I. Assessment Outcomes from the Course Syllabus

☒ (A) Ability to apply knowledge of mathematics, science and engineering.
☐ (B) Ability to design and conduct experiments as well as analyze and interpret data.
☐ (C) Ability to design a system, component, or process to meet desired needs.
☐ (D) Ability to function on multidisciplinary teams.
☒ (E) Ability to identify, formulate, and solve engineering problems.
☐ (F) An understanding of professional and ethical responsibility.
☒ (G) Ability to communicate effectively in written and oral formats.
☐ (H) A broad education necessary to understand the impact of engineering solutions in global, economic, and societal context.
☐ (I) Recognize the need for, and have the ability to engage in life long learning.
☐ (J) Have a broad education and knowledge of contemporary issues.
☒ (K) Ability to use techniques, skills and modern engineering tools necessary for engineering practices.

II. List of Course Topics from the Course Syllabus

1. Introduction to Matlab (Octave/Scilab)
2. Programming
3. Finite precision, inherent algorithmic errors
4. Root-finding
5. Solving systems of equations
6. Least-squares fitting
7. Numerical integration
III. Course Assessment Summary Table: one row of the table should be devoted to each of the checked outcomes in part I.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Topics</th>
<th>Specific Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) Ability to apply knowledge of mathematics, science and engineering.</td>
<td>4-7</td>
<td>Homework assignments and exams. See, for example, Homework 4; Homework 11, problem 2; Exam 2, problem 6.</td>
</tr>
<tr>
<td>(E) Ability to identify, formulate, and solve engineering problems.</td>
<td>4-7</td>
<td>Homework assignments and exams. See, for example, Homework 9; Homework 10; Homework 12; Final exam, problem 5.</td>
</tr>
<tr>
<td>(K) Ability to use techniques, skills and modern engineering tools necessary for engineering practices.</td>
<td>1-7</td>
<td>Homework assignments and exams. See, for example, any of the Homework assignments listed as measures for Outcomes (A) and (E) above.</td>
</tr>
</tbody>
</table>

IV. Using the table as a guide, for each outcome summarize your evaluation of the students’ achievement of that outcome; cite student performance on the identified measures as evidence to support your conclusions.

(A) An ability to apply knowledge of mathematics, science and engineering:

Homework assignments and in-class examinations are used to assess this criterion. Assessment of student performance is primarily dependent upon examination scores; 65% of the students’ final grade is based on examination scores. Homework scores account for 35% of the students’ final grade. Homework questions are designed to be somewhat more in-depth than exam questions and are designed to require some synthesis of various topics covered in the course.

Exam and homework scores indicate that students performed well relative to outcome A. The overall average of the two midterm exams and the final exam was approximately 76%. The average of all homework scores was approximately 85%, significantly higher than the average exam score.
**E) An ability to identify, formulate, and solve engineering problems**

Homework assignments during the second half of the semester emphasized use of Matlab (SciLab, Octave) to solve somewhat realistic, though simplified, engineering-type problems. In general, the format for these types of problems consisted of providing students with governing equations for some physical system and a problem which could be addressed by using these governing equations. Students were required to cast the governing equations into a form which addressed the problem at hand and use Matlab (SciLab, Octave) to obtain a solution to the problem.

The overall average for the last four homework assignments of the semester was approximately 76%, somewhat lower than the overall homework assignment average. Still, considering the increased level of difficulty of the assignments, one can conclude that the students’ performance relative to this objective is acceptable.

**K) Ability to use techniques, skills and modern engineering tools necessary for engineering practices**

All homework assignments and examination problems were concerned with solution of mathematical and engineering-related problems using contemporary engineering computational software. Matlab was the default software choice for the class, though students were encouraged to use “free-ware” software such as SciLab or Octave if they preferred.

Overall, students performed well relative to this outcome. The overall exam average was 76% and the overall homework average was approximately 85%. It appeared that virtually all students were fairly competent at programming in a Matlab environment by the end of the semester, though many students still struggled with programming under a time constraint during in-class exams. Students also displayed a reasonable level of proficiency in solving engineering-type problems in a Matlab environment by the end of the semester.

**V. Qualitative Assessment of Student Performance: using the arguments above and other data support the claim that students who completed this course with a grade of C or better have achieved each of the intended outcomes of this course.**

Overall, the students did very well on exams and homework assignments. The average score on the midterm exams was approximately 76% and the homework assignment average was approximately 852%. These metrics indicate adequate performance relative to the ABET criteria listed above.
VI. Concerns: state any concerns you may hold about this class – were the students adequately prepared coming into it? Are there topics or outcomes where (some) students were weak after completing the course? Other concerns? Were there any comments on students’ course evaluations that should be addressed in future instances of the course? This section is very important for improving our program: it provides critical input to the curriculum committee for identifying areas requiring attention.

Students were, in general, adequately prepared for the class before entering it. Some students did display poor mathematical skills, but these students appeared to be in the minority.

One problem area was a wide variation in the programming background of the students. Approximately half the class indicated, during an informal poll, that they had “significant” programming experience. About one third of the class indicated that they had absolutely no experience with programming. Students with no programming experience struggled somewhat during the semester; it is recommended that a weekly optional discussion session be conducted in the future to provide these students with a little extra contact time with the instructor.

Teaching assistants staffed the computer lab for about ten hours per week during this semester, in order to help students with program debugging and problem solving. This was popular with the students, but crowd control became an issue on occasion. It is recommended that, if at all possible, the number of hours for which teaching assistants staff the lab be increased, and that the students be allowed to sign up for a time slot during which they can be guaranteed a seat in the lab and access to a teaching assistant.

Signature __________________________________________ Date: ______________________