Instructor:
Name: Boyi Hu
Email Address: boyihu@ise.ufl.edu
Office Phone Number: 3522947701
Office Hours: By appointment

Teaching Assistants:
Please contact through the Canvas website
- TASLIMI, Bijan b.taslimi@ufl.edu

Course Description
4 credits. Theory and application of vector, matrix and other numerical methods to systems problems. Simultaneous linear equations, characteristic values, quadratic forms, error analysis, use of series, curve fitting, nonlinear equations, discrete methods.

Course Pre-Requisites / Co-Requisites
MAC 2313, MAP 2302 with minimum grades of C.

Course Objectives
• To understand the underlying fundamental ideas behind numerical methods and the concepts behind the techniques presented in the course
• To grasp the analysis of algorithms, computational complexity, and other concepts and modern developments in numerical methods
• To develop facility with the techniques themselves, and to be able to solve small size problems analytically
• To learn how to implement the methods in the MATLAB/Python programming environment

Materials and Supply Fees
N/A

Required Textbooks and Software
- Introduction to Linear Algebra (5th edition)
  Gilbert Strang
  978-0-9802327-7-6

- Numerical Methods and Optimization An Introduction
  Sergiy Butenko; Panos M. Pardalos
  CRC Press, 2014
  978-1-4665777-7-0

The textbook for this course, Introduction To Linear Algebra- 5th Edition and Numerical Methods and Optimization An Introduction, are available as a short-term loan to check out for two hours at a time at the Marston Science Library. Please visit the service desk and ask for the course reserve item for ESI4327C.

Relation to Program Outcomes (ABET):

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics.</td>
<td>High</td>
</tr>
</tbody>
</table>
2. An ability to apply both analysis and synthesis in the engineering design process, resulting in designs that meet desired needs.

3. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

4. An ability to communicate effectively with a range of audiences.

5. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

6. An ability to recognize the ongoing need for additional knowledge and locate, evaluate, integrate, and apply this knowledge appropriately.

7. An ability to function effectively on teams that establish goals, plan tasks, meet deadlines, and analyze risk and uncertainty.

**Course Schedule**

<table>
<thead>
<tr>
<th>Week:</th>
<th>Lecturer:</th>
<th>Homework &amp; Exam</th>
<th>Topics:</th>
</tr>
</thead>
</table>
| 1     | Boyi Hu   | HW 1            | - Introduction  
- Vectors |
|       |           |                 |         |
| 2     | Boyi Hu   | HW 2            | - Matrix Introduction  
- Rules for Matrix Operation |
|       |           |                 |         |
| 3     | Boyi Hu   | HW 3            | - Inverse Matrices  
- Elimination and Factorization  
- Transposes and Permutations |
|       |           |                 |         |
| 4     | Boyi Hu   | HW 4            | - Direct Methods for Linear Systems  
- Iterative Methods for Linear Systems |
|       |           |                 |         |
| 5     | Boyi Hu   | HW 5            | - Numerical Methods for Solving nonlinear equations |
|       |           |                 |         |
| 6     | Boyi Hu   | HW 6 Exam 1     | - Vector spaces  
Subspaces – part 1 |
|       |           |                 |         |
| 7     | Boyi Hu   | HW 7            | - Vector spaces  
Subspaces – part 2 |
<p>| | | | |
|       |           |                 |         |
| 8     | Boyi Hu   | HW 8            | - Determinants |</p>
<table>
<thead>
<tr>
<th>Tuesday, Thursday 8:30-10:25</th>
<th>Boyi Hu</th>
<th>HW 9</th>
<th>Cramer's Rule, Inverses</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Boyi Hu</td>
<td>HW 10</td>
<td>Eigenvalues, Eigenvectors, Power Methods</td>
</tr>
<tr>
<td>10</td>
<td>Boyi Hu</td>
<td>HW 11 Exam 2</td>
<td>Numbers and Errors, Polynomial Interpolation</td>
</tr>
<tr>
<td>11</td>
<td>Boyi Hu</td>
<td>HW 12</td>
<td>Review</td>
</tr>
<tr>
<td>12</td>
<td>Boyi Hu</td>
<td>HW 13</td>
<td>Orthogonality</td>
</tr>
<tr>
<td>13</td>
<td>Boyi Hu</td>
<td>HW 14</td>
<td>Numerical Integration</td>
</tr>
<tr>
<td>14</td>
<td>Boyi Hu</td>
<td>HW 15</td>
<td>Numerical Solution of Differential Equations</td>
</tr>
<tr>
<td>15</td>
<td>Boyi Hu</td>
<td>HW15</td>
<td>Numerical Solution of Differential Equations</td>
</tr>
<tr>
<td>16</td>
<td>Boyi Hu</td>
<td></td>
<td>Review</td>
</tr>
</tbody>
</table>

The course Schedule is offered as a guide. This means that it is subject to change, depending on the pace of the class. The instructor might choose to cover parts of the curriculum more extensively, or give extensions to deadlines. The dates of the exams might be subject to change depending on the progress of the class.

