprocess, analyze, plot, and save data using Matlab.
3. Develop data management skills for research project.
4. Develop problem solving and trouble-shooting skills for programming and coding purposes.

Course Objectives and/or Goals

Following completion of the course, the student will be able to:

1. Inspect, postprocess, analyze, plot, and save a variety of rehabilitation and human movement science data using Matlab.
2. Read and revise existing Matlab codes and scripts.
3. Apply data quality control procedures to data collection and analysis.

Instructional Methods

This course will be a hybrid of didactic lectures and laboratory-based coding and programming sessions dedicated toward different data analysis procedures. **All students shall read directed book chapter(s) and sections each week before attending the lab session.**

Weeks 1-13

Each week, the course instructor gives a one-hour lecture to walk students through the Matlab commands and problems. Students shall watch the lecture video(s) and use an additional 60-120 min to practice Matlab commands and codes in the textbook. During the two-hour lab session, students work with his/her partner on lab problems and assignments to gain experience with Matlab coding and programming. Students can also explore other Matlab functions that may be related to their research projects. The instructor monitors and supervises the lab sessions. The instructor summarizes Q & As and posts the Q & As each week.

Week 14

The final week is dedicated to the final project. The students code independently to inspect, analyze, and save the rehabilitation science data collected from their studies. Students shall upload their Matlab scripts and a word document introducing the data analysis procedures on OneDrive.

DESCRIPTION OF COURSE CONTENT

The lecture series will be covering basic Matlab commands/functions, data type, matrices, calculations, contingencies, plots, and data input/output. The lab sessions will focus on specific rehabilitation and movement science related data importing, inspection, analysis, computation, and saving/exporting.

Topical Outline/Course Schedule

Note: Date(s) are for the lab sessions.

Week	Date(s)	Topics	Due
1	01-14	Introduction & Interacting with Matlab-1 <ul style="list-style-type: none"> • Introduction (Programming basics) • Matlab environment (Learn how to interact with Matlab windows, and Matlab scripts) • Basic Matlab functions Readings: Chs. 1, & 2 (2.1, 2.2) Lab 1: Explore the Matlab environment and help center	01-20 (A) A denotes assignment due; L denotes lab assignment due
2	01-21	Interacting with Matlab-2 & Matrices-1 <ul style="list-style-type: none"> • Writing tiny programs • Allowing or suppressing outputs • Writing, saving, and running larger programs as scripts • Creating matrices • Specifying elements of matrices Readings: Chs. 2 (2.3-2.8) & 3 (3.1) Lab 2: Debug errors in Matrices-1	01-27 (A, L)
3	01-28	Matrices-2 <ul style="list-style-type: none"> • Concatenating and transposing matrices • Size and status of matrices • Empty matrices Readings: Ch. 3 (3.2-3.8) Lab 3: Debug errors in Matrices-2	02-03 (A, L)
4	02-04	Calculations-1 <ul style="list-style-type: none"> • Learn a variety of calculations in Matlab (e.g., adding, subtracting, multiplying, dividing, raising values to a power, rounding) • Ordering calculations Readings: Ch. 4 (4.1-4.3, 4.10) Lab 4: Debug errors in Calculations 1-3 (This lab assignment is for Weeks 4-6; lab assignment due on 02-24)	02-10 (A)
5	02-11	Calculations-2 <ul style="list-style-type: none"> • Generate random numbers/matrices • Performing descriptive statistical calculations with and without missing data Readings: Ch. 4 (4.4-4.6)	02-17 (A)
6	02-18	Calculations-3 <ul style="list-style-type: none"> • Calculate with matrices Readings: Ch. 4 (4.7)	02-24 (A, L)

Week	Date(s)	Topics	Due
7	02-25	Contingencies-1 <ul style="list-style-type: none"> Use the if...else...end construct Readings: Ch. 5 (5.1) Lab 5: Debug errors in Contingencies 1-3 (This lab assignment is for Weeks 7-9; lab assignment due on 03-17)	03-03 (A)
8	03-04	Contingencies-2 <ul style="list-style-type: none"> Use the switch...case...end construct Use the for...end construct Readings: Ch. 5 (5.1-5.3)	03-10 (A)
9	03-11	Contingencies-3 <ul style="list-style-type: none"> Use the while...end construct If-ing instantly Readings: Ch. 5 (5.4-5.8)	03-17 (A, L)
10	03-18	Input-Output <ul style="list-style-type: none"> Learn how to import/load/read and export/write/save data Rehab science data import and export Readings: Ch. 6 (6.1-6.3, 6.12, 6.15)	03-24 (A)
11	03-25	Modules and Functions <ul style="list-style-type: none"> Learn how to create “chunks” of programs/ functions in Matlab to facilitate complex coding/programming Kinetic data analysis-1 Readings: Ch. 8 (8.1-8.3, 8.4, 8.6)	03-31 (A)
12	04-01	Data Plots <ul style="list-style-type: none"> Plots & graphics features Kinematic data analysis Readings: Ch. 9 (9.1-9.7,9.10-9.12)	04-07 (A)
13	04-08	Data Types <ul style="list-style-type: none"> Identify strings, numbers, and logical values Convert across different data types Kinetic data analysis-2 Readings: Ch. 7 (7.1-7.4)	04-14 (A)
14	04-15	Final Project	04-27

Course Materials and Technology

Required:

- Textbook:** Rosenbaum, D. A., Vaughan, J., & Wyble, B. (2014). MATLAB for behavioral scientists. Routledge (ISBN-13: 978-0415535946)
- A personal laptop (PC or Mac) to be able to access the UF Apps.

Students are responsible for accessing Matlab prior to the first class. Training videos, FAQ page and Help Request can be found at <https://info.apps.ufl.edu/>. For

assistance, please contact PPHP IT at 352-273-6200 (or email at support@phpp.ufl.edu).

Optional:

Textbook: Rosenbaum, D. A. (2019). MATLAB Blues. Routledge (ISBN-13: 978-1138480544)

For technical support for this class, please contact the UF Help Desk at:

- Learning-support@ufl.edu
- (352) 392-HELP - select option 2
- <https://iss.at.ufl.edu/help.shtml>

ACADEMIC REQUIREMENTS AND GRADING

Grading

The grade for the course will be calculated based on the following criteria:

1. **Weekly assignment (100 points each week × 13 weeks=1300 points; 60%):** The weekly assignment includes a Matlab Onramp online course series and regular course assignment. Matlab Onramp is a free online course series offered by Matlab Academy (<https://matlabacademy.mathworks.com/>). Students will register this course online using their UF email account. Students will complete the assigned online courses each week to receive points. For the regular assignment, students will solve Matlab problems on the textbook as well as those provided by the instructor. Students will need to upload Matlab scripts on OneDrive on a weekly-basis for grading. The OneDrive link will be created by the instructor and shared with each student.
2. **Lab assignment (100 points each week × 4 weeks=400 points; 20%):** The lab assignment is dedicated to allow students to troubleshoot and debug problematic codes. Practice problems were carefully selected from Rosenbaum, D. A. (2019). MATLAB Blues. Routledge (ISBN-13: 978-1138480544). Students will troubleshoot 3-6 complex Matlab codes/scripts through each assignment.
3. **Final Project (300 points in total; 20%):** Students will upload Matlab scripts and a word document on OneDrive to show how they import, postprocess, analyze, plot, and export data collected through their research project. In the word file, students will 1) specify what type of rehabilitation science data is selected for the final project and what research questions are associated with analyzing the data (60 points); 2) specify which variables need to be calculated/derived from the data that allow the students to address their proposed research questions (60 points); 3) create a Matlab script (or programming flow chart) to import (20 points), manipulate (e.g., filter, detrended and so on) the data (20 points), and compute (20 points) targeted variables; 4) create figures that are associated with each step of the data analysis (60 points); and 5) interpret the dependent variables and final results (60 points). Each step of the data analysis needs to be performed in a logical, accurate, and organized manner to receive the full points. Figures need to demonstrate all necessary steps of the data analysis to allow knowledgeable individuals (i.e., the instructor and other students in the class) to be able to understand the logic of the analysis.

Point system used (i.e., how do course points translate into letter grades).

Example:

Points earned	1860-2000	1800-1859	1740-1799	1660-1739	1600-1659	1540-1559	1460-1539	1400-1459	1340-1399
%	93-100	90-92	87-89	83-86	80-82	77-79	73-76	70-72	67-69
Letter Grade	A	A-	B+	B	B-	C+	C	C-	D+
Points earned	1260-1339	1200-1259	< 1199						
%	63-66	60-62	< 60						
Letter Grade	D	D-	E						

Please be aware that a C- is not an acceptable grade for graduate students. The GPA for graduate students must be 3.0. in all 5000 level courses and above to graduate. A grade of C counts toward a graduate degree only if a sufficient number of credits in courses numbered 5000 or higher have been earned with a B+ or higher.

Letter Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E	WF
Grade Points	4.0	3.67	3.33	3.0	2.67	2.33	2.0	1.67	1.33	1.0	0.67	0.0	0.0
Letter Grade	I	NG	S-U										
Grade Points	0.0	0.0	0.0										

More information on UF grading policy may be found at:
<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#grades>

Exam Policy

This course does not have mid-term and final exams. Students will be graded based on the weekly assignments and final project.

Policy Related to Make up Exams or Other Work

Excused absences will be handled in accordance with UF policy for excused absences. In other cases, make up work is not otherwise permitted unless arrangements have been made with the instructor. Coordination of any make-up work with instructor is encouraged to take place in advance (at least one week ahead of the time) whenever possible. When make up work is approved by the instructor, it must be completed within two weeks of the student's return to class. No further submission will be accepted if the the grace period has passed.

Policy Related to Required Class Attendance

Attendance Policies:

Excused absences will be handled in accordance with UF policy for excused absences.

In other cases, attendance to all exams and class activities is mandatory.

If possible, faculty should be informed of absences prior to the time of the scheduled activity (exam, assignment deadline), unless it is an illness or emergency. (See the “Policy Related to Make up Exams or Other Work” above related to missing assignment and final project.)

Please note all faculty are bound by the UF policy for excused absences.

Excused absences must be consistent with university policies in the Graduate Catalog (<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#attendance>) and require appropriate documentation. Additional information can be found here: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

Assignment policies: Assignment due dates are provided in the course outline in this syllabus. All assignments are **due no later than the beginning of class** on the date assigned unless otherwise instructed. Late assignments will be subject to a 10% reduction in grade for each day late, and will be accepted for up to three days after the deadline, unless prior arrangements have been made with the instructor.

STUDENT EXPECTATIONS, ROLES, AND OPPORTUNITIES FOR INPUT

Expectations Regarding Course Behavior

Professional behavior is exemplified by:

1. Attendance to all classes
2. Not using electronic devices for personal use during class
3. Timeliness
4. Respectful and polite interaction with peers and instructors
5. Active learning as demonstrated by questions and discussion

Communication Guidelines

Laptop / tablet policy

Please bring a laptop or tablet to class with a copy of your assignment loaded on it. Please do not use these devices for personal internet use (e.g. email) during class.

Phones

Professionalism is expected. Please do not use these devices for personal internet use (e.g. email) during class.

Academic Integrity

Students are expected to act in accordance with the University of Florida policy on academic integrity. As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge:

“We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.”

You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either required or implied:

“On my honor, I have neither given nor received unauthorized aid in doing this assignment.”

It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For additional information regarding Academic Integrity, please see Student Conduct and Honor Code or the Graduate Student Website for additional details:

<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>

<http://gradschool.ufl.edu/students/introduction.html>

Please remember cheating, lying, misrepresentation, or plagiarism in any form is unacceptable and inexcusable behavior.

Online Faculty Course Evaluation Process

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

Policy Related to Guests Attending Class

Only registered students are permitted to attend class. However, we recognize that students who are caretakers may face occasional unexpected challenges creating attendance barriers. Therefore, by exception, a department chair or his or her designee (e.g., instructors) may grant a student permission to bring a guest(s) for a total of two class sessions per semester. This is two sessions total across all courses. No further extensions will be granted. Please note that guests are **not** permitted to attend either cadaver or wet labs. Students are responsible for course material regardless of attendance. For additional information, please review the Classroom Guests of Students policy in its entirety. Link to full policy: <http://facstaff.php.ufl.edu/services/resourceguide/getstarted.htm>

SUPPORT SERVICES

Accommodations for Students with Disabilities

If you require classroom accommodation because of a disability, it is strongly recommended you register with the Dean of Students Office <http://www.dso.ufl.edu> within the first week of class or as soon as you believe you might be eligible for accommodations. The Dean of Students Office will provide documentation of accommodations to you, which you must then give to me as the instructor of the course to receive accommodations. Please do this as soon as possible after you receive the letter. Students with disabilities should follow this procedure as early as possible in the semester. The College is committed to providing reasonable accommodations to assist students in their coursework.

Counseling and Student Health

Students sometimes experience stress from academic expectations and/or personal and interpersonal issues that may interfere with their academic performance. If you find yourself facing issues that have the potential to or are already negatively affecting your coursework, you are encouraged to talk with an instructor and/or seek help through University resources available to you.

- The Counseling and Wellness Center 352-392-1575 offers a variety of support services such as psychological assessment and intervention and assistance for math and test anxiety. Visit their web site for more information: <http://www.counseling.ufl.edu>. Online and in person assistance is available.
- You Matter We Care website: <http://www.umatter.ufl.edu/>. If you are feeling overwhelmed or stressed, you can reach out for help through the You Matter We Care website, which is staffed by Dean of Students and Counseling Center personnel.
- The Student Health Care Center at Shands is a satellite clinic of the main Student Health Care Center located on Fletcher Drive on campus. Student Health at Shands offers a variety of clinical services. The clinic is located on the second floor of the Dental Tower in the Health Science Center. For more information, contact the clinic at 392-0627 or check out the web site at: <https://shcc.ufl.edu/>
- Crisis intervention is always available 24/7 from:
Alachua County Crisis Center:
(352) 264-6789
<http://www.alachuacounty.us/DEPTS/CSS/CRISISCENTER/Pages/CrisisCenter.asp>
x

Do not wait until you reach a crisis to come in and talk with us. We have helped many students through stressful situations impacting their academic performance. You are not alone, so do not be afraid to ask for assistance.