Syllabus

ECE 3040 — Numerical Methods for Engineers

Descriptions: Developing numerical algorithms to provide solutions to engineering problems. Derivation of numerical algorithms and investigation of their stability, accuracy, efficiency, and scalability. Programming numerical algorithms in Matlab. Topics include Machine Round-off error, truncation error, root finding, solution of systems of linear and nonlinear algebraic equations, Taylor and Chebyshev series and rational function approximation, interpolation, regression, numerical differentiation, numerical integration, numerical solution of ordinary differential equations.

Prerequisites: BE1200 & BE1500 & MAT2030; prereq or coreq: MAT2150

Prerequisites and co-requisites are checked automatically at the time of registration. However, it is ultimately a student's responsibility to make certain that they have the prerequisites and co-requisites for a course. Students must remain registered for a co-requisite course throughout the semester. Advisors will check course prerequisites and co-requisites during the 5th and 6th week of the semester. Any student found to be registered for a course without meeting these requirements, and without an official waiver on file, will be administratively withdrawn from the course.

Schedule:

Check this link for class schedules and registration info for the class. **Class Schedule Link: (http://classschedule.wayne.edu/sections_new.cfm?subj=B%20E&course=2550&campus=NOSELECTION&instr=NOSELECTION)**

Lecture time: Tu & Thu, 10:00-11:15

Academic Calendar :

Please check this website **Link** **(https://wayne.edu/registrar/registration/calendar)** for the appropriate dates like Start date, last day to drop, end date, study dates, final exam dates, etc.

Instructor(s): Dr. Abhilash Pandya, Professor of Electrical and Computer Engineering

Campus Office: Room 3129 ENGR

E-mail Address: **af8262@wayne.edu** **(mailto:af8262@wayne.edu)**

(Professor-In-Charge: Prof. Mohamad Hassoun)

Numbers: +1-313-577-9921 (phone), can also call via Teams

Office Hours: After each class, more hours TBD.

Additional appointments and Q&A by e-mail (Subject heading should contain " **ECE3040**")

Course Learning Objectives:

1. Utilize the computer to solve engineering problems

2. Utilize programming logic, structure and syntax to develop multifunctional algorithms to solve engineering problems

3. Integrate existing numerical methods into these algorithms

4. Implement the designed algorithms using MATLAB

5. Determine errors present in numerical solutions to engineering problems

6. Integrate programming and numerical methods to solve linear and nonlinear engineering problems.

Outcome Coverage:

ABET 1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

Students will learn to apply the learned numerical analysis methods, algorithms, and Matlab programs to solve some important engineering problems. The problems include matrix computation, solutions of linear and nonlinear equations, regression, interpolation, differentiation, integration, approximation, differential equations, optimization, etc.

ABET 2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

Homework assignments and design projects require students to analyze functions and equations, develop models for data fitting, regression, and optimization, design algorithms to solve problems to satisfy specifications.

ABET 6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

Students will apply numerical methods to create models from data, analyze and evaluate errors, perform Matlab programming to solve engineering problems numerically.

ABET 7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Grading:

Homework:: Per unit: on-line homework; All the Exams will be based on problems similar to the given homework.

Projects: Two (or Three) Projects with reports or presentation (40%)

Exams: Midterm, Final (50%)

Attendance/Homework/Quizzes: 10%

Attendance required and counted.

Guidelines for assigning grades:

Name:		Range:
A	100 %	to 94.0%
A-	< 94.0 %	to 90.0%
B+	< 90.0 %	to 87.0%
B	< 87.0 %	to 84.0%
B-	< 84.0 %	to 80.0%
C+	< 80.0 %	to 77.0%
C	< 77.0 %	to 74.0%
C-	< 74.0 %	to 70.0%
D+	< 70.0 %	to 67.0%
D	< 67.0 %	to 64.0%
D-	< 64.0 %	to 61.0%
F	< 61.0 %	

Suggested Textbooks and Software:

Numerical Methods with Applications, Autar Kaw, E. Eric Kalu (on-line version is free).

http://autarkaw.com/books/numericalmethods/index.html (http://autarkaw.com/books/numericalmethods/index.html) .

Please consider donations to the authors.

Matlab: **PhysModMatlab.pdf (https://canvas.wayne.edu/courses/153951/files/10145129/preview)**
http://greenteapress.com/matlab/ (http://greenteapress.com/matlab/)

MATLAB software: http://mathworks.com (http://mathworks.com/) . Purchase a student version or use PCs in the labs. **New License for MATLAB Student R2020b (mathworks.com) (https://www.mathworks.com/store/link/products/student/SV?s_tid=ac_buysuite_sv_bod)** Matlab is also available to students through **https://vlab.eng.wayne.edu/ (https://vlab.eng.wayne.edu/)** Use your WSU your AccessID login and password to gain access to this web site.

Assignments

Check the course website for homework/quiz problems assigned to each unit. Homework solutions will be posted.

All assignments are individual work, unless otherwise stated.

Projects (engineering design experiences) will be assigned during the course of the term.

Always start EARLY on homework assignments and projects.

General Policies

1. Copying of assignments is strictly prohibited and a violation will result in a **course grade F (failing grade)**. However, discussion of lecture materials and assignments is encouraged. Students are encouraged to visit the instructor and the Teaching Assistants during the assigned office hours. Cheating in all tests (quizzes and exams) will also result in a **course grade F**.
2. No make-up quiz or examination will be allowed. Very special circumstances will be considered for make-up examination but the instructor must be notified as early as possible.
3. Homework solutions are available on the course website. No late homework or project will be accepted, unless under unforeseen circumstances. Please submit the assignment through the course website by the due time unless specified. Project reports should be typed and prepared in a professional report format.
4. University Policy: Students should activate their Access ID and either use their Wayne State email or forward it to their regular email account. The WSU account will be the email address used by the University and faculty to communicate with them.
5. Deferred and incomplete grades will only be granted to students with legitimate medical or other unforeseen excuses.
6. Photocopies of the textbooks are illegal and are a violation of the U.S. copyright laws.

Student Conduct:

It is the responsibility of each student to adhere to the principles of academic integrity. Academic integrity means that a student is honest with him/herself, fellow students, instructors, and the University in matters concerning his or her educational endeavors. Thus, a student should not falsely claim the work of another as his/her own, or misrepresent him/herself so that the measures of his/her academic performance do not reflect his/her own work or personal knowledge. In this regard, cheating will not be tolerated. Cheating includes (but is not limited to) any communication (written or oral) during examinations and sharing of work, such as using the same models or computer programs or copying work. All homework and projects must be an individual effort unless specifically noted. **Students who cheat on any assignment or during any examination will be assigned a**

failing grade for the course. Therefore avoid all appearances of improper behavior! Students who witness cheating should report the incident to the instructor as soon as possible. Students are also welcome to discuss any concerns related to cheating with Associate Dean for Academic Affairs.

Reporting Cheating: Cheating hurts our school's reputation and is not fair to students with integrity who are working hard without cheating. You can anonymously report cheating at the following site: **https://forms.wayne.edu/5e7eefd667d0b/ (https://forms.wayne.edu/5e7eefd667d0b/)**

Policy on Classroom Attendance:

All students are expected to attend all lectures, quizzes, and examinations. Although classroom attendance does not mathematically contribute to the final course grade, active class participation is expected of all students and may help to boost up the course grade in those “borderline” cases between failing and passing.

It is recognized that students may be required to miss classes on occasions because of their participation in approved University activities. Examples of such activities include formal participation on University sports teams, debate teams, and performing arts groups. These activities are generally directed by a University official, such as a coach, and usually have a set schedule of events.

Students participating in approved University activities should consult instructors prior to registration, but no later than the end of the second week after the start of classes, to determine the class attendance policy. At this time, the student should provide the instructor with a schedule of planned absences, preferably signed by the University official directing the activity (e.g., Athletic or Program Director or his/her designee), in order to allow the instructor to evaluate and advise the student on the possible impact of the planned absences. In this case, the instructor will consider absences due to participation in approved University activities, as outlined above, to be excused absences, on par with those due to other unavoidable circumstances such as illness and work-related travel.

It is the student's responsibility to learn the course material. When classes are missed, for whatever reason, it is the obligation of the students to obtain copies of the class materials and students are responsible for all materials covered in the lectures. An excused absence does not excuse the student from completing assigned work, including exams.

Policy on Incomplete Grade:

A grade of “I” (incomplete) can only be assigned if all of the following criteria are met:

the student is not currently failing the class and,

there is not a substantial quantity of work yet to be completed,

there is no extra work required of the instructor beyond the normal duties of grading the paper/exam,

there is no need for the student to attend the class in subsequent terms.

The final decision to assign an incomplete grade rests with the instructor. An incomplete grade MUST be made up within one year of the assignment of the grade. Incompletes will revert to a failing grade after one calendar year.

Policy on Examination:

The examination schedule is published in the syllabus. If you have any conflicts with any of the examination dates, please notify the instructor as soon as possible. The following documentation is required for rescheduling of an examination:

- Medical Excuse: A signed letter from a physician from the day of the examination indicating that the student had a valid medical reason for missing school. This letter must be on the physician's letterhead and the name and phone number of the physician must be legible. (Note: For cases of extended medical treatment, the letter can be dated prior to the examination, if the physician's recommendation for leave extends beyond the examination date.)
- Employment Conflict: A signed letter from the student's direct supervisor indicating that an absence from the Detroit-area is required for the student's employment for the dates surrounding the examination.
- Death in the Family or Family Illness: A copy of the death certificate or obituary for the family member who has died. For illness of a family member for whom a student is the primary care-giver, a signed letter from the family member's physician for the day of the examination.
- Transportation Problem: In the event that a student is prevented from arriving on campus due to a transportation delay, the following should be provided:
  - A copy of the police report concerning a traffic accident
  - A copy of the receipt for towing from a towing service
  - A signed letter from the Customs and Immigrations Officials at the Detroit/Windsor border indicating that a student was delayed for questioning

The final determination of the validity of an excuse is the jurisdiction of the faculty member. In all of the above instances, all reasonable attempts must be made to contact the faculty member to notify them of the problem BEFORE the examination. This can be done via email or via phone. If notice is not provided before the examination, no documentation will be accepted.

Exam Scheduled During the Final Exam Week:

Final Examination and is scheduled during the Final Exam Week. Students who have three or more exams scheduled for that day have the right to request relief. Please consult the instructor as soon as possible if that is the case. Consult: **Link (https://wayne.edu/registrar/registration/exam-schedule)** for final dates. The final exam for this class will be Thursday,December 16 (10:15am-12:15am), but, please check with the link above and the instructor.

Educational Accessibility Services:

If you have a documented disability that requires accommodations, you will need to register with the Student Disability Services (SDS) for coordination of your academic accommodations. The SDS Office is located at 1600 David Adamany Undergraduate Library in the Student Academic Success Services Department. The SDS telephone number is 313-577-1851, 313-577-3365 (TDD only), and

(313) 577-4898 (Fax); Email: **studentdisability@wayne.edu (mailto:studentdisability@wayne.edu)** ; Website: **http://studentdisability.wayne.edu (http://studentdisability.wayne.edu/)** . Once you have your accommodations in place, I will be glad to meet with you privately during my office hours to discuss your special needs.

Cheating and Penalty for Cheating: Cheating is defined by the University as “intentionally using or attempting to use, or intentionally providing or attempting to provide, unauthorized materials, information, or assistance in any academic exercise.” This includes any group efforts on assignments or exams unless specifically approved by the professor for that assignment or exam. Evidence of fabrication or plagiarism, as defined by the University in its brochure “Academic Integrity,” will also result in downgrading for the course. Students who cheat on any assignment or during any examination will be assigned a failing grade for the course.

Policy on cheating:

All work submitted for grading must be 100% individual effort (unless otherwise told beforehand by your professor).

The solutions to assignments (bonus problems and mini-projects) might already be out there. Advice: Do not look at them, period!

All work you submit for grading (assignments, lab reports, exams, projects, and bonus problems) must be 100% your own effort. You understand that once you submit your work for grading then you are automatically certifying that the work is 100% yours. Upon grading your work, if cheating is detected (no matter how small) on an Exam then you will FAIL the course. On all other graded work, the first cheating incidence (no matter how small) by a student will earn that student a zero for that piece of work. The second offense is an automatic failure of the course.

And yes, your professor monitors websites such as Chegg.com Freelancer.com, and others. Advice: Do not use such sites to cheat.