**Attendance Policy**

Attendance is very strongly encouraged - you are responsible for the announcements made in class. Students are expected to know the material covered in the prerequisite courses. When necessary, they are expected to relearn material from these courses on their own.

This is not a course where you can do well on exams solely by blindly applying formulas. In order to get the most out of the course, try to stay ahead. By the weekend, make sure you have at least reviewed the material covered in the lectures and readings of the preceding week. In addition to reading, **working out extra exercises on your own will help in improving your understanding of the material.** With diligent practice, you can prepare yourself to the point where, on exams, instinct takes over and the problems seem straightforward.

**Exam Policy**
You are expected to be present without exception and to plan any travel around these dates accordingly. Medical emergencies are of course excluded if accompanied by a doctor’s note. A note indicating that you were seen at the health center the day of the exam is not sufficient documentation of a medically excused absence from an exam. The note must say that you were medically unable to take the exam. If you fail to take the exam on the assigned day and do not have a valid excuse, there will be no make-up exam and you will be given a zero (0) on the exam. Employment interviews, employer events, weddings, vacations, etc. are not excused absences.

**Evaluation of Grades**
Your performance in the course will be evaluated based on three in-class exams and regular assignments, as follows:  
(a) Homework (~15 HWs, some have coding elements): 30%  
(b) Exam 1: 20%  
(c) Exam 2: 20%  
(d) Exam 3: 30% (Exam 3 will be comprehensive)

Exam Grading Appeals: Every effort will be made to ensure that grading is as objective and fair as possible. If you believe that there is an error in the grading, please submit, in writing, an appeal within one week of your exam being returned. However, please be advised that if you submit such an appeal, the entire exam will be regraded to ensure that all parts are properly graded. As such, your grade on the exam could increase or decrease based on the secondary grading.

<table>
<thead>
<tr>
<th>Percent</th>
<th>Grade</th>
<th>Grade Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>90.0 - 100.0</td>
<td>A</td>
<td>4.00</td>
</tr>
<tr>
<td>87.0 - 89.9</td>
<td>A-</td>
<td>3.67</td>
</tr>
<tr>
<td>84.0 - 86.9</td>
<td>B+</td>
<td>3.33</td>
</tr>
<tr>
<td>81.0 – 83.9</td>
<td>B</td>
<td>3.00</td>
</tr>
<tr>
<td>78.0 - 80.9</td>
<td>B-</td>
<td>2.67</td>
</tr>
<tr>
<td>75.0 - 77.9</td>
<td>C+</td>
<td>2.33</td>
</tr>
<tr>
<td>72.0 – 74.9</td>
<td>C</td>
<td>2.00</td>
</tr>
<tr>
<td>69.0 - 71.9</td>
<td>C-</td>
<td>1.67</td>
</tr>
<tr>
<td>66.0 - 68.9</td>
<td>D+</td>
<td>1.33</td>
</tr>
<tr>
<td>63.0 - 65.9</td>
<td>D</td>
<td>1.00</td>
</tr>
<tr>
<td>60.0 - 62.9</td>
<td>D-</td>
<td>0.67</td>
</tr>
<tr>
<td>0 - 59.9</td>
<td>E</td>
<td>0.00</td>
</tr>
</tbody>
</table>

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

**Students Requiring Accommodations**
Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, https://www.dso.ufl.edu/drc) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

**Course Evaluation**
Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at https://evaluations.ufl.edu/evals. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results/.

**University Honesty Policy**
UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by
the Honor Code. On all work submitted for credit by students 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.” The Honor Code (https://www.dso.ufl.edu/scrr/process/student-conduct-honor-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Software Use
All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy
There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html

Campus Resources:

Health and Wellness

**U Matter, We Care:**
If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.

**Counseling and Wellness Center:** http://www.counseling.ufl.edu/cwc, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

**Sexual Assault Recovery Services (SARS)**
Student Health Care Center, 392-1161.

**University Police Department** at 392-1111 (or 9-1-1 for emergencies), or http://www.police.ufl.edu/

Academic Resources

**E-learning technical support**, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. https://lss.at.ufl.edu/help.shtml.


**Library Support**, http://cms.uflib.ufl.edu/ask. Various ways to receive assistance with respect to using the libraries or finding resources.

**Teaching Center**, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. https://teachingcenter.ufl.edu/.


**Student Complaints Campus**: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

Commitment to a safe and inclusive learning environment
The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination.

It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind please contact your instructor or any of the following:

- Your academic advisor or Graduate Program Coordinator
- Robin Bielling, Director of Human Resources, 352-392-0903, rbielling@eng.ufl.edu
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@ufl.edu

Sexual Discrimination, Harassment, Assault, or Violence
If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the Office of Title IX Compliance, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